

The Impact of Information Technology on Hospital Management Systems

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Abstract

This study examines the significant contribution of IT to improving hospital information system management. They are mainly aimed at assessing how IT applications in hospitals, including Electronic Health Records (EHR), Clinical Decision Support Systems (CDSS), and telemedicine, enhance processes, communication, and patient outcomes. Using quantitative data sources involving performance measurement data, together with qualitative data collected through interviews and observation forms, forms the basis of the research. This study demonstrated its strengths by gathering data from various hospitals using a stratified random sample, enabling a comprehensive comparison of various healthcare facilities. Some of the findings highlighted are the fact that integration has a positive overall impact on the working of the business, reduces office responsibilities, and increases positive effects on patients. Electronic health records simplify patient data entry, allowing for better album handling and more accurate records. CDSS assists the clinician in making the right choices, which in turn helps to improve the quality of care.

Keywords: *Clinical Decision Support Systems (CDSS), Electronic Health Records (EHR), Hospital Management, Information Technology, Patient Outcomes, Performance Measurement, Telemedicine, and User Acceptance.*

Introduction

Electronic Health Records (EHR) can be described as one of the most radical shifts in the sphere of healthcare IT. EHR systems supplant traditional paper charts; patient information is maintained and accessed in electronic form but can also be edited. They allow for real-time access to patient records, overall health records, lab reports, or prescribed treatment plans, and they help the parties involved make better decisions [8]. Progress in telemedicine has provided the means through which patients could receive medical advice and treatments from the comfort of their homes, thus eradicating geographical and logistical hindrances to accessing quality healthcare services [9].

The role of IT in hospital administration cannot be overemphasized. The coordination of actual processes that occur in hospitals requires

proper management that focuses on operations such as admission and discharge, treatment, and documentation encompassing billing processes. It is imperative that these processes are improved, coordinated through IT systems, efficient, and, above all, secure. EHR systems, for example, have facilitated a significant reduction in administrative hassles, training, records mistakes, and billing and coding efficiency [10]. This not only boosts operational efficiency but also reduces expenses associated with document development and subsequent manual correction of errors. CDSS may be described as an information technology system that supports healthcare workers in making decisions concerning patients and in determining the appropriate treatment that should be given. CDSS employs the computer patient record enhanced by information technology remotely

linked to a clinical knowledge base to support timely and right diagnosis by clinicians [5].

The primary purpose of this research is to assess the impact of information technology (IT) on the advancement of hospital management systems. It also intends to learn how IT applications make a positive impact in the areas of operations, patients' care, and hospital effectiveness. In a literature review study, it was found that most of the research focused on specific hospital IT implementations rather than broadly investigating key success factors enabling hospitals to manage comprehensive IT systems [7]. In some cases, it is challenging to search for the records of a specific patient and find the information needed, which means that the search has to be conducted by using paper-based records that have to be updated one by one, including the patient data [4]. Records on paper are vulnerable to physical mutilation and disappearance, which undermines the accuracy of past medical histories and data authenticity.

Materials and Methods

This mixed-methods study combines semi-structured interviews capturing the views of hospital stakeholders on the impact effects of IT with a quantitative analysis of performance data available for measuring and contextualizing fifty impacts accruing from it over time. Combining both qualitative insights and quantified outcome measures allows for methodological triangulation in an effort to probe further into the hypothesized impacts of IT. The interviews give subjective accounts meant to understand the mechanisms driving change. Longitudinal hospital performance metrics then determine if promised benefits were realized and what contextual factors induced the variance.

This research design is highly appropriate for the current investigation, as it combines qualitative and quantitative approaches. This research design therefore employs both subjectivist and positivist approaches so that the

hypothesized impacts of IT are fully investigated by considering the sentiments as well as the results of the affected parties. The data collection technique used in this study is stratified random sampling because it will help in developing an effective and representative sample. Stratified random sampling is regarded as the most effective for this type of study, as it provides the highest accuracy and reliability of a survey and the most efficient distribution of resources.

A quantitative and qualitative research design is used in this study; questionnaires, interviews, and observations are used to collect data that will be used in the analysis of IT in hospitals. All these methods have been chosen very carefully in a way that would encompass both numerical and relative data and information about the subject matter. Open-ended and closed-ended questionnaires will be used in the surveys; while easy to analyze, the closed-ended questionnaires may lack depth. Integration entails comparing the results of qualitative and quantitative factors to paint a balanced picture of the effects of IT on hospital management and performance.

Results

The quantitative data collected from the 20 major hospitals therefore required data description and analysis, where basic frequencies and percentages were done through the use of descriptive statistics. As shown in Table 1, the descriptive statistics highlight key performance measures before and after IT implementation, including mortality rate, readmission rate, patient satisfaction, and other operational metrics. By providing mean and standard deviations of different performance indicators before and after the IT implementation, this analysis offered an understanding of the degree of central tendencies and dispersion. Components monitored were knowledge and competence, mortality and readmission, patient satisfaction scores, medication incidents, integrated care,

infection and costs accomplished and stay and waiting times. The results of the descriptive statistics and performance metrics test have a similar conclusion: confirmation and implementation of IT have improved hospitals' performance. Reduced mortality rates as well as decreased readmission rates support ideas of improving patient conditions and overall clinical treatment. Higher scores in patient satisfaction surveys mean that patients are more satisfied with the care they have received, which can be attributed to the implementation and use of IT systems that bring about streamlined operations. Table 2 presents the statistical significance of the changes in performance metrics, confirming that the

observed differences are unlikely to be due to chance. The importance of this research in relation to enhancing patient care cannot be overemphasized. Advanced features within an EHR give a healthcare provider the right of entry to full patient histories, thus minimizing medical errors while at the same time improving efficacy in diagnosing as well as in treatment regimens [11]. The availability of real-time data ensures that clients can provide effective care to patients as soon as possible to ensure better results. CDSS tools present choices based on research studies, thus assisting patients and healthcare professionals to select the most appropriate therapy and minimize error rates for adverse events.

Table 1. below summarizes the descriptive statistics highlighting key performance measures before and after IT implementation, including mortality rate, readmission rate, patient satisfaction, and other operational metrics.

Performance Metric	Mean (Pre-IT)	SD (Pre-IT)	Mean (Post-IT)	SD (Post-IT)
Mortality Rate (%)	2.5	0.6	2.2	0.5
Readmission Rate (%)	15.0	3.2	13.5	2.9
Patient Satisfaction (%)	78.0	6.5	83.0	5.8
Medication Errors (#)	120	25	85	20
Care Coordination (Score)	70	10	75	8
Infection Rate (%)	1.8	0.4	1.5	0.3
Costs (\$M)	12.0	3.5	10.5	2.8
Length of Stay (days)	5.0	1.2	4.5	1.0
Waiting Times (mins)	30	10	25	8

Table 2. presents the statistical significance of the changes in performance metrics, confirming that the observed differences are unlikely to be due to chance

Performance Metric	T-Value	P-Value
Mortality Rate	3.20	0.004
Readmission Rate	4.10	0.001
Patient Satisfaction	5.30	0.000
Medication Errors	6.50	0.000
Care Coordination	3.75	0.002
Infection Rate	2.90	0.007
Costs	4.55	0.000
Length of Stay	3.40	0.003
Waiting Times	3.80	0.002

Participants noted that through the use of IT systems, there was enhanced communication within and across departments among the physicians and nurses. Features such as access to up-to-date messages, files, or documents have improved the cooperation between various healthcare teams and, as a result, the management of patients and timely decision-making for the healthcare teams [12]. Based on the results of the qualitative analyses, IT systems have led to numerous positive changes in hospitals in terms of their performances, processes, and patients' experiences. The key themes of symptom relief, workflows, and changes in communication, quality, and patient involvement reflect the benefits offered by IT. The combined assessment supports the hypothesis of a positive relationship between IT use, hospital performance, and patient care outcomes. The study provides detailed recommendations on how to use IT in various hospital management areas, such as EHR, CDSS, and telemedicine, to support hospitals. Because of these mechanisms, hospital managers can capitalize on the knowledge they have about the IT solutions that they want to purchase and install. This research shows what stops organizations from using IT solutions, like user resistance and training issues. It also suggests ways to make the change to IT systems as smooth as possible by minimizing the problems that come with trying to make it work. The qualitative results of the study provide more detailed and richer perspectives on how IT is integrated in their organizations and how it impacts the decisions made in hospitals. These findings enhance existing knowledge in the healthcare IT domain due to the efforts to unravel factors that may either motivate or hinder the efficiency of IT in this field. This research can be of great use to hospital administrators and IT managers as it pinpoints some important factors that can help in improving the efficiency of the implementation of health IT and consequently improving the standards of care and delivery in hospitals [18].

This study serves to bridge a significant research gap and provide practical directions for leveraging IT to enhance healthcare management while enriching the theoretical body of knowledge on the subject.

Discussion

The derived 10% increase in patient satisfaction ratings suggests that applications of IT systems that promote increased patient centration, including patient portals, create patient-favorable experiences. These findings align with the improvements summarized in Table 3. If they can retrieve their patient information easier and if they can communicate with the caregiver more easily, patients will have higher levels of satisfaction as they receive care from the caregiver [15]. Applying the conflict-of-interest policy in pharmacy was effective in minimizing medication errors from 1.2% to 0.8%, proving that the regular use of CPOE systems decreases the number of prescription errors [3]. This only shows that there was a form of resistance to change, and this was more evident among older employees because of the cultural and behavioral changes that implement the use of IT [19]. The issue of patient privacy and conduct continues to dominate. It is crucial to note that various regulated information must be stored in hospitals, hence the need for proper compliance with the laws. This means an annual or monthly review of data and the use of proper data storage media [14]. policies that explain who can use the data and when, among others. Stakeholders such as healthcare providers, patients, and I/T staff are essential in the process of implementing IT systems. It is advisable for hospital administrators to create friendly platforms such as forums or committees where the relevant stakeholders can come in and give out their opinions, grievances, and even new ideas regarding the implementation of change management. This approach can minimize the risk of exposing different loopholes that may lead to a failure in

the system and help understand the need to come up with solutions that benefit everyone. Clinical and IT managers and hospital administrators should focus on long-term IT strategies for investments. This encompasses not only the one-off costs of adopting EHRs, CDSS, or CPOE but also potential recurrent costs associated with product maintenance, version upgrading, and technical support for staff. It is also important for these systems to have enough capital to be implemented and integrated in hospitals. The increased use of electronic tools involving patient engagement, for example, patient portals and secure messaging, has a great impact on patient satisfaction and patient care. Hospital administrators should prioritize the ease of use and accessibility of these tools to ensure their effective use. It is equally important to equip the patients with knowledge on how to go about using these tools, and this can be done through the helpdesk that most hospitals provide or through training.

The programs should include both theoretical components that explain the functioning of specific IT systems and practical elements that demonstrate their application in daily organizational activities [1]. Seminars and workshops regarding technological advancements and training on the job would also come in handy when staff seem to feel comfortable only with the set technologies [18]. Overlapping information technologies within care settings facilitate reduced workflows, such as integrated workflows, and can improve care interconnectivity [6, 17]. Implementation of new systems should not be done across the board; rather, hospitals should carry out trial runs with test data in order to detect any flaws. The slow rollout also involves the possibility of changing some of the features depending on the response of the first set of users, as well as reducing the possibility of interference with the normal running of hospitals. Systems should be tailored to suit the various requirements of a company, in that various sub-organizations and

end-users will require diverse systems to suit their operations [20]. To achieve higher success with change management, organization and communication concerning the transition, especially through addressing worries and promoting the advantages of implementing IT systems, can also assist in the process [2]. Table 3 provides a side-by-side comparison of performance metrics before and after IT implementation, clearly illustrating the magnitude of change across all measured indicators. The overall sample size and generalizability of the sample can be considered major drawbacks of this study. In order to increase the use and usability of IT systems, they should be designed in a way that will utilize approaches towards the human component of technology. They are intended to be user-friendly, usable, and conform to the operational environment of the healthcare industry. It is possible to involve end-users in the development and refining processes to ensure that the latter meets their expectations. The implications of IT in the health field, particularly hospitals, must embrace strategic planning, training, secure data management, engaging stakeholders, and teamwork. With these recommendations and strategies met, hospital administrators and IT managers can fully leverage the IT system, thus enhancing patient care and operation efficiency. Although the study prioritized the use of stratified random sampling to gather a diverse and large cross-section of hospitals and stakeholders, the total number of hospitals and stakeholders may not be sufficiently comprehensive to account for variations across various regions, hospital sizes, and types. Problems associated with data consistency and completeness are inherent difficulties with the use of longitudinal data for evaluating the implementation of IT systems over time, as in the present study. New hospital CEOs, board membership changes, or other policy changes during the study period could potentially impact the results, while changes in healthcare regulations or technological

advancements during this period could also contribute to variability. The findings may be more relevant to other hospitals that are of comparable size, type, and locale to those of the study population, but the generalization across

settings may not be very clear. Like any other study, future research can enhance its external validity by collecting data from larger and more diverse samples.

Table 3. provides a side-by-side comparison of performance metrics before and after IT implementation, clearly illustrating the magnitude of change across all measured indicators

Metric	Pre-IT Implementation	Post-IT Implementation	Change
Mortality Rates	2.5%	2.1%	-0.4%
Readmission Rates	15.0%	13.5%	-1.5%
Patient Satisfaction	72%	82%	+10%
Medication Errors	1.2%	0.8%	-0.4%
Length of Stay	5.6 DAYS	5.2 DAYS	-0.4 DAYS
Cost per Patient	\$10,500	\$9,800	-\$700
Infection Rates	3.0%	2.5%	-0.5%

Conclusion

This research contributes enormously to the field of IT in hospital management by offering a rich set of empirical analyses of its effects on clinical and organizational performance. The study utilizes both quantitative and qualitative methods to reveal how applications like EHRs and CDS can thus result in reductions in mortality, readmissions, and improvements in patient satisfaction. The study therefore reveals that there is future research needed to ascertain the long-term benefits of such implementation strategies when faced with challenges such as initial adoption and that there is a need for frequent staff training, particularly in the new system, and strong leadership. One potential concern relates to the generalizability of the findings from the sample to a larger population of hospitals due to the size, nature, and technological heterogeneity of the sample. The findings may be more relevant to other hospitals that are of comparable size, type, and locale to those of the study population, but the generalization across settings may not be very clear. Like any other study, future research can enhance its external validity by collecting data from larger and more diverse samples. The

study examines the impact of IT implementation at a specific point in time, ensuring that its efficacy does not require a longer duration to determine the positive outcomes of these systems. Some advantages or disadvantages associated with the implementation of IT that may exist can take years to surface, which is beyond the observation horizon of this study.

Research could also cover the economic consequences, given that studies of IT implementation in health care could explain the cost and revenue of its investments. Another area of research concern is integration, where questions that deal with the compatibility of various IT systems and the harmonization of data exchange formats are of importance [10]. This would greatly improve the probity and efficacy of IT in healthcare, as it would allow for the interoperability of different systems [16]. Future research should address the ethical issues related to IT in healthcare, especially in relation to patient confidentiality and information safety [13]. A review of sound strategies for conforming to ethical standards and the optimal utilization of IT could offer

valuable advice for policymakers and healthcare organizations.

Conflict of Interest

The authors declare that they have no conflict of interest. All authors have read and agreed to the published version of the manuscript.

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