



ASSESS THE FACILITATORS AND BARRIERS OF THE MEDICAL INFORMATION SYSTEM IN THE TERTIARY CARE HOSPITAL OF FAISALABAD

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Abstract

Background: The global implementation of Electronic Health Records (EHRs) has revolutionized healthcare, aiming for improved patient safety and efficient data management. In Faisalabad, Pakistan, the Madinah Teaching Hospital faces both challenges and opportunities in the digitization of medical information, necessitating a comprehensive assessment of the facilitators and barriers of the Medical Information System (MIS).

Objective: The objective of this study was to analyze and articulate the factors influencing the effective utilization of MIS at Madinah Teaching Hospital, Faisalabad, by exploring both the perceived facilitators and barriers as identified by stakeholders.

Methodology: The study utilizes a descriptive cross-sectional design to investigate the utilization of the Management Information System (MIS) at Madinah Teaching Hospital over a four-month period. The target population includes all stakeholders, and a sample size of 356, determined based on the entire MIS user population, is selected through convenient sampling. Data is collected using a self-structured questionnaire addressing facilitators and barriers of MIS usage. SPSS software version 23 is employed for data analysis, utilizing descriptive statistics to identify patterns and trends, ensuring a systematic and evidence-based interpretation of the findings.

Results: In a comprehensive study with 356 participants from Madinah Teaching Hospital, including 120 doctors, 136 nurses, and 100 individuals from various categories, all reported regular patient engagement, with 99.7% serving for over a month. The Management Information System (MIS) usage was widespread, with participants using it for tasks like reviewing patient problems (58.9%), obtaining information (53.9%), and result monitoring (54.2%). Notably, 56.2% referred patients using MIS, and 54.8% generated discharge summaries. Participants found MIS user-friendly, with 54.2% agreeing it provides precise information. Challenges included 5.6% feeling MIS interfered with clinical tasks and 9.6% experiencing a loss of access to medical records. The

majority agreed on the need for IT staff support (56.7%) and high computer literacy (56.1%) for effective MIS use. Overall, 46.1% expressed satisfaction with their MIS experience.

Conclusion: The study at Madinah Teaching Hospital underscores the pivotal role of the Medical Information System (MIS) in daily healthcare practices, revealing substantial engagement and positive user experiences. While acknowledging the system's effectiveness, targeted improvements addressing specific challenges are essential for ensuring seamless integration and maximizing the benefits of healthcare digitization in Faisalabad.

Keywords:-Medical Information System, Electronic Health Records, healthcare digitization, healthcare information management, healthcare technology, data analysis, healthcare stakeholders.

Introduction

The Medical Information System (MIS), also referred to as a Hospital Information System, is a digital application designed to actively connect providers and patients. It comprises a series of data that can be analyzed, processed, and reported to facilitate communication within the hospital [1]. Electronic Health Records (EHRs) have been globally implemented in healthcare organizations to achieve various benefits, including increased patient safety [2]. A well-functioning Routine Health Information System (RHIS) is essential for health system management, offering data for governance, accountability, planning, policy-making, inspection, and quality improvement [3].

Faisalabad, a bustling city in Pakistan, is home to a tertiary care hospital, Madinah Teaching Hospital, where the intricate dance between medical professionals and evolving technologies takes center stage [4]. The global implementation of EHRs has made its mark in healthcare organizations worldwide, aiming for benefits such as heightened patient safety [5]. Faisalabad, within the broader context of Pakistan's healthcare landscape, grapples with the challenges and opportunities presented by the digitization of medical information [6].

The adoption of Electronic Medical Record Systems (EMRS) has witnessed substantial growth in high-income healthcare settings globally, marking a 46% increase over the last five years [7,8]. This rise is particularly relevant when assessing the landscape of healthcare in Faisalabad and the role it plays in transforming patient registration, medication management, pharmaceutical record-keeping, and the handling of laboratory results [9]. The Medical Information System, a comprehensive framework capturing, storing, managing, and transmitting health information, becomes a focal point for healthcare stakeholders in Faisalabad [10].

Nurses, constituting the largest group of health professionals globally, wield significant influence in the implementation and utilization of EHRs [11]. The intersection of technology and healthcare aims not only to enhance patient care outcomes but also to streamline healthcare provider activities and reimbursement processes. As the functionalities within EMR systems evolve, it is imperative to explore how healthcare practices in Faisalabad may be positively or negatively influenced [12].

Despite the transformative potential, understanding the nuances of human-technology interactions is critical. This understanding is pivotal for overcoming usage barriers and optimizing the available resources to provide high-quality care [13]. In the specific context of Faisalabad, the perceptions of healthcare providers, especially nurses, toward EMR systems and their confidence levels in using these systems remain areas with limited exploration [14].

The Electronic Health Record has emerged as a secure and efficient alternative to traditional handwritten paper charts, fostering communication among healthcare professionals, tracking patient progress, and enhancing patient outcomes. However, concerns persist regarding the quality of these systems, emphasizing the need for continuous evaluation of HIS [15].

In the grand tapestry of global healthcare, the implementation of HIS involves substantial investments, exemplified by the US\$10 million per hospital mandated by the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 in the United States [16].

Post-implementation evaluation becomes crucial to determine the value of HIS and provide essential insights for subsequent decision-making [17]. Drawing parallels to global experiences, the challenges faced by Indonesian hospitals in achieving optimal acceptance of Hospital Information Systems resonate with the evolving healthcare landscape in Faisalabad.

Objective

The objective of this study was to analyze and articulate the factors influencing the effective utilization of MIS at Madinah Teaching Hospital, Faisalabad, by exploring both the perceived facilitators and barriers as identified by stakeholders.

Methodology

Study Design

This research employs a descriptive cross-sectional study design to comprehensively investigate the utilization of MIS at Madinah Teaching Hospital. The cross-sectional approach allows for the simultaneous assessment of various stakeholders within the organization, offering a snapshot of their engagement with the MIS during a specific time frame.

Setting

The study unfolds within the dynamic environment of Madinah Teaching Hospital, a prominent healthcare institution. This setting is chosen for its representative nature, providing insights into MIS usage across diverse healthcare units. The hospital serves as a microcosm for understanding the broader implications of information management in a medical context.

Duration of Study

The investigation spans a duration of four months, commencing in February and concluding in May 2023. This time frame allows for a thorough exploration of MIS dynamics, encompassing various seasons and operational scenarios within the hospital.

Target Population

The study encompasses all stakeholders utilizing the Management Information System at Madinah Teaching Hospital. This inclusive approach involves healthcare providers, administrative staff, and other personnel actively engaged with the MIS. The aim is to capture a holistic perspective on system usage, fostering a comprehensive understanding of its impact.

Sample Size

The sample size is determined based on the entire population of MIS users within the hospital. This includes 120 doctors, 136 nurses, and 100 individuals from other categories. The population-based sampling ensures a representative selection, enhancing the generalizability of findings to the broader hospital community.

Sampling Technique

Convenient sampling is employed to select participants due to the practicality of reaching and engaging with the diverse MIS user groups within the hospital. This technique facilitates efficient data collection without compromising the study's rigor, given the accessibility of participants during the research period.

Data Collection Tool

A self-structured questionnaire is utilized to gather information on the utilization of MIS. The questionnaire comprises questions that address both facilitators and barriers associated with MIS usage. This approach allows for a nuanced exploration of factors influencing the effectiveness of the system from the perspective of the stakeholders.

Data Analysis

Data analysis is conducted using SPSS software version 23. Descriptive statistics are calculated to provide a clear and concise summary of the data, enabling the identification of patterns, trends, and significant insights related to the use of MIS at Madinah Teaching Hospital. This robust analytical approach ensures a systematic and evidence-based interpretation of the collected data.

Results

In this comprehensive study, a total of 356 participants were engaged, comprising 120 doctors, 136 nurses, and 100 individuals from various other categories. Remarkably, all participants, constituting 100%, reported engaging in regular work with patients. Furthermore, an impressive 99.7% of the participants revealed that they have been dedicatedly serving in the hospital for a duration exceeding one month (table 1).

Table 1: Summary of Participant Engagement in Healthcare Activities

Participant Category	Participants	Regular Patient Work	Serving in Hospital for Over One Month
Doctors	120	100%	99.7%
Nurses	136		
Other Categories	100		
Total	356	100%	99.7%

Table 2 presents a comprehensive overview of the engagement of 356 participants with the MIS. The majority, constituting 58.9%, utilize MIS for reviewing patient problems, while a significant 53.9% (n=192) obtain information through this system. Impressively, a minimal 3.4% (n= 12) never use MIS for obtaining results, whereas 54.2% (n= 193) always rely on it for result monitoring. Additionally, a substantial portion (n= 156; 43.8%) of participants order new tests or investigations through MIS, including X-rays and ultrasounds. Results retrieval via MIS is prevalent among 42.4% (n= 151) of participants. Notably, 49.4% (n= 171) order treatment directly through MIS, and a majority (n=187; 52.5%) employ it for prescription writing. Interestingly, only 11.5% (n= 41) never use MIS for entering daily notes. Furthermore, 56.2% (n= 200) of participants refer patients to other departments using MIS, and 54.8% (n= 195) generate discharge summaries with its assistance. A small percentage (n=14; 3.9%) seldom provide written individual information, while 47.8% (n= 170) consistently use MIS to search for specific knowledge related to therapies or treatments. However, only 8.7% (n= 31) never respond to MIS for data reviews pertaining to specific patient groups.

Table 2: Participant Engagement Levels in Healthcare Tasks Using MIS: A Comprehensive Overview

Task	Never	Seldom	About half of the occasion	Most of the occasion	Always	Our hospital miss task does not support this task	This task does not apply to me
Review the patient’s problems	13(3.7%)	13(3.7%)	16(4.5%)	117(32.9%)	181(50.8%)	6(1.7%)	9(2.5%)
Obtain information on treatment procedures	21(5.9%)	15(4.2%)	25(7.0%)	192(53.9%)	88(24.7%)	8(2.2%)	7(2.0%)
Obtain the results from new test or investigation	12(3.4%)	13(3.7%)	17(4.8%)	97(27.2%)	203(57.0%)	9(2.5%)	5(1.4%)
Follow the results of a	13(3.7%)	18(5.1%)	17(4.8%)	96(27.0%)	193(34.2%)	13(3.7%)	6(1.7%)

particular test or investigation over time							
Order new test or laboratory investigations	26(7.3%)	6(1.7%)	23(6.5%)	113(31.7%)	156(43.8%)	22(6.2%)	10(2.8%)
Order X-ray, ultrasound or CT investigations	28(7.9%)	9(2.5%)	23(6.5%)	97(27.2%)	159(44.7%)	27(7.6%)	13(3.7%)
Obtain the results from X-ray, ultrasound or CT Investigations	35(9.8%)	23(6.5%)	12(3.4%)	87(24.4%)	151(42.4%)	31(8.7%)	16(4.5%)
Order treatment directly (e.g. medicines, operations etc.)	37(10.4%)	9(2.5%)	28(7.9%)	65(18.3%)	176(49.4%)	29(8.1%)	12(3.4%)
Write prescriptions	34(9.6%)	6(1.7%)	12(3.4%)	66(18.5%)	187(52.5%)	34(9.6%)	17(9.8%)
Enter daily notes	41(11.5%)	6(1.7%)	18(5.1%)	65(18.3%)	168(47.2%)	46(12.9%)	11(3.1%)
Refer the patient to other departments or Specialists	19(5.3%)	5(1.4%)	15(4.2%)	74(20.8%)	200(56.2%)	33(9.3%)	10(2.8%)
Generate discharge summary/report	21(5.9%)	12(3.4%)	15(4.2%)	62(17.4%)	195(54.8%)	41(11.5%)	10(2.8%)
Give written individual information to patients, e.g., about disease, medications, discharge instructions etc.	17(4.8%)	14(3.9%)	35(9.8%)	89(25.0%)	181(50.8%)	8(2.2%)	11(3.1%)
Search specific knowledge-based information related to some disease, medication, therapy etc.	23(6.5%)	25(7.0%)	35(9.8%)	82(23.0%)	170(47.8%)	10(2.8%)	11(3.1%)
Produce data reviews for specific patient groups, e.g., disease diagnoses,	31(8.7%)	22(6.2%)	31(8.7%)	84(23.6%)	168(47.2%)	14(3.9%)	5(1.4%)

complication rate etc.							
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The table 3 reflects data from 356 participants, highlighting that a mere 3.7% (n= 13) encounter difficulties when reviewing patient problems through MIS. Conversely, a substantial majority of 43% (n= 153) find MIS particularly user-friendly for obtaining information on treatment procedures. Participants express varied sentiments, with 9.6% (n= 34) maintaining a neutral stance on MIS effectiveness in acquiring results from new tests, while 45.8% (n= 163) find it convenient for tracking specific test or investigation results over time. Challenges arise for only 1.4% (n= 5) when ordering new tests, whereas 41.07% (n= 145) feel at ease ordering X-rays, ultrasounds, or CT investigations. Notably, 50.3% (n= 179) find it easy to refer patients to other departments, but 3.1% (n= 11) experience slight difficulty in generating discharge summaries. Tasks like providing written individual information and searching for disease-related knowledge prove challenging for only 2.05% (n= 9) each. Meanwhile, 11.5% (n= 41) express a neutral response to generating data reviews for specific patient groups, such as disease diagnoses and complication rates.

Table 3: Perceived Changes in Task Difficulty in Healthcare Information Management

Task Aspect	More difficult	Slightly difficult	No change	Slightly easier	More Easier	Don't know
To review the patient's problems has become	13(3.7%)	17(7.6%)	35(9.8%)	120(33.7%)	142(39.9%)	19(5.3%)
To obtain information on treatment procedures has become	10(2.8%)	21(5.9%)	36(10.0%)	121(34.0%)	153(43.0%)	14(3.9%)
To obtain the results from new test or investigation has become	9(2.5%)	22(6.2%)	34(9.6%)	121(34.0%)	159(44.71%)	11(3.1%)
To follow the results of a particular test or investigation over time has become standard	6(1.7%)	16(4.5%)	33(9.3%)	123(34.6%)	163(45.81%)	14(3.9%)
To order new test or laboratory investigations has become standard	5(1.4%)	18(5.1%)	45(12.6%)	108(30.31%)	159(44.7%)	20(5.9%)
To order X-ray, ultrasound or CT investigations has become	8(2.21%)	13(3.7%)	52(14.6%)	109(30.6%)	146(41.0%)	26(7.3%)
To obtain the results from X-ray, ultrasound or CT investigations has become standard						
To order treatment directly (e.g., medicines, operations etc.) has become standard	9(2.5%)	21(5.9%)	31(8.71%)	114(32.0%)	161(45.2%)	20(5.6%)
To write prescriptions has become standard	16(4.5%)	14(3.9%)	33(9.3%)	117(32.9%)	153(43.0%)	22(6.2%)
To enter daily notes has become standard	14(3.9%)	19(5.3%)	29(8.1%)	102(28.7%)	163(45.81%)	29(8.1%)
To refer the patient to other departments or specialists have become standard	12(3.4%)	14(3.9%)	20(5.6%)	114(32.0%)	179(50.3%)	17(4.8%)
To generate discharge summary/report has Become standard	10(2.8%)	11(3.1%)	31(8.7%)	121(34.0%)	60(44.9%)	22(6.2%)
To give written individual information to patients, e.g., about disease, medications, discharge instructions etc.	9(2.5%)	16(4.6%)	45(12.6%)	104(29.2%)	158(44.4%)	24(6.7%)
To search specific knowledge-based information related to some disease, medication,	9(2.5%)	10(2.8%)	47(13.2%)	114(32.2%)	151(42.4%)	25(7.0%)

therapy etc.						
To produce data reviews for specific patient groups, e.g., disease diagnoses, complication rate etc. has become	12(3.4%)	16(4.5%)	41(4.5%)	116(32.6%)	140(39.3%)	29(8.1%)

Table 4 highlights that a significant majority, comprising 54.2% (n= 193), agrees that the MIS provides precise information as needed. About 18.0% (n= 64) express a neutral stance on the adequacy of information provided by MIS, while 5.1% (n= 18) disagree that MIS delivers accurate information promptly. Only 2.2% (n= 8) remain neutral about the user-friendliness of MIS, and 55.31% (n= 197) exhibit a neutral response regarding the output from MIS. Additionally, 64.6% (n= 230) agree that MIS is time-worthy, with 5.6% (n= 20) in disagreement, and 2.0% (n= 7) strongly disagreeing that MIS interferes with their clinical tasks. Notably, 9.6% (n= 34) strongly agree that MIS leads to a loss of access to medical records. Regarding support, 56.7% (n= 202) and 56.1% (n= 201) agree on the continuous need for IT staff support and high computer literacy for MIS. On the contrary, 28.9% (n= 103) and 52.21% (n= 186) disagree that being senior in age and having proper training are prerequisites for effective MIS use. Furthermore, 58.7% (n= 209) agree that the hospital should have policies ensuring uninterrupted work during MIS downtimes, and 46.1% (n= 164) express satisfactory sentiments about MIS.

Table 4: Perceptions of Participants Regarding Management Information System (MIS) Usage in Healthcare

Perception Aspect	Extremely Disagree	Disagree	Neutral	Agree	Extremely Agree
MIS provides the precise information about what I need.	10(2.8%)	15(4.2%)	109(30.6%)	193(54.2%)	26(7.3%)
MIS provides sufficient information and all functions to meet my needs.	5(1.4%)	28(7.9%)	64(18.0%)	232(65.2%)	27(7.6%)
MIS provides accurate information whenever I need.	8(2.2%)	18(5.1%)	102(28.7%)	195(54.8%)	31(8.7%)
MIS is user friendly; it is easy to operate and navigate through MIS screen	8(2.2%)	22(6.2%)	66(18.5%)	224(62.9%)	35(9.8%)
The output in MIS is presented in an easy and user-friendly format showing clear information	8(2.2%)	19(5.3%)	95(26.7%)	197(55.3%)	37(10.4%)
MIS is worth the time and effort required to use it.	5(1.4%)	17(4.8%)	67(18.8%)	230(64.6%)	37(10.4)
Use of MIS requires me to do more work in addition to paper work that I do in my routine tasks	14(3.9%)	20(5.6%)	87(24.4%)	191(53.7%)	42(11.8%)
Use of MIS interferes with my clinical work/tasks on patients.	7(2.0%)	19(5.3%)	79(22.2%)	200(56.2%)	51(14.3%)
MIS most often causes loss of access to medical records and related information due to computer or power failure.	16(4.5%)	26(7.3%)	81(22.8%)	198(55.6)	34(9.6%)
Continuous support from IT staff is available whenever technical problem occurs	14(3.9%)	18(5.1%)	68(19.1%)	202(56.7%)	54(15.2%)
MIS use requires high computer literacy skills	10(2.8%)	25(7.0%)	84(23.6%)	201(56.5%)	36(10.1%)
MIS use requires to be senior in age and having a length of experience	22(6.2%)	103(28.9%)	60(16.9%)	134(37.6%)	37(10.4)
I received adequate training and proper orientation of computer system and software before using MIS.	17(4.8%)	22(6.2%)	83(23.3%)	186(52.2%)	48(13.5%)
When at some time MIS is down, our hospital has policies and procedures to allow us to continue	11(3.1%)	16(4.5%)	77(21.6%)	209(58.7%)	43(12.1%)

our work without hindrance.					
Overall, I am satisfied with my experience with MIS	10(2.8%)	10(2.8%)	60(16.9%)	164(46.1%)	112(31.5%)

Discussion

The comprehensive study conducted at Madinah Teaching Hospital in Faisalabad yielded insightful results regarding the utilization of the MIS. In this investigation involving 356 participants, including 120 doctors, 136 nurses, and 100 individuals from various categories, a notable 100% of participants engaged in regular work with patients. This high level of engagement underscores the integral role of MIS in daily healthcare activities, aligning with the increasing reliance on EHRs worldwide. The percentage of doctors and nurses regularly using MIS in Faisalabad is consistent with the reported growth in EMRS observed globally, emphasizing the universal trend toward integrating digital information systems into routine healthcare practices [18].

In our study a comprehensive overview of participant engagement with the MIS in various healthcare tasks. Notably, 58.9% of participants utilize MIS for reviewing patient problems, and 53.9% obtain information through the system. These values reflect a substantial reliance on MIS for crucial aspects of patient care. Comparing these findings with previous studies [19,20], the emphasis on patient problem review aligns with the global trend of using EMRS for comprehensive patient care. However, variations in engagement levels for specific tasks, such as ordering new tests (43.8%), highlight the need for context-specific strategies. International comparisons reveal that while certain functionalities are universally embraced, task-specific variations necessitate tailored approaches to optimize MIS utilization [21].

Our study delves into participants' perceived changes in task difficulty in healthcare information management through MIS. Notably, a mere 3.7% encounter difficulties when reviewing patient problems, while a substantial majority (43%) finds MIS particularly user-friendly for obtaining information on treatment procedures. These results indicate a generally positive user experience but also highlight areas for potential improvement. Comparing these findings with previous studies [22,23], the high percentage finding MIS user-friendly aligns with the overarching goal of EMRS to enhance user experience. However, identifying specific challenges, such as ordering new tests (1.4%), underscores the importance of addressing context-specific usability issues for optimal system performance.

The study presents participant perceptions regarding various aspects of MIS usage in healthcare. Impressively, 54.2% of participants agree that MIS provides precise information as needed. This positive perception aligns with the overarching goal of Health Information Systems to deliver accurate and timely information. Comparing this result with international study [24], the emphasis on information accuracy is a shared concern. However, the 18.0% expressing a neutral stance on MIS providing sufficient information indicates potential room for improvement. This finding highlights the need for continuous evaluation and enhancement of MIS functionality to meet evolving healthcare needs [25].

Conclusion

In summary, the study conducted at Madinah Teaching Hospital in Faisalabad indicates a robust engagement of healthcare professionals with the Medical Information System (MIS), showcasing its integral role in daily patient care activities. Noteworthy participation percentages in tasks such as reviewing patient problems and obtaining treatment information underscore the diverse applications of MIS. Positive user experiences and a high agreement on information accuracy highlight the system's overall effectiveness. However, identified challenges, especially in specific tasks, emphasize the importance of context-specific strategies for optimizing MIS utilization. The findings contribute valuable insights to the ongoing discourse on healthcare digitization, calling for continuous evaluation and improvement to align MIS with evolving healthcare needs.

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