Comparative Analysis of Digital Health Transformation: Adoption and Implementation of Electronic Patients' Record (EPR) Systems in the UK and USA

Qazeem Faniran

Independent Researcher

| **Abstract** | **Original Research Article** |

The market-driven healthcare system of the US and the public-funded NHS system in the UK present clear differences in policy design and probable financial sustainability. Nonetheless, there are limited comparative studies to understand how these divergent models influence EPR adoption and implementation. Thus, this study examined the comparative analysis of the adoption and implementation of electronic patients' record systems in the UK and the USA. The study adopts the systematic review approach, adopting the Preferred Items for Systematic Reviews and Meta-Analyses (PRISMA). The final selected literature using the PRISMA tool is thirteen (13) studies, which were selected based on identified inclusion and exclusion criteria. Findings showed that factors determining the adoption of electronic patients' records in the UK include social influence (SI), facilitating conditions, performance expectancy (PE), effort expectancy (EE), perceived privacy and security, institutional pressures and engagement with medical professionals. Meanwhile, the factors determining the adoption of electronic patient records in the United States include institutional forces (normative, mimetic, and coercive pressures), location and types of hospital, and physicians' satisfaction and confidence in electronic patient records. Results showed that the UK prioritizes stakeholder engagement, institutional alignment, and usability improvement in policy intervention for the implementation of EPR, while the US relies on policy-driven implementation. It was concluded that there are several challenges associated with the implementation of electronic patient record. Thus, there is a need for continuous policy refinement and innovation in electronic patient record.

Keywords: Electronic Patient Record, United Kingdom, United State of America, Adoption, Implementation, Physicians.

INTRODUCTION

Health is essential for humans, as it presupposes and drives almost all activities to be carried out or conducted. The advent of Information and Communication Technologies (ICTs) has led to wider discussions and developments on the use of different digital infrastructures/tools to provide healthcare services. Generally, this has made healthcare service delivery seamless and, sometimes, timeless. Electronic record systems are one of the essential ways that ICTs have been adopted and implemented in the healthcare sector. This involves adopting digital tools to keep records of patients. The transformation of healthcare through digital innovation is reshaping patient care and operational efficiency. While this transformation is global, there are discrepancies in the rate of adoption of digital healthcare systems across countries. These discrepancies may be hospital-to-hospital basis, county-to-country basis, and continent-to-continent basis.

In this age, digital health transformation is an emerging and essential requirement for healthcare service delivery. While it is not the only essential requirement to implement digital health transformation, health service managers'

competencies are critical to the success of adopting and implementing such digital innovation. These competencies are in addition to their other core healthcare service provision responsibilities (Brommeyer & Liang, 2022). Rachmad (2022) highlights that the advances in digital technology have brought a lot of benefits to the healthcare sector, which include improved health outcomes, personalized health services, open access to health, and reduced health costs. These advancements have led to the emergence of video services (telemedicine), which is expected to have a major influence on transformation in the healthcare sector.

Meskó et al. (2017) noted that the concept of "digital health" is a disruptive innovation or idea that has become inseparable from best healthcare practices in this age. The authors noted further that both human and cultural factors are critical in the transition from traditional healthcare service provision to digital healthcare services. Alami et al. (2017) viewed digital health transformation as a strategic and visionary idea that requires the development of digital skills to work and collaborate with patients. However, strategies and policies regarding new technologies in healthcare services are not common in healthcare centres. Baltaxe et al. (2019) concluded that the heterogeneity of evidence in the area of digital transformation of healthcare in Europe suggests a need for a clear strategy of implementation. It was further recognized by the authors that the evolution of digital health tools alongside clear policies towards adoption will enhance digital health services with necessary digital tools.

The outbreak of COVID-19 and its attendant restrictions as a result of the lockdown has also entrenched the digital health transformation. Therefore, the adoption and/or implementation of digital health systems may not be a result of perceived usefulness, but the prevailing need to adapt to the reality of restrictions as a result of the pandemic (Adeyemi & Issa, 2020). That aside, there are different ways digital transformation can be adopted and implemented in healthcare facilities. Senbenov et al. (2020) established that digital transformation became highly sought after owing to the COVID-19 pandemic, and they were prevalent in the areas of diagnosis, consultation, and treatment of patients. Dudon et al. (2020) supported that digital tool can be used for diagnosing and managing respiratory conditions. During this period, digital health transformation took a great stride in the areas of teleconsultation, tele-intensive care units (tele-ICU), and electronic medical record systems (Abdolkhani et al., 2022). The focus of this study is, however, the electronic medical record systems.

In the early practice of medical or healthcare services, the paper-based traditional medical record system has been prevalent. However, the advent of digital tools in the provision of healthcare services has enhanced different systems/applications, which include electronic medical record systems. Electronic medical record (EMR) system is a disruptive technology that has revolutionized healthcare service delivery, which helps in clinical workflows and help improve patient care (Janett & Yeracaris, 2020). Honavar (2020) notes that EMR is considered one of the initiatives that demonstrate the transformation of healthcare, which helps to enhance the accuracy of patients' information, support clinical decision-making, and improve accessibility of patients' information for continuity. Al-Sadrah (2020) observes that EMR contains data or information on disease registries, epidemiological studies, drug safety surveillance, and clinical trials.

The prevailing transition from the paper-based system to electronic medical record system is not far-fetched as it is as a result of its numerous benefits. Meirte et al. (2020) identified that the benefits of electronic medical record systems include patients' preference and acceptability of the systems, lower cost of maintenance, faster or similar completion time, higher data quality and retrieval, improved symptom management, and patient-clinician communication. Wali et al. (2020) noted that the benefits of EMR include a standardized format for documentation, easy access, availability. This helps to enhance or improve workflow and communication between healthcare workers and administrators, which would ultimately reduce hospital costs and efficiency. Despite all these benefits, the adoption and implementation of electronic patient records presents different challenges that may vary across countries due to systems, regulation, cultural contexts, and available technological infrastructure.

Al-Kahtani et al. (2022) established that there are disparities in the readiness level of healthcare facilities in the adoption and implementation of digital transformation. While this evidence may be indicative of the disparity in adoption and implementation of EPR, it does not answer the question of the comparative evidence in the UK and the US. While these countries have made significant strides in implementing electronic patients record systems, the comparative analysis of the experiences remains inadequately explored. For instance, in the US, the federal government incentivized the adoption of electronic patients record through the Health Information Technology for Economic and Clinical Health (HITECH) Act (Kim & Lee, 2020). However, implementation has been observed to be uneven with disparities among hospitals based on infrastructure, resources, and size (Lin et al., 2020). Similarly, the UK's National Health Service (NHS) has prioritized digital transformation, but adoption and implementation vary greatly in healthcare facilities. While there are studies on the extent of EPR adoption in both countries, there is little or no study on the comparative factors shaping THE adoption and implementation in the two countries.

Meanwhile, there are challenges in the implementation of EPR systems. Fennelly et al. (2020) noted that the implementation process of EPR is essential for success with factors such as organizational, human, and technological factors influencing its successful implementation in healthcare facilities. It has been established that system interoperability, patient safety, data privacy and security, and resistance to change by healthcare providers as issues regarding the implementation of EPR in the UK and the US (Jimma & Enyew, 2022; Ludwick & Doucette, 2009; Mistry et al., 2022). However, comparative studies addressing how these challenges manifest in different healthcare contexts remain scarce. For instance, while the US's fragmented healthcare system often finds it challenging with cross-provider interoperability (Kansiime et al., 2024), the UK's centralized NHS is bedevilled with both bureaucratic and logistical challenges (Paton, 2022). Meanwhile, having a good understanding of these different challenges is pivotal for setting a paradigm for best healthcare practices that would transcend national boundaries.

Aside from all the identified challenges necessitating the need for this study, there are issues relating to policy and financial implications as they relate to EPR adoption and implementation. While available health policies and funding mechanisms play a significant role in EPR adoption, previous studies (Currie & Finnegan, 2011; Howley et al., 2015; Lim et al., 2018) only explored these aspects in isolation with a focus on either of the countries (UK or US). The market-driven healthcare system of the US and the public-funded NHS system in the UK present clear differences in policy design and probable financial sustainability (Kansiime et al., 2024). Nonetheless, there are limited comparative studies to understand how these divergent models influence EPR adoption and implementation. It is against this backdrop that this study seeks to provide answers to the following questions:

i.   What are the factors that determine the adoption of electronic patient records in the UK and the US?
ii. What are the factors that influence the implementation of electronic patient records in the UK and the US?
iii. What are the policy interventions that influence the adoption of electronic patient records in the UK and the US?
iv. What are the financial implications of adopting electronic patient records in the UK and the US?
v.   What are the challenges associated with the implementation of electronic patient records in the UK and the US?

METHODOLOGY

This study adopts the qualitative systematic review design to comparatively analyse the adoption and implementation of electronic patient record (EPR) systems in the United Kingdom and the United States. More specifically, it focuses on factors that determine or influence the adoption and implementation of EPR. In order to achieve this, Templier and Paré's (2015) framework was adopted, which includes formulating research questions, searching the literature, screening the literature with set inclusion and exclusion criteria, assessing the quality of primary studies, extracting the relevant data from the studies, and analysing the collected data to ascertain themes. This approach is different

from meta-analysis that does not provide comprehensive quality evidence on the data extracted from the literature.

Having established that this study is based on a literature search, the search was conducted using different databases. It was recommended that credible and relevant databases should be considered when conducting a systematic review (Schut et al., 2024). This study searched literature from different credible databases, which include Scopus, Web of Science, Google Scholar, MEDLINE, and CINAHL Plus (see Table 2). This provides efficient access to wide-ranging information resources that address digital health transformation, focusing on the adoption and implementation of electronic patient record (EPR) systems in the United Kingdom and the United States. In the course of searching the literature, some inclusion and exclusion criteria were used to consider articles to be selected for this study. These criteria are presented in Table 1.

Table 1: Inclusion and Exclusion Criteria

Inclusion criteria	Exclusion criteria
Primary research studies	Secondary research studies
Peer-reviewed studies	Non-peer reviewed studies
Studies published from 2015 to the present to ensure recent advancements	Studies published in 2014 or later
Articles focusing on EPR systems adoption in the UK and the US	Articles that do not focus on EPR systems in the UK and the US
Quantitative, qualitative, and mixed-methods studies	Review

Source: Author's self-designed (2025)

Meanwhile, the search was conducted following a structure using relevant and appropriate keywords and search terms. These search terms include "adoption of electronic patients' record (EPR) systems in the US", "adoption of electronic patients' record (EPR) systems in the UK", "implementation of electronic patients' record (EPR) systems in the US", and "implementation of electronic patients' record (EPR) systems in the UK". Also, synonymous words were used to expand the search of the literature. For instance, electronic medical record (EMR) was used in place of electronic patient records (EPR) in order to increase the search return or retrieval. Moreover, the Boolean operators were used to refine the results of the search. The operators that were adopted for this study include the "AND" and "OR". This led to search strings like "adoption AND implementation of electronic patients' records in the US" and "adoption AND implementation of electronic patients' records in the UK". Above all, the search strings were customized for each database to maximize relevant results.

Table 2: Electronic Search Strategy (Extracts for five databases)

S/N	Search terms	Web of Science	Scopus	Google Scholar	MEDLINE	CINAHL
		Number of hits				
S1	"Adoption of EPR" AND "implementation of EPR"	6300	951	5341	682	2974
S2	"Adoption of EPR in the UK" AND "implementation of EPR in the UK"	37000	241,083	1750000	46272	5417
S3	"Adoption of EPR in the US" AND "implementation of EPR in the US"	2400	370	87	315	619
Databases search limits adopted						
Duplicates removed		52	84	63	45	65

Titles and abstracts checked	43	75	46	37	51
Articles < or = 10 years (2015-2025)	17	34	11	12	15
Secondary research	09	19	08	06	08
Peer-reviewed articles/journals	05	12	06	05	04
English language only	NA	N/A	02	N/A	N/A
Final selected	3	4	3	1	2

Source: Author's Literature Search (2025)

Meanwhile, the Preferred Reporting for Systematic Reviews and Meta-Analyses (PRISMA) framework (see Figure 1) was used for structured data collection. This is believed to be the most popular and trustworthy framework for systematic reviews (Helach et al., 2023; Page et al., 2022). Thus, it was considered for this study as the structured collection technique enhances objectivity, credibility, and repeatability. The 27-item PRISMA is divided into four categories, which include identification, screening, eligibility, and inclusion. The identification stage focuses on the literature search, which includes the sources and databases consulted for this study. These databases can be viewed in Table 2. The screening stage concerns the consideration of the title and abstracts of the retrieved literature from the consulted databases. The eligibility stage concerns the process of implementing the inclusion and exclusion criteria that have been outlined to consider the final selected literature. Having duly followed this process, the final selected literature for this study is thirteen (13).
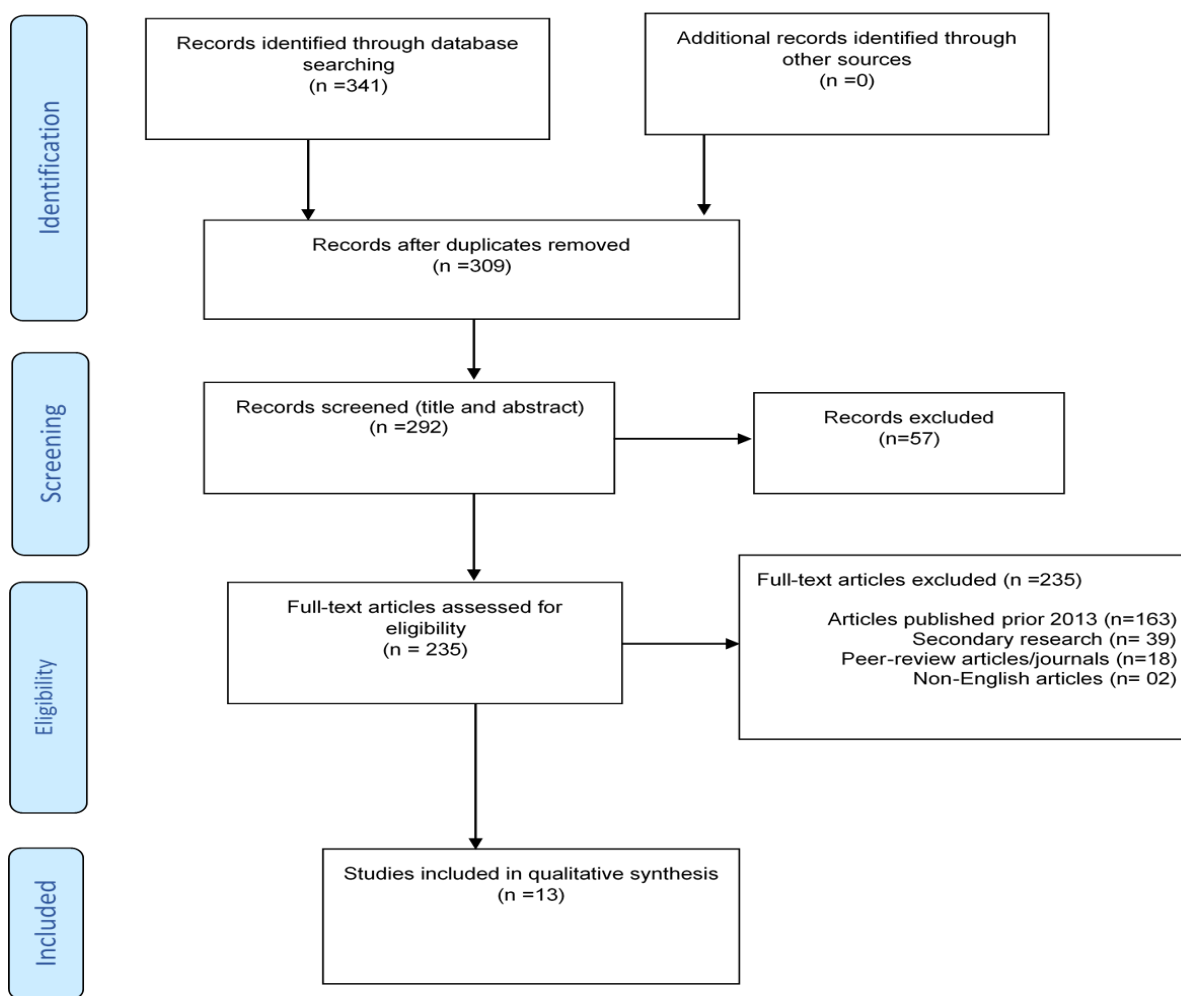

Figure 1: PRISMA diagram flow (Author's self-designed, 2025)

RESULTS AND DISCUSSIONS

The results and discussions are presented under the themes, which emerged based on the specific objectives of the study. This was done as such so as to ascertain specific findings on the objectives set out for this study. Conducting apriori thematic analysis would enable one achieve the specific objectives highlighted, and limit the data collected from the literature to the specific needs of the study. For the objective one, which focused on factors determining the adoption of electronic patient records, it was confirmed that the factors determining the adoption of electronic health records in the United Kingdom include social influence (SI) and facilitating conditions (Abd-Alrazaq et al., 2015; Abd-Alrazaq et al., 2019); performance expectancy (PE), effort expectancy (EE), and perceived privacy and security (Abd-Alrazaq et al., 2019); and institutional pressures and engagement with medical professionals (Klecun et al., 2019). Meanwhile, the factors determining the adoption of electronic patient records in the United States include institutional forces (normative, mimetic, and coercive pressures) (Sherer et al., 2016); location and types of hospital (Henry et al., 2015); and physicians' satisfaction and confidence in electronic patient records (Palabindala et al., 2016).

Meanwhile, there are differences in factors determining the implementation of electronic patient records in healthcare systems between the United Kingdom and the United States. For the United Kingdom, the importance of stakeholder engagement, participatory planning, and addressing organizational, cultural, and technological considerations were established (Cucciniello et al., 2015). Also, Bloom et al. (2020) revealed that the usability challenges persist, with no electronic patient record systems in the UK emergency departments meeting acceptable usability standards. Klecun et al. (2019) suggest that involving IT professionals and medical practitioners reduces resistances and enhances implementation success in the United Kingdom. Meanwhile, in the United States, Harris et al. (2018) showed that electronic patient records-related stress and insufficient documentation time contribute to physician burnout,

negatively affecting implementation. Other factors that affect the implementation of electronic patient records in the United States include the location of the hospital due to financial and logistical constraints (Adler-Milstein et al., 2018; Henry et al., 2015). Also, Lim et al. (2018) demonstrated that despite the adoption of electronic patient records, physicians in the U.S. perceived increased costs and reduced productivity, which pose a challenge to sustained implementation.

On the policy interventions that influence electronic patient record adoption, it was revealed that policies emphasizing healthcare IT support and national standards are critical to electronic patient records adoption (Klecun et al., 2019). Also, it was shown that privacy and security concerns has impact on the perceptions of electronic patient records policies in the United Kingdom (Papoutsi et al., 2015). Moreover, Wilson and Khansa (2018) indicate that healthcare standards must be established before significant progress in electronic patient records implementation can occur. Comparatively, Sherer et al. (2016) note that coercive policies, such as financial incentives and penalties, have driven electronic patient records adoption in the United States. Adler-Milstein et al. (2018) reported that the "Meaningful Use" program has been instrumental in ensuring compliance and interoperability among healthcare providers. Meanwhile, Henry et al. (2015) demonstrated that policy interventions in the United States need to focus on reducing disparities in adoption, especially in hospitals in rural areas.

On the financial implications of adopting electronic patient records, it was revealed that hidden financial costs associated with stakeholder integration and usability is a challenge faced in NHS hospitals (Cucciniello et al., 2015). This is supported by the findings of Klecun et al. (2019), which suggest that financial constraints within the NHS limit the widespread adoption of electronic patient record. Bloom et al. (2020) highlight that suboptimal usability often lead to additional training and implementation costs. Meanwhile, in the United Kingdom, Lim et al. (2018) revealed that ophthalmologists report increased practice costs and

reduced net revenues post-electronic patient record adoption. Two of the final selected studies (Adler-Milstein et al., 2018; Henry et al., 2015) demonstrated that financial barriers remain significant for small and rural hospitals, despite federal support. Palabindala et al. (2016) noted that while electronic patient record investments improve patient care in the long term, they present substantial upfront financial challenges.

On the challenges associated with the implementation of electronic patient records, it was revealed that issues regarding usability in emergency departments impact efficiency and patient care (Bloom et al., 2020). Papoutsi et al. (2015) revealed that privacy concerns, data inaccuracies, and potential commercial exploitation are major challenge associated with the implementation of electronic patient records implementation in the U.K. Wilson and Khansa (2018) demonstrated that differences in healthcare structures in the United Kingdom complicate the implementation of electronic patient records. Meanwhile, in the United States, there are challenges associated with the implementation of electronic patient records. Harris et al. (2018) revealed that the major challenge relating to the implementation of electronic patient record system is physician burnout due to excessive documentation requirements. Adler-Milstein et al. (2018) showed that interoperability and integration issues continue to hinder seamless electronic patient records implementation. Two of the final selected studies (Henry et al., 2015; Palabindala et al., 2016) revealed that small and rural hospitals in the United States are faced technical and financial challenges.

IMPLICATIONS

The findings indicate that there are disparities in the adoption of electronic patient records in the United Kingdom and the United States. This disparity occurs in the rate of adoption, usability issue, financial challenges, and issues regarding implementation. This underscores the need for policy interventions and strategic practices. Also, there is a need to address the issue of financial and regulatory barriers, which can only be done by the policymakers. In the US, federal incentives drive widespread adoption of electronic patient record system, yet small and rural hospitals struggle due to financial constraints. Therefore, additional financial aid or support should be provided for the concern institutions to achieve equitable adoption. Meanwhile, in the UK, financial challenge within NHS makes it difficult to have consistent and/or universal electronic patient records implementation. This means that policies should be made to ensure cost-effective solutions and improved usability standards. All these can facilitate smoother integration of electronic patient records.

Healthcare practices should monitor the usability of electronic patient records system and physician workload. It can be inferred from this study that both countries highlight the burden of documentation and usability concerns, which can lead to burnout. Therefore, providing training programs, AI-driven documentation support, and optimizing user interfaces can enhance the efficiency of electronic patient records usage. Moreover, there is a need to foster interdisciplinary collaboration among IT professionals, medical practitioners, and policy makers to ensure effective and sustainable implementation strategies. There is also a need to ensure that interoperability and standardization issues are addressed. In the US, there has been significant progress made in the interoperability of the electronic patient records through "Meaningful Use" policies, however there is a need to enhance the system further to allow for seamless data exchange across healthcare institutions.

CONCLUSION

This study conducted a comparative analysis of digital health transformation, focusing on the adoption and implementation of electronic patients' record systems in the United Kingdom and the United States. The comparison highlights that there are different approaches to electronic patient records in the UK and the US. While the United Kingdom prioritizes stakeholder engagement, institutional alignment, and usability improvements, the United States relies on policy-driven incentives and financial incentives. This highlights that the policies guiding the implementation of electronic patient

records in the United Kingdom is more of concerted efforts among different stakeholders with appropriate lobbying. Meanwhile, the policy guiding the implementation of electronic patient records in the United States is more of policy makers-design. Despite the recorded progress of electronic patient records in both the UK and the US, there are several challenges hindering its implementation. These challenges include usability of the record systems, physician workload, financial challenge, and interoperability. This accentuates the importance of continuous policy refinement and innovation in electronic patient records deployment strategies.

REFERENCES

Abdolkhani, R., Petersen, S., Walter, R., Zhao, L., Butler-Henderson, K., & Livesay, K. (2022). The impact of digital health transformation driven by COVID-19 on nursing practice: Systematic literature review. *JMIR Nursing*, *5*(1), 1-18.

Abd-Alrazaq, A., Bewick, B. M., Farragher, T., & Gardner, P. (2019). Factors affecting patients' use of electronic personal health records in England: Cross-sectional study. *Journal of Medical Internet Research*, *21*(7), 1-20.

Abd-Alrazaq, A., Alalwan, A. A., McMillan, B., Bewick, B. M., Househ, M., & Al-Zyadat, A. T. (2020). Patients' adoption of electronic personal health records in England: Secondary data analysis. *Journal of Medical Internet Research*, *22*(10), 1-25.

Adeyemi, I. O., & Issa, A. O. (2020). Perceived usefulness and ease of use as predictors of early-year lawyers satisfaction with Law Pavilion Electronic Law Reports. *Buletin Al-Turas*, *26*(2), 239-252.

Al-Kahtani, N., Alrawiai, S., Al-Zahrani, B. M., Abumadini, R. A., Aljaffary, A., Hariri, B., ... & Alumran, A. (2022). Digital health transformation in Saudi Arabia: A cross-sectional analysis using Healthcare Information and Management Systems Society'digital health indicators. *Digital Health*, *8*, 1-20.

Alami, H., Gagnon, M. P., & Fortin, J. P. (2017). Digital health and the challenge of health systems transformation. *Mhealth*, *3*, 1-5.

Adler-Milstein, J., DesRoches, C. M., Kralovec, P., Foster, G., Worzala, C., Charles, D., ... & Jha, A. K. (2015). Electronic health record adoption in US hospitals: progress continues, but challenges persist. *Health Affairs*, *34*(12), 2174-2180.

AlSadrah, S. A. (2020). Electronic medical records and health care promotion in Saudi Arabia: An overview. *Saudi Medical Journal*, *41*(6), 583-589.

Alyami, M. A., & Song, Y. T. (2016). Removing barriers in using personal health record systems. In *2016 IEEE/ACIS 15th International Conference on Computer and Information Science (ICIS)* (pp. 1-8). IEEE.

Baltaxe, E., Czypionka, T., Kraus, M., Reiss, M., Askildsen, J. E., Grenkovic, R., ... & Cano, I. (2019). Digital health transformation of integrated care in Europe: Overarching analysis of 17 integrated care programs. *Journal of Medical Internet Research*, *21*(9), 1-14.

Bloom, B. M., Pott, J., Thomas, S., Gaunt, D. R., & Hughes, T. C. (2021). Usability of electronic health record systems in UK EDs. *Emergency Medicine Journal*, *38*(6), 410-415.

Brommeyer, M., & Liang, Z. (2022). A systematic approach in developing management workforce readiness for digital health transformation in healthcare. *International Journal of Environmental Research and Public Health*, *19*(21), 1-14.

Cucciniello, M., Lapsley, I., Nasi, G., & Pagliari, C. (2015). Understanding key factors affecting electronic medical record implementation: a sociotechnical approach. *BMC Health Services Research*, *15*, 1-19.

Currie, W. L., & Finnegan, D. J. (2011). The policy-practice nexus of electronic health records adoption

in the UK NHS: An institutional analysis. *Journal of Enterprise Information Management*, *24*(2), 146-170.

Dundon, A., Cipolla, D., Mitchell, J., & Lyapustina, S. (2020). Reflections on digital health tools for respiratory applications. *Journal of Aerosol Medicine and Pulmonary Drug Delivery*, *33*(3), 127-132.

Fennelly, O., Cunningham, C., Grogan, L., Cronin, H., O'Shea, C., Roche, M., ... & O'Hare, N. (2020). Successfully implementing a national electronic health record: A rapid umbrella review. *International Journal of Medical Informatics*, *144*, 104281.

Harris, D. A., Haskell, J., Cooper, E., Crouse, N., & Gardner, R. (2018). Estimating the association between burnout and electronic health record-related stress among advanced practice registered nurses. *Applied Nursing Research*, *43*, 36-41.

Helach, J., Hoffmann, F., Pieper, D., & Allers, K. (2023). Reporting according to the preferred reporting items for systematic reviews and meta-analyses for abstracts (PRISMA-A) depends on abstract length. *Journal of Clinical Epidemiology*, *154*, 167-177.

Henry, J., Pylypchuk, Y., Searcy, T., & Patel, V. (2016). Adoption of electronic health record systems among US non-federal acute care hospitals: 2008–2015. *ONC Data Brief*, *35*(35), 2008-15.

Honavar, S. G. (2020). Electronic medical records–The good, the bad and the ugly. *Indian Journal of Ophthalmology*, *68*(3), 417-418.

Howley, M. J., Chou, E. Y., Hansen, N., & Dalrymple, P. W. (2015). The long-term financial impact of electronic health record implementation. *Journal of the American Medical Informatics Association*, *22*(2), 443-452.

Janett, R. S., & Yeracaris, P. P. (2020). Electronic medical records in the American health system: Challenges and Lessons Learned. *Ciencia & Saude Coletiva*, *25*, 1293-1304.

Jimma, B. L., & Enyew, D. B. (2022). Barriers to the acceptance of electronic medical records from the perspective of physicians and nurses: A scoping review. *Informatics in Medicine Unlocked*, *31*, 1-19.

Kansiime, E. P., Ondulo, J. M., & Odoyo, C. O. (2024). Navigating the interoperability landscape of electronic medical record systems in developing countries: A narrative literature review. *Journal of Science, Innovation and Creativity*, *3*(2), 18-25.

Kim, H., & Lee, J. (2020). The impact of health IT on hospital productivity after the enactment of HITECH Act. *Applied Economics Letters*, *27*(9), 719-724.

Klecun, E., Zhou, Y., Kankanhalli, A., Wee, Y. H., & Hibberd, R. (2019). The dynamics of institutional pressures and stakeholder behavior in national electronic health record implementations: A tale of two countries. *Journal of Information Technology*, *34*(4), 292-332.

Lim, M. C., Boland, M. V., McCannel, C. A., Saini, A., Chiang, M. F., Epley, K. D., & Lum, F. (2018). Adoption of electronic health records and perceptions of financial and clinical outcomes among ophthalmologists in the United States. *JAMA Ophthalmology*, *136*(2), 164-170.

Lin, H. L., Wu, D. C., Cheng, S. M., Chen, C. J., Wang, M. C., & Cheng, C. A. (2020). Association between electronic medical records and healthcare quality. *Medicine*, *99*(31), 1-21.

Ludwick, D. A., & Doucette, J. (2009). Adopting electronic medical records in primary care: Lessons learned from health information systems implementation experience in seven countries. *International Journal of Medical Informatics*, *78*(1), 22-31.

Meirte, J., Hellemans, N., Anthonissen, M., Denteneer, L., Maertens, K., Moortgat, P., & Van Daele, U. (2020). Benefits and disadvantages of electronic patient-reported outcome measures: systematic review. *JMIR Perioperative Medicine*, *3*(1), 1-15.

Meskó, B., Drobni, Z., Bényei, É., Gergely, B., & Győrffy, Z. (2017). Digital health is a cultural transformation of traditional healthcare. *Mhealth*, *3*, 1-8.

Mistry, P., Maguire, D., Chikwira, L., & Lindsay, T. (2022). Interoperability is more than technology. The King's Fund. https://assets.kingsfund.org.uk/f/256914/x/c48bd5a1a2/interoperability_more_than_technology_2022.pdf

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., & Chou, R. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Systematic Reviews*, *10*(1), 1-11.

Palabindala, V., Pamarthy, A., & Jonnalagadda, N. R. (2016). Adoption of electronic health records and barriers. *Journal of Community Hospital Internal Medicine Perspectives*, *6*(5), 32643-32681.

Papoutsi, C., Reed, J. E., Marston, C., Lewis, R., Majeed, A., & Bell, D. (2015). Patient and public views about the security and privacy of Electronic Health Records (EHRs) in the UK: results from a mixed

methods study. *BMC Medical Informatics and Decision Making*, *15*, 1-15.

Paton, C. (2022). *NHS reform and health politics in the UK: revolution, counter-revolution and Covid crisis*. Springer Nature.

Rachmad, Y. E. (2022). MediVerse: Challenges and development of digital health transformation towards metaverse in medicine. *Journal of Engineering, Electrical and Informatics*, *2*(2), 72-90.

Schut, M., Adeyemi, I., Kumpf, B., Proud, E., Dror, I., Barrett, C. B., ... & Leeuwis, C. (2024). Innovation portfolio management for the public non-profit research and development sector: What can we learn from the private sector? *Innovation and Development*, 1-19.

Senbekov, M., Saliev, T., Bukeyeva, Z., Almabayeva, A., Zhanaliyeva, M., Aitenova, N., ... & Fakhradiyev, I. (2020). The recent progress and applications of digital technologies in healthcare: A review. *International Journal of Telemedicine and Applications*, *2020*(1), 1-18.

Templier, M., & Paré, G. (2015). A framework for guiding and evaluating literature reviews. *Communications of the Association for Information Systems*, *37*(1), 6-16.

Wali, R. M., Alqahtani, R. M., Alharazi, S. K., Bukhari, S. A., & Quqandi, S. M. (2020). Patient satisfaction with the implementation of electronic medical Records in the Western Region, Saudi Arabia, 2018. *BMC Family Practice*, *21*, 1-6.2

Wilson, K., & Khansa, L. (2018). Migrating to electronic health record systems: a comparative study between the United States and the United Kingdom. *Health Policy*, *122*(11), 1232-1239.

S/N	Research titles and authors	Aims	Study location	Sample size (n)	Data collection	Findings
1	Patients' adoption of electronic personal health records in England: Secondary data analysis. Abd-Alrazaq et al. (2015)	The study examined patients' adoption of electronic personal health records in England	England, UK	Four (4) general practices in West Yorkshire	Descriptive survey was adopted while questionnaire was used for data collection.	- This study found that social influence (SI) and facilitating conditions (FCs) are associated with PE directly and behavioural intention (BI) indirectly through performance expectancy (PE)
2	Factors affecting patients' use of electronic personal health records in England: Cross-sectional study. Abd-Alrazaq et al. (2019)	This study investigated the use of electronic personal health records in England.	England, UK	Four (4) general practices in West Yorkshire	Questionnaire was used for data collection in the descriptive survey research.	- Findings showed that facilitating conditions (FC) and behavioural intention (BI) significantly influenced use behaviour. - Results demonstrated that behavioural intention (BI) to use electronic health records by patients was significantly influenced by performance expectancy, effort expectancy, and perceived privacy and security.
3	Migrating to electronic health record systems: a comparative study between the United States and	The study compared practices regarding migration to electronic health records systems.	US and UK	The sample size of two (2)	Delphi study	- Findings suggest that although EHR implementation and adoption are on the rise in the US and the UK alike, both countries are facing considerable hurdles in executing their vision of

	the United Kingdom. Wilson and Khansa (2018)				establishing their respective nationwide EHR systems. - Results suggest that healthcare standards are required before any progress can be made regarding implementation of electronic patients' record.
4	Estimating the association between burnout and electronic health record-related stress among advanced practice registered nurses (ARPNs). Harris et al. (2018)	The study aims to characterize health information technology use and measure associations between electronic health records-related stress and burnout among advanced practice registered nurses.	U.S.	All APRNs licensed in Rhode Island, United States	Descriptive survey	- The findings showed that more than half of the advanced practice registered nurses were faced with daily frustration as a result of the use of electronic health records. - Results demonstrate that less than half of the participants had insufficient amount of time for documentation. - Findings showed that both insufficient amount of time for documentation and electronic health records adding to daily frustration contribute to nurses' burnout.
5	The dynamics of institutional pressures and stakeholder behaviour in national electronic health records implementations: A tale of two countries Klecun et al. (2019)	The study analyzed the national electronic health record programs of Singapore and England, comparing their perspectives on their top-down system implementations.	Singapore and England	Secondary data collected from health facilities in the two countries	Descriptive survey	- Results suggest that the presence of boundary spanners, supporting implementation agency that included IT staff from healthcare organizations, and greater engagement with medical professionals were associated with more positive dynamics of stakeholder interactions (e.g., limited pushback from professionals or the press) during electronic health record implementation in England. - Differences in the healthcare structures and systems, electronic health record project organization, and the combined influences of institutional pressures shed light on the varying implementation paths and outcomes in England.
6	Understanding key factors affecting electronic medical record implementation: A sociotechnical approach Cucciniello et al. (2015)	The study examined the interaction of sociological and technological factors in the implementation of an electronic medical record (EMR) system by a major national hospital.	Central Scotland	A major teaching hospital in Scotland, which includes 25 medical wards and 6000 staff	Mixed methods approach	- The results illustrate the importance of planning innovation and complex information systems with reference to the expressed needs and involvement of different actors, starting from the initial introductory phase. - Findings showed that promoting commitment to the system and adopting a participative approach for electronic medical records. - The paper highlights the organizational, cultural,

					technological, and financial considerations that should be taken into account when planning strategies for the implementation of EMR systems in hospital settings.
7	Patient and public views about the security and privacy of Electronic Health Records (EHRs) in the UK: Results from a mixed methods study Papoutsi et al. (2015)	This study examines patient and public views about the security and privacy of EHRs used for health provision, research and policy in the UK.	West London, U.K.	Survey participants (N=5331) were recruited from primary and secondary care settings in West London (UK). Survey results were discussed 13 focused groups with people living with a range of different health conditions and in 4 mixed focus groups with patients, health professionals and researchers (N=120). Qualitative data were thematically analyzed.	Mixed methods approach.	- In focus group discussions, participants weighed up perceived benefits against potential security and privacy threats from wider sharing of information, as well as discussing other perceived risks: commercial exploitation, lack of accountability, data inaccuracies, prejudice and inequalities in health provision.
8	Usability of electronic health records systems in UK Eds Bloom et al. (2020)	The study examined the usability of electronic health record systems in the UK.	Royal College of Emergency Medicine, U.K.	The study had 1663 responses from a total population of 8794 (19%) representing 192 healthcare organisations (mainly UK NHS) and 25 EHR systems.	Descriptive survey.	- The study showed that no EHR system implemented in UK EDs achieved average or acceptable usability standards. - Usability was associated with the EHR system and, after adjusting for the EHR system, was associated with the healthcare organisation in which the system was implemented.
9	Adoption of electronic health record systems among US non-federal acute care hospitals: 2008-2015 Henry et al. (2015)	The study examined the adoption of electronic health record systems among US non-federal acute care hospitals between 2008 and 2015	The U.S.	US non-federal acute care hospitals	Longitudinal study	- Nearly all reported hospitals (96%) possessed a certified EHR technology in 2015. - Small, rural, and critical access hospitals continue to have significantly lower Basic EHR adoption rates compared to all hospitals. - In 2015, while over 8 in 10 general medicine hospitals adopted a Basic EHR, a little over half of children's hospitals adopted a Basic EHR and only 15% of

						psychiatric hospitals adopted a Basic EHR. - In 2015, 8 out of 10 hospitals (84%) adopted EHRs with advanced levels of functionality above Basic EHRs without Clinician Notes; this refers to the adoption of Comprehensive EHRs (40%) and Basic EHRs with Clinician Notes (44 %).
10	Applying institutional theory to the adoption of electronic health records in the US. Sherer et al. (2016)	The study applied the institutional theory to ascertain the adoption of electronic health records in the US.	The U.S.	National representative survey of physicians in the U.S.	Descriptive survey.	- Findings showed that institutional forces can explain the adoption of electronic health records (EHRs) in ambulatory medical practices in the U.S. - Prior to U.S. government incentives, mimetic forces had a slightly lesser effect on adoption than normative forces. - Coercive forces introduced with the U.S. government incentives/penalties rival normative forces. - Normative forces have continually influenced electronic health records adoption decisions.
11	Adoption of electronic health records and barriers. Palabindala et al. (2016)	This study examined the adoption of electronic health records and barriers in the US healthcare systems.	The U.S.	National representative survey	Questionnaire was used for data collection.	- For those who have invested in EHR, physicians report high levels of satisfaction and confidence in the reliability of their system. There is also consensus that EHR can improve patient care, promote safe practice, and enhance communication between patients and multiple providers, reducing the risk of error. - As EHR implementation continues in hospitals, administrative and physician leadership must actively investigate all of the potential risks for medical error, system failure, and legal responsibility before moving forward.
12	Adoption of electronic health records and perceptions of financial and clinical outcomes among ophthalmologists in the United States. Lim et al. (2018)	The study assessed the adoption rate and perceptions of financial and clinical outcomes of EHRs among ophthalmologists in the United States.	The U.S.	Population-based, cross-sectional study.	A random sample of 2000 ophthalmologists was generated on the basis of mailing address zip codes from the 2015 American Academy of Ophthalmolog	- The adoption rate of EHRs among surveyed ophthalmologists (348 respondents) was 72.1%. The responding ophthalmologists perceived that their net revenues and productivity have declined and that practice costs are higher with EHR use. Of those who attested for stage 1 of the EHR incentive program, 83% had already or were planning to attest to stage 2, but 9% had no plans.

					y US active membership database, which included more than 18,000 ophthalmologists.	
	Electronic health record adoption in US hospitals: progress continues, but challenges persist. Adler-Milstein et al. (2018)	The study examined the trends in relation to the adoption of electronic health records in the United States.	The U.S.	National representative study.	The study used 2008–14 national data, which includes the most recently available, to examine hospital EHR trends.	- We found large gains in adoption, with 75 percent of US hospitals now having adopted at least a basic EHR system—up from 59 percent in 2013. However, small and rural hospitals continue to lag behind. Among hospitals without a basic EHR system, the function most often not yet adopted (in 61 percent of hospitals) was physician notes. - We also saw large increases in the ability to meet core stage 2 meaningful-use criteria (40.5 percent of hospitals, up from 5.8 percent in 2013); much of this progress resulted from increased ability to meet criteria related to exchange of health information with patients and with other physicians during care transitions. - Our findings suggest that nationwide hospital EHR adoption is in reach but will require attention to small and rural hospitals and strategies to address financial challenges, particularly now that penalties for lack of adoption have begun.