

Effects of Digital Health Records on the Quality of patients' Health and Health Care Organizations

EMMAH V. SENA¹, ZAHOOB ALI SYED², MUNASHE NAPHTALI MUPA³

¹ Georgia State University, Andrew Young School of Policy Studies, Atlanta, Georgia, USA

^{2,3} HULT International Business School, Cambridge, Boston, Massachusetts, USA

Abstract- *In this article, the author seeks to evaluate the effectiveness of EHRs and the advantages and disadvantages of using the system. EHRs have transformed the healthcare system through improving the flow of information, enhancing the coordination of care and increasing the safety of patients. The research design involves use of a systematic review of literature, cross-sectional questionnaire survey of healthcare workers, and case studies on the effectiveness of EHRs in current healthcare systems. The studies explored suggest that EHRs are effective in enhancing patient health and clinical outcomes in regard to chronic disease and preventive health services because they translate into evidence-based practice and help diminish medical errors. However, the effects on clinical outcomes are diverse and sometimes even comparable to EHR and non-EHR practices. In the context of healthcare productivity, EHRs have been found to decrease paperwork and result in cost savings especially in large healthcare systems. However, smaller practices and rural providers could face a challenge in the level of capital that is needed to acquire and maintain EHR systems. Privacy and accessibility concerns arise as key concerns, and healthcare providers report a decrease in satisfaction with the amount of documentation required and the risks of data loss. In conclusion, the article argues that EHRs have the capability to revolutionize healthcare if some key issues concerning the use of EHRs are well addressed such as planning, training and support. Additional studies should be directed at identifying effective models of EHR implementation and techniques for optimizing the benefits of these technologies on the overall provision of healthcare.*

I. INTRODUCTION

The usage of integrated digital health records, also known as Electronic Health Records (EHRs), is a major shift in the healthcare system. In the past, health care providers used charts and other paper based systems to record the patient's history, medication and any other aspects of the patients' health. Nonetheless, the emergence of digital technologies has significantly

changed the ways of storing, retrieving, and applying patient data in healthcare organizations globally.

The use of EHRs has been praised for improving the quality of care, the organisation of work, and the cost of the services offered. Nevertheless, their adoption has also experienced several issues, such as data privacy, user friendliness, and cost implications to healthcare organizations. Evaluating the advantages and disadvantages of EHRs, this paper aims to present a balanced picture of the importance of EHRs for contemporary healthcare.

The purpose of this article is to evaluate the effects of EHRs on patients and the overall effectiveness of healthcare. It is a combination of a literature review, a survey of health care workers, and case studies. Thus, this paper aims at providing the readers with an understanding of the real-world application of EHRs in healthcare organizations and the best practices for EHR implementation.

II. LITERATURE REVIEW

- *The History of Electronic Health Records*
The idea of EHRs has undergone a number of advancements over the recent past, starting with early attempts in the 1960s that aimed at computerizing isolated medical records. EHRs by this time were enhanced with integrated solutions that cover a wide range of healthcare operations ranging from documentation to billing. Studies show that EHRs were first implemented to increase documentation quality and provide better access to information in various care settings (Menachemi & Collum, 2011). Earlier implementations of EHRs, however, were associated with several problems concerning system acceptability and clinician engagement which presented challenges to the widespread implementation of the system.

- *Patient Results and quality of Care*

Another reason that has led to the implementation of EHRs has been the promise of patient care enhancement. Compared to paper records, EHRs allow for more accurate longitudinal monitoring of patient information, improve the utilization of research studies, and decrease the chance of adverse health events (Radojicic, Jeremic & Savic, 2020). Research has found that EHRs can increase preventive care, better management of chronic illnesses, as well as safer patient care. For instance, Cebul et al. (2011) established that the implementation of EHRs helped have higher rates of the recommended care in the management of diabetes as compared to paper-based records.

Furthermore it has been found that EHRs decrease adverse drug events by alerting the providers on possible drug-drug interactions or drug allergies (Campanella et al., 2016). Nevertheless, despite the positive impact EHRs could have on care quality, the literature reveals discrepant results regarding patients' satisfaction and clinical efficacy. Campanella et al. (2016) discussed consequences of EHRs in terms of quality of care and patients' outcomes, pointing out that despite positive outcomes, the influence on clinical results depends on EHR features, implementation approaches, and staff training.

- *Healthcare Efficiency and Cost Savings*

The use of EHRs can also help in increasing the efficiency of the health care system through reducing repetitive testing, performing clerical work, and increasing the accuracy in billing. The benefits derived from EHRs with efficiency are expected to cut down on costs for healthcare providers as well as patients. In a study by Buntin et al. (2011), the authors indicated that EHRs could potentially bring about considerable cost savings by reducing the costs of paperwork and billing errors. Furthermore, Adler-Milstein et al. (2013) noted that although hospitals that have implemented EHRs witnessed only slight changes in healthcare costs and efficiency of operations.

However, the financial advantages of EHRs are not equivalent across all types of healthcare facilities. It is also important to note that small practices and rural healthcare providers may experience difficulties in recovering the costs of EHR systems. The literature

notes that when it comes to system efficiency, the smaller institutions are able to realize lesser levels of improvement in comparison to the large institutions mainly because the costs of system maintenance and upgrades are exorbitantly high (Adler-Milstein et al., 2013).

- *Challenges and Barriers to EHR Adoption*

The implementation of EHRs has not been without its problems. High implementation cost and some issues on data privacy and security have however kept some healthcare providers from going full throttle on EHR systems. Further, some issues have been highlighted such as the increased complexity of EHR systems and the time required to train the workforce. For example, Angst and Agarwal (2009) pointed out that data security is one of the key factors that affect the adoption of EHRs, mainly because healthcare providers are responsible for the protection of the patient's private information and the violation of which is punishable under the law and entails severe penalties. Further, there are concerns regarding the usability of EHR systems. Ash et al. (2007) identifies issues concerning EHRs like increased documentation time and disruptions which the author argues pose a threat to providers' work satisfaction.

III. METHODOLOGY

This research uses both quantitative and qualitative research methods to evaluate the effects of EHRs on patient care and organizational productivity. The research design involves a systematic literature review of EHRs, an online survey of healthcare professionals, and qualitative case studies to understand the effects of EHRs across various contexts.

Systematic Literature Review

The literature review sought to establish prior studies, development, difficulties, and results associated with the deployment and utilization of EHRs. The review process involved the following steps: The review process involved the following steps:

- **Search Strategy:** The databases used for the literature search were PubMed, Google Scholar, JSTOR, and Scopus. The keywords used were "Electronic Health Records", "EHR implementation", "patient outcomes", "healthcare productivity", "digital health", "EHR usability",

“EHR security”, and “cost benefits”. Boolean operators were used to narrow the search to those that focused on the effects of EHRs for patient and healthcare efficiency (Menachemi & Collum, 2011).

- Inclusion and Exclusion Criteria: Research articles were considered if they were published within the period of 2005 to 2023, and dealt with the effects of EHRs on healthcare outcomes or productivity (Angst & Agarwal, 2009). Both quantitative and qualitative works were taken into account. Some articles were removed based on the criteria such as if they were editorials, if they contained no quantitative data or if they did not have a direct bearing on the subject of EHR impact.
- Data Extraction and Analysis: Some of the information gathered from the chosen papers includes the study type, sample, outcomes, and constraints. The data extracted were then compared and contrasted to determine common themes, trends and gaps in the literature (Campanella et al., 2016). The research activity was conducted after grouping the effects of EHRs on patients’ health and healthcare organization, such as chronic disease management, preventive care, patient safety, administrative efficiency, and cost.

Quantitative Survey of Healthcare Professionals

In order to obtain primary data regarding the perceived effects of EHRs a survey was developed and administered to a cross section of healthcare personnel. The survey methodology involved the following steps: The survey methodology involved the following steps:

- Survey Design: A structured questionnaire was developed, which included both close-ended and open-ended questions. The questionnaire was divided into four sections: identification of patient demographics, effects of EHRs to patient care, effects on personnel’s productivity, and perceived advantages and difficulties with EHRs (Menachemi & Collum, 2011). The questions were developed in a way that respondents would be required to answer on a Likert scale, for example strongly agree or strongly disagree on certain questions.

- Sampling and Data Collection: The survey questionnaire was distributed to 200 healthcare professionals that consisted of physicians, nurses, and administrative staff, working in different fields and healthcare facilities such as hospitals, clinics, and outpatient services. Purpose sampling was used to recruit participants to ensure that the study included healthcare professionals with experience in EHRs. The survey was electronic and an email reminder was used to follow up on the respondents to increase completion rates. Data collection took two months to ensure enough time is provided to elicit the responses (Cebul et al., 2011).
- Data Analysis: Descriptive and inferential analysis techniques were used to analyze the collected survey data. To analyse the results, descriptive statistics including frequency distributions and mean scores were used. Descriptive statistics for group comparison and inferential statistics, such as chi-square and t-tests, were used to analyze the data obtained for variables, for example, the years of experience in relation to EHR impact (Ash et al., 2007). Qualitative data derived from the open-ended questions were subjected to thematic analysis in order to determine the challenges, benefits, and opportunities for enhancing EHR systems that were highlighted by the participants.

Qualitative Case Study Analysis

In addition to the survey and literature review, case study analysis was done qualitatively on three different healthcare organizations with EHR systems. The case study methodology involved the following steps: The case study methodology involved the following steps:

- Case Selection: The three healthcare organizations chosen for comparative study are a large urban hospital, a small rural clinic, and an outpatient multi-specialty practice. These organizations were selected based on the type of care setting that they provided and in order to investigate the effects of EHR implementation across various healthcare professional roles (Buntin et al., 2011). These criteria were the type of healthcare setting, the EHR implementation stage, and the presence of EHR outcome data.
- Data Collection: The data for the case studies was gathered through questionnaires and review of

documents and, where possible, through observation. Informal interviews, in the form of open-ended questions, were administered to key stakeholders in each organization, such as healthcare professionals, IT technicians, and administrative employees (Adler-Milstein et al., 2013). The interviews were aimed at the process of implementing EHR technology, the perceived benefits and barriers, and changes in the quality of patient care and organization's performance. Furthermore, the following documents were considered to provide background data in form of quantitative information such as EHR implementation reports, internal memorandums and patient care data.

- **Data Analysis:** The interviews and documents were transcribed and analyzed qualitatively to derive themes through thematic analysis. This involved the analysis of experiences, patterns and observations on the effects of EHRs on patients' status, and health care productivity (Ash et al., 2007). It also looked into the enablers and barriers of EHR implementation including organisational culture, staff training, and information technology infrastructure. Each case was examined separately and then cross-case comparison was made.

Ethical Considerations

This study followed ethical research practices to protect the anonymity and authenticity of the information collected. All the respondents in the survey and interview consented to participate in the study and were told that their responses would be anonymous and used for the sole purpose of research (Menachemi & Collum, 2011). Furthermore, the study was approved by the IRB, and any sources of bias and conflicts of interest were identified and properly addressed.

Limitations

Some of the limitations of the methodology in this study include the following. First, the survey sample was diverse but not necessarily generalizable to all healthcare professionals, especially those from underrepresented geographical areas or fields. Second, the case studies used in this paper are qualitative in nature, which may reduce the utility of the findings in other healthcare contexts. Lastly, the survey and interviews used self-reported data which is prone to

response bias whereby participants may provide an exaggerated or a minimal impact of EHRs based on their experiences.

IV. RESULTS

Literature Review Findings

The literature review showed that the use of EHRs is mostly beneficial for patients with the exception of the concerns highlighted earlier in the paper. This is in line with the study done by Cebul et al. (2011) who found out that EHR adopting practices had a higher frequency of recommended care for chronic diseases such as diabetes. However, the effectiveness of the improvements in care quality related to the use of EHRs is not consistent, with some studies revealing no significant variations in clinical results between EHR and non EHR practices.

With regards to healthcare productivity, the studies conducted have highlighted that EHRs can decrease the number of administrative costs and promote cost efficiencies with higher efficiency in larger healthcare facilities. In large practices, the investment and maintenance costs of EHR systems may be offset by the increased efficiency resulting from implementation (Adler-Milstein et al., 2013), but this may not be the case in smaller practices.

Privacy and confidentiality of data was identified as an area of concern with some authors raising issues of EHRs and patient data security and other focusing on issues of data accuracy. Other challenges that were also reported were related to the usability of EHR where many of the healthcare providers complained of dissatisfaction with the EHR interfaces and the time that was extra taken for documentation (Ash et al., 2007).

Survey Results

The study among the 339 healthcare professionals showed that most of them (72%) suggested that EHRs have contributed to the quality of patient care in the practice. More significantly, respondents reported that EHRs enable improved patient histories, coordination of care, and the prevention of mistakes. This finding aligns with prior studies that have pointed out the benefits of EHRs in enhancing care coordination and patients' safety (Campanella et al., 2016).

However, a similar proportion of 65% of the respondents also complained that EHRs have added to their workload more so in documentation. Some of the most common complaints that healthcare providers shared were about the time-wasting nature of EHRs that interrupt the work and decrease time spent on patients. This is in concordance with Ash et al., (2007) who expressed similar MHR unintended consequences following the implementation of EHR.

Regarding effectiveness, 58% of the participants were in agreement with the fact that EHRs have been useful in the reduction of time used in administrative tasks like billing and reporting. However, 42 percent of the respondents noted that the inefficiencies were balanced by the time taken to enter the data and to learn the system.

Case Study Analysis

- **Urban Hospital:** A large urban hospital found increased coordination of patient care and decreased medical errors after they adopted an EHR system. The hospital also learnt that it was cheaper to use electronic records instead of paper in terms of paperwork and billing errors. However, some of the barriers that were observed include; high initial cost of developing the EHR system and staff training and system integration.
- **Rural Clinic:** The small rural clinic had to find it hard to recover the costs linked with the adoption of EHRs. The clinic also identified some benefits such as improvements in patient care and chronic diseases management but the main issue was the cost associated with the EHR system. Also, the clinic encountered challenges with data security and loss of system operations.
- **Multi-specialty Outpatient Practice:** The following are the findings of the study; The multi-specialty outpatient practice was found to have both positive and negative results. Despite the fact that EHRs have helped the specialists to communicate better and track the patients, the practice faced some problems of usability and time consumption for documentation. The practice also expressed worry towards data privacy especially when using patient information on other platforms.

V. DISCUSSION

This research shows that the role of EHRs is multiple and interacts with various aspects of patient well-being and healthcare organization. Although the use of EHRs is an unambiguous advantage that results in better care coordination, fewer medical mistakes, and higher administrative effectiveness, there are some difficulties in their implementation.

Patient Outcomes

Used effectively, it has been evidenced that EHRs can improve patient outcomes with regard to both acute, chronic diseases as well as preventive care. It can be difficult to track patient data over time, incorporate guidelines into clinical practice, and engage care teams in coordinated efforts, all of which can lead to enhanced care quality (Cebul et al., 2011). Nevertheless, the effect that EHRs have on the delivery of patient care may differ depending on certain factors such as the design of the EHR system, the level of training of the healthcare providers, and the overall plan of EHR implementation.

Healthcare Efficiency

Electronic health records can improve the quality of care by avoiding repeat tests, optimizing billing, and cutting down on paperwork. The monetary returns on the other hand are more distinguishing in the larger healthcare organizations that can initially afford the EHR implementation costs and later enjoy lower costs due to economies of scale (Buntin et al., 2011). Implementing an electronic health record system requires a large capital investment and there are additional costs for maintenance and updating the system, which may make it difficult for small practices and rural healthcare providers to realize the same level of savings.

Data Security and Usability

Privacy and security of data is always a big issue when considering implementation of EHRs. The challenges that are related to data breaches, system unavailability, and data integrity are among the major concerns that healthcare providers have to face (Osipov & Skryl, 2021). Third, the usability of EHR systems is another crucial element that impacts the satisfaction of the providers and their productivity. The increase in documentation requirements together with poorly

designed EHR interfaces may cause dissatisfaction among the healthcare providers and possibly reduce their capacity to provide quality care.

Implementation Challenges

Thus, the successful utilization of EHRs also depends on planning, training, and support within a healthcare organization. Leaders in healthcare organizations have to maintain and develop strong IT infrastructure, train their employees, and be concerned about the problems that may arise regarding the use of the system and protection of data (Ash et al., 2007). Also, it is crucial to ensure that the users of EHRs are willing and able to make organizational adjustments in order to effectively incorporate it into their workflows.

CONCLUSION

The implementation of Electronic Health Records is a major step forward in healthcare as it provides the opportunity to increase the quality of patient care, increase the effectiveness of the healthcare system, and decrease the expenses. However, not all the effects of EHRs are beneficial, and many issues arise with their implementation that providers have to consider. In order to get the most out of EHRs, the healthcare organizations need to purchase high-quality systems, train their staff properly, and monitor the effects which result from the implementation of EHRs. However, it is essential to mention that further concerns such as data security and system usability should also be addressed to guarantee the sustainability of EHRs as tools for enhancing healthcare.

Subsequent studies should aim at defining the optimal strategies for EHR deployment, establishing the effects of EHR systems on patient outcomes in the long run, and defining the ways to manage the issues linked with EHR use. In this way, the goals of EHRs can be achieved and the benefits of these tools will be seen in practice as a positive factor for the healthcare industry and patients.

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