Obstacles and Outcomes of Hospital Management System Implementation

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Abstract
This study was conducted to identify the obstacles and outcomes in the implementation of a Hospital Management System (HMS) in Pakistan. A Hospital Management System (HMS) is used to streamline hospital processes by managing healthcare-related information efficiently. It is a necessity in today's world, but limited hospitals in developing countries like Pakistan have implemented such systems. This study adopted a qualitative approach to identify major areas related to the obstacles and outcomes of HMS implementation in a hospital. It employed a qualitative approach rooted in interpretivism and an inductive methodology. Interviews were conducted in different departments of the hospital to ensure adequate representation of the various management levels and skill set diversity. Open-ended questions were asked from the interviewees related to the topic under study during the personal interviews. All the interviews were recorded and transcribed verbatim. Special attention was paid to capturing all relevant information, and these transcripts were then entered into NVivo software. The results of the study may prove beneficial in streamlining the HMS implementation process in other hospitals and working out the identified obstacles before implementation to carry out the task more efficiently.
Keywords: Hospital Management System, Hospital Automation, Employee Satisfaction, Patient Satisfaction, Qualitative Analysis.

1. INTRODUCTION

Due to the rapid increase in the number of patients, there is a dire need for speedy procedures and processes and accurate information storage and retrieval of information in big hospitals. Therefore, all over the world, hospitals are switching to modern hospital management information systems from the traditional manual method. Technological advancements have revolutionized healthcare, offering ways to enhance service quality, elevate patient care, and optimize operational efficiency (Lu et al., 2005). Healthcare technology stands as a cornerstone in hospital infrastructure, significantly enhancing treatment quality and performance, as stated by Calman et al. (2007). Moreover, it indirectly contributes to hospitals' financial viability. For example, electronic medical records (EMR) and computerized provider order entries (CPOE) have

been shown by Holden (2010) to streamline care processes and reduce time, especially in information retrieval. Studies consistently highlight that healthcare services failing to embrace new information technology risk inefficiency and losing patient trust (Aggelidis and Chatzoglou, 2009; Ammenwerth et al. (2003).

Sophisticated Hospital Management Systems (HMS) marks a significant shift. HMS caters to hospitals' diverse information needs, encompassing patient, clinical, ancillary, and financial management. They facilitate timely, precise data for informed decision-making, thereby boosting healthcare quality (Bihari, 2010). Widely embraced globally, HMS brings numerous benefits like improved information access, enhanced service quality, and better patient care. Despite its proven effectiveness in fostering accuracy and efficiency, developing countries like Pakistan face distinct challenges and barriers, differing from those in developed nations (Sood et al., 2008). Studies have consistently shown that healthcare services that fail to embrace new information technology risk becoming ineffective and losing credibility with patients (Aggelidis and Chatzoglou, 2009; Lu et al., 2005; Ammenwerth et al., 2003).

2. LITERATURE REVIEW

A Hospital Management System (HMS) was introduced to streamline hospital processes by managing healthcare-related information efficiently. The inception of HMS dates back to the 1960s, evolving continuously to sync with advancing technologies and modernize healthcare practices. Today, healthcare management starts at patients' fingertips through mobile devices, catering to their needs. The significance of HMS lies in simplifying the complexities inherent in managing paperwork across hospital departments while ensuring confidentiality. By centralizing paperwork management, HMS reduces staff workload in organizing and analyzing patient records. Its functionalities include managing and maintaining patient medical records and contact details, tracking appointment schedules and storing insurance information for future reference, and monitoring bill payments and ensuring accuracy in financial transactions (Sittig 1994; Aarts and Peel 1999).

A typical HMS includes appointment management for online booking through hospital websites, integrated billing, prescription management, discharge summaries, operation theater, pharmacy, & lab management, and a comprehensive master information system and multi-location management. Choosing the right HMS tailored to specific hospital needs is crucial for optimal functionality and efficiency (Barley 1986; Sofaer 1999). Assessing individual requirements aids in selecting the most appropriate HMS system for implementation. The potential benefits of HMIS, particularly in providing more efficient and timely treatment options for patients, suggest a significant positive impact on healthcare services. This system seems poised to revolutionize the way patient data is recorded, stored, and utilized for providing better healthcare services (Anderson 1997; Kaplan 1997).

Implementation of a HMS offers numerous benefits including time-saving technology that enhances efficiency and minimizes human errors, enhanced data security and accessibility for accurate retrieval, cost-effectiveness through streamlined processes and improved management controls, improved patient care through comprehensive record-keeping and easy access to patient history, simplified inventory monitoring and reduced documentation workload and improved compliance to policies & regulations (Goldstein 1994).quality care. The quality of healthcare systems directly impacts patient satisfaction and influences their choices. Patient satisfaction hinges on the management system's quality: Naidu (2009). Research, such as that conducted in Turkey, indicates that patients in private hospitals express higher satisfaction due to updated medical technology and services from physicians, nurses, and support staff compared to government hospitals. Technology fosters better connections between hospitals, healthcare

providers, pharmacies, and patients, significantly improving therapeutic methods: McDonald et al., (2005).

Currently, a large number of hospitals in Pakistan still lack appropriate Hospital Management systems. The shift to computer-based medical information systems is a complex process as it not only demands high computer literacy of the user, but it needs to take into account the complex social and behavioral transformation required (NCVHS 2001; WHO 2002). HMS are seen as critical to improving the health system in developing countries. In practice, however, HMS and especially hospital information systems development in developing countries is difficult to implement due to organizational complexity, fragmented and uncoordinated organizational structures and unrealistic ambitions (WHO, 2000).

3. SCOPE OF THE STUDY

The study was conducted on a hospital in the city of Kharian in Pakistan. It is a large hospital where, on average, 1500 to 2000 patients visit the hospital daily in outpatient departments (the medical, family and pediatrics Out-Patient Departments). There are a considerable number of patients admitted to different wards. The hospital also has a separate burn centre. The HMS itself is a comprehensive tool. The basic mechanism is that when a patient visits a staff surgeon and explains his or her medical problem. The doctor retrieves all the family data, along with earlier medical history, from the HMS. The patient is then referred to the concerned medical specialist by the staff surgeon electronically. The patient gets checked by the specialist and is then prescribed medicines and tests on HMS. The medical prescription goes straight to the medical store electronically, and if any tests and x-rays are recommended, then those are referred to x-ray departments or medical laboratories online as well. The patient collects medicines from the store, where he/she is provided with a copy of the prescription form as well. In case of tests or x-rays, their results are sent back to specialists electronically for further review.

4. RESEARCH FRAMEWORK

The research framework for this study is based on the Technology Acceptance Model (TAM). The Technology Acceptance Model (TAM) has gained widespread acceptance in understanding factors influencing technology adoption. It has been applied across various industries, including healthcare, banking, and government services, to identify key factors affecting technology acceptance (Kijsanayotin et al., 2009; Zhou et al., 2010; AbuShanab and Pearson, 2007; Lean et al., 2009). TAM occasionally integrates external variables such as user training, system characteristics, and user involvement in the design and implementation processes. It stands as one of the most extensively referenced models in the technology acceptance realm, receiving considerable empirical validation over recent decades. The fundamental components of TAM, including perceived usefulness, perceived ease of use, and attitude toward use, have garnered significant support in comprehending technology acceptance and usage patterns (Janz and Hennington, 2007; Wu et al., 2007). Prior research validates the relevance of technology acceptance models in understanding adoption factors. These models serve as valuable tools for predicting attitudes, satisfaction, and usage patterns based on beliefs and external variables (Al-Gahtani and King, 1999[4]). Hence, exploring factors influencing healthcare technology adoption becomes imperative within this framework.

5. METHODOLOGY

This study employed a qualitative approach rooted in interpretivism and an inductive methodology. This choice was based on the assumption that investigation outcomes can differ across contexts (Bryman and Bell, 2014). This method is well-suited for exploring context-sensitive phenomena, such as workplace ostracism, which can manifest varied outcomes over time (Robinson et al., 2013). Following the guidance of O'Reilly et al. (2014), a qualitative

phenomenological approach was adopted to delve into the experiences of staff at the hospital while implementing the HMS. Qualitative research excels in addressing 'how' questions, understanding perspectives of the participants, and elucidating processes rather than focusing solely on quantitative measures (Pratt, 2009, p. 856).

Phenomenology was specifically selected as it allows for a deeper understanding of individual experiences within their contextual framework, steering away from preconceived notions (Bryman and Bell, 2014). The major primary data collection tool used in this study was one-to-one personal interviews. Comprehensive interviews were conducted with the important personnel who are actively responsible, familiar and users of HMS. The sample for the study was drawn from the HMS control room, medical staff, and management to get valuable data. The interviews followed a basic set of 26 standardized open-ended questions pertaining to the chosen topic.

The other source of data was secondary data, which was collected to find the pertinent literature on the selected topic. Open-ended questions were asked from the interviewees related to the topic under study during the personal interviews. All the interviews were recorded and transcribed verbatim. Special attention was paid to capturing all relevant information, and these transcripts were then entered into NVivo software. This facilitated efficient data review, enabled in-depth text searches, and supported the identification of codes, themes, categories, and the exploration of relationships among them. Employing NVivo 10 was considered crucial for enhancing the accuracy of qualitative data analysis (Banihani and Syed, 2017).

6. ANALYSIS AND DISCUSSION

The HMS being adopted in this hospital was already implemented and was successfully running in its sister hospitals. Initially, one of the biggest challenges for the hospital was to enter a large amount of data from scratch. Kharian is a big city where a large population had to be registered in the HMS. The management has almost achieved the desired target, though not fully, due to a large number of retired personnel visiting seldom. Secondly, communication was and still to some extent is a great challenge. The medical staff were comfortable with the new system and found it much easier to use the benefits needed to be communicated to patients, as well as some resistant hospital departments, more actively and thoroughly. Thirdly, a much-highlighted challenge was the dearth of staff. Medical, para-medical and support staff were all overburdened. The doctor-patient ratio was very high, as well as the number of support staff and technicians was also less than required, so they found it cumbersome to switch to the new system and were resistant to adopting it.

All the interviewees unanimously agreed that HMS had a positive effect on the employees' performance and organizational productivity in the long term. Undoubtedly, it helped in the better diagnosis and treatment of patients by doctors due to the availability of their medical and family information in one place. It served as an anti-fraud tool, which led to financial advantage for the hospitals and their sponsors. It reduced the chances of human errors. Better strategies and decisions could be made by the management using valid data. The system can be very helpful in future research and development in medical science. However, at the time of research, the performance feedback was negative, but the management had started noticing a major turnaround and the attitudes and consequently the employees' performance trend had started moving upwards from the negative dip. On a scale from 1 to 5, all respondents rated the decision to implement HMS as Good. And all the respondents believe that other hospitals should also use such systems to gain maximum benefit from this breakthrough in the health care industry.

7. RECOMMENDATIONS

Based on the above discussion, major recommendations to overcome these challenges are:

- **Increase in the strength of staff:**

This can be done by new hiring or better allocation of human resource by Head office to different hospitals operating under its umbrella depending upon their size and requirements.

- **Invest in capacity building of current staff members:**

An ongoing training program is the need of the hour. Staff should be given training in their primary tasks to build upon their respective strengths and develop their expertise in their primary responsibility areas.

- **Active marketing of the HMS to medical staff as well as to the patients:**

The management can display banners and posters regarding the logic and benefits of the HMS.

- **Ensure uninterrupted power supply:**

Appropriate measures should be taken by the management to ensure there is no breakdown of power.

- **Aligned incentives for improved performance:**

The performance of doctors should be linked to effective use of HMS. Like publication of new research papers, case studies, presentation given in different symposiums should be encouraged and rewarded by promotions, educational scholarships, training, etc.

- **Encouragement of innovation:**

This will help in the increased use of HMS in an effective manner.

- **Community-based interventions to alter fundamental determinants of health :**

Huge numbers of medical teams visit field areas on regular basis. They set up their camps in rural, urban and even far slung areas. They can be trained in creating awareness among the masses regarding the benefits of registering with good hospitals and breakthroughs with newly deployed automated systems.

- **Accountability:**

The great initiative taken by the management should not go to waste with no accountability at the end. People responsible for managing, maintaining, and using the system should be held accountable for their effective or ineffective use of HMS by holding audits and performance appraisals biannually.

- **HMS curriculum:**

Medical, nursing and other schools in the health sector should include short training of HMS modules as part of their curriculum.

- **Mobile Apps:**

A healthcare mobile application simplifies patient-doctor communication, offering swift appointment booking, secure payments, and scheduling. Patients can be monitored using mobile devices, tablets, and wearables, ensuring timely diagnoses for both patients and healthcare professionals. A single-click phone call feature enhances patient engagement and expedites communication.

- **Patient Portal:**

The patient portal fosters improved patient engagement and transparent information exchange between healthcare organizations and patients. It allows for the viewing and updating of vital profile information such as heartbeat, blood pressure, and temperature. Patients can access their medical history, current and past prescriptions, as well as lab and radiology reports. Additionally, they can schedule appointments and make secure payments through the portal.

- **HR Management**:

Integrated human resource management solutions within hospital administration systems facilitate streamlined personnel recruitment, onboarding, training, payroll processing, and

attendance tracking. This comprehensive system enables healthcare organizations to manage various aspects of the employee life cycle more efficiently.

- **On-premises & Cloud-Based Support**:

A hospital management system should offer Software as a Service (SaaS) for IT services, ensuring secure and highly available healthcare IT solutions. It must efficiently handle data migration processes for both cloud-based migration and on-premises support without causing disruptions. Based on the data analysis, it was concluded that the users of HMS should be given sufficient time to implement HMS, as it not only demands proficiency in computer and software usage, but rather it is challenging the decades-old manual system as well as the basic mindset and approach of the beneficiaries. A major problem lies in the difficulty of hospital staff, managers, and patients understanding the logic of a computerized information system, which is needed to take full advantage of the burgeoning technology. A long-term mutual training process where technical and medical/managerial personnel work together on improving information, as well as community-based awareness programs, can be key steps to overcome this challenge.

CONCLUSION

The implementation of HMS is an important step for a hospital operating in a developing country like Pakistan. The hospital faces a number of obstacles and challenges in the implementation of HMS. The study of the HMS implementation process may serve as a roadmap for other health care institutions planning to implement HMS. The different challenges identified in the qualitative study were reported based on the different nature of respondents' duties and their specialities. All these challenges in the smooth implementation of the system carry importance, and the input provided by respondents is valid and crucial to rectifying any errors and to effectively improving the system.

Based on the data analysis, an increase in the number of staff and active communication of its advantages to the hospital staff, as well as to patients. Currently, the performance feedback shows a negative dip, as there is basic resistance to change, and as the staff is already overburdened, they are finding it cumbersome to switch to a new automated system. In addition, patients are also dissatisfied as they are confused with a lack of proper directions, demanding more attention and counselling, consuming more time of doctors and support staff, which in turn is adversely affecting their performance. However, despite all the odds, the benefits of the system outweigh the challenges. The decision to implement such a system has been unanimously categorized as Good by the respondents, and all of them highly recommended that this kind of system should be implemented in other hospitals, especially Government hospitals, which will provide valuable data on patients at the local level. HMS has proven benefits which are very much required in today's complex and dynamic environment. It is a good endeavour by the hospital to take such initiative, however, the process is laborious and requires a lot of perseverance, as it is a long-term learning process. It can improve the policies and decisions related to the distribution of funds and preventive control measures, etc., by the Government.

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APPENDIX

INTERVIEW QUESTIONS

(Themes & sub themes developed with NVIVO)

Q: **Influence**: In your opinion How will the HMS impact day-to-day tasks of your staff?

Structural/ Operational Challenges:

Q: Top Management Support: How much support and encouragement do hospital leaders provide for the adoption and use of the new system?

Q: Workflow Disruption: How has the system affected existing workflows?

Q: Customization and Adaptability: To what extent can the system be customized to fit specific departmental needs or workflows within the hospital?

Q: Maintenance and Support: How responsive is the technical support for addressing issues or concerns encountered by hospital staff while using the system?

Q: Structural barrier: What are the structural / procedural barriers in the usage of HMS?

Human Challenges:

Q: Training and Familiarity: Are there sufficient training resources and sessions to ensure all staff members are proficient in using the system?

Q Training Effectiveness: *Was the training effective enough?*

Q: User Participation: Have the end-users (doctors, nurses, administrative staff) been actively involved in the design or selection of the system?

Q: Human Barriers: What are the primary reasons for resistance among staff to adopt the system?

Technical Challenges:

Q: Interoperability: How effectively does the management system integrate with existing hospital software and hardware?

Q: Scalability: Can the system accommodate the hospital's growth and increasing data volumes without compromising performance?

Q: Data Security and Privacy: What measures are in place to ensure patient data security and compliance with privacy regulations?

Q: Technical barriers: Are there technical constraints or limitations that hinder the proper functioning or integration of the system?

Perceived Usefulness:

Q: Benefits: What are the potential benefits of HMS?

Perceived ease of use

Q: Ease of Use: Do users perceive the system as easy to learn and use in their day-to-day tasks within the hospital?

Behavioral Intention:

Q: Intent to Use: Are users motivated and willing to use the system regularly in their work routines?

Q: Resistance: What are the main reasons behind any resistance or reluctance among users to adopt the system?

Actual System Use:

Q: Usage Patterns: What is the actual usage rate of the system among different user groups within the hospital?

Q: Feedback and Improvements: What feedback have users provided about the system's strengths and weaknesses? How can these insights be used to improve its implementation and usability?

Q: Support and Maintenance: How responsive is the technical support for addressing issues or concerns users face while using the system?

Q: Impact: What are the positive or negative effects on employees' performance due to implementation of HMS?

Q: Removal of barriers: In your opinion, how can the barriers identified earlier be removed?

Q: Decision effectiveness: on a scale of 1 to 5 where 1 stand for very poor and 5 stands for very good in your opinion how effective is the decision to implement HMS in HOSPTAL Kharian on employees performance and organizational productivity?

Q: Recommendation: Will you recommend the management of other hospitals of the country to implement such system?

Q: Future Scope: HMS How do you envisage scope of HMS in your hospital, and in our health industry in general?