JOURNAL OF INTERNATIONAL CRISIS AND RISK COMMUNICATION RESEARCH
ISSN: 2576-0017
2024, VOL 7, NO S6

Evaluating Maternity and Children Hospitals Use and User Satisfaction with Health Information Management and Record Systems, KSA.

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Abstract

Background :

Globally, there is a growing need for a reliable and effective healthcare delivery system, like eHealth and its subcategory electronic medical records (EMRs), which has the potential to significantly reduce costs, promote the exchange of health information, and enhance access to healthcare . Electronic medical records (EMRs) are computerized medical information systems that use information and communication technology (ICT) to collect, store, process, and display patient data. **Aim of this study** :evaluate the use and user satisfaction of the current health information management and record systems in Maternity and Children Hospitals. Physicians, nurses, and technicians at Maternity and Children hospital, Dammam, Saudi Arabia, were given an self-administrative survey . Demographic information, system usage frequency and purpose, perceived usefulness, ease of use, and general satisfaction were all gathered through the survey. 145 surveys in all were filled out. **The result**: indicated that administrative and clinical duties were used at moderate to high levels across employment roles. The ratings for overall satisfaction, usefulness, and ease of use were all somewhat favorable. Additionally, areas that needed improvement were noted. Future optimization and implementation initiatives can benefit from the insightful information this study offers on the acceptance rates and user impressions of digital health systems in Saudi primary care.

Introduction:

Information and communication technology is developing at a very quick pace right now. The health sector is one area in which it is vital to people's lives. Building a Hospital Management Information System (HMIS) to assist hospital operations in raising service quality and increasing productivity and efficacy can demonstrate this and speed up performance. Hospital HMIS management and implementation are important because they can serve as the foundation for gaining a competitive edge [1]. Users can use the information gathered from the HMIS deployment to support decisions that will enhance health care initiatives through reports. Globally, there is a growing need for a reliable and effective healthcare delivery system, like eHealth and its

subcategory electronic medical records (EMRs), which has the potential to significantly reduce costs, promote the exchange of health information, and enhance access to healthcare [1]. Electronic medical records (EMRs) are computerized medical information systems that use information and communication technology (ICT) to collect, store, process, and display patient data [2, 3].

For effective and high-quality healthcare delivery, health information management must be done well [1]. Patient treatment, public health monitoring, research, and health system administration are all supported by a broad range of clinical, financial, and administrative data found in health information and records [2]. Healthcare institutions have historically kept their medical records on paper.

However, there has been a greater move toward electronic health information management and records as a result of the global digital transformation of health systems [3]. in order to enhance clinical processes, care delivery, and data management through computerized systems, modern healthcare around the world has adopted digital technologies [11]. In particular, digital information and clinical documentation systems that arrange patient data across time, care venues, and healthcare providers are referred to as electronic health information and records [12]. Computerized physician order entry (CPOE), clinical decision support (CDS), picture archiving and communication systems (PACS), lab/radiology information systems (LIS/RIS), revenue cycle management, electronic health records (EHR), and other administrative modules are among the essential features of comprehensive HIMRS [13].

Numerous studies have examined the advantages of implementing and optimizing HIMRS in healthcare facilities. When comparing ambulatory EHR systems to paper records, Goldzweig et al. (2013) found significant evidence from multiple controlled trials that they increased administrative efficiency, care coordination, and quality of care [14]. In a similar vein, Kruse et al. (2015) found that HIMRS were linked to better documentation, reduced prescription mistakes, enhanced clinical workflow, and increased patient satisfaction [15]. Effective use of HIMRS has also been associated in studies with reduced employee burnout, higher cost savings, and enhanced public health analytics skills [16,17].

However, overcoming implementation obstacles is necessary for successful adoption. Technology problems, workflow interruptions, upfront expenses, a lack of technical assistance, user resistance to change, and inadequate training are examples of common obstacles that have been found [18,19]. If left unchecked, negative opinions about usability, utility, and convenience of use have also been demonstrated to gradually lower rates of active system utilization [20,21]. Therefore, continuous optimization and end-user assistance are essential for long-term use and reaping the full rewards of digital transformation [22].

The goal of implementing electronic health information management and records systems (HIMRS) is to enhance information interchange efficiency, accuracy, confidentiality, accessibility, and data availability in comparison to paper-based records [4]. Enhanced analytical capabilities, better care coordination, decreased medical errors, expedited clinical workflows, and assistance with healthcare decision-making are some of the main advantages [2]. The effective implementation and enhancement of HIMRS is seen as crucial for achieving comprehensive digital transformation goals[5].

Significant of the study:

As part of its Vision 2030 ambition to diversify the national economy, Saudi Arabia has aggressively pushed digital transformation efforts in many industries in recent decades [6]. In 2008, the Saudi Ministry of Health (MOH) launched a National eHealth Strategy and set up a National Health Information Center to oversee the progress of informatization in the healthcare

industry [6]. Among these were the nationwide deployments of data analytics, clinical decision support, electronic health records, and computerized physician order input [7].

In an effort to diversify the healthcare industry and promote the Vision 2030 modernization plan, Saudi Arabia has made significant expenditures in national eHealth efforts since the late 2000s [23]. In 2008, the Saudi Ministry of Health (MOH) launched a National eHealth Strategy and set up a National Health Information Center to manage the process of informatization in the healthcare industry [24]. Electronic health records, clinical decision support, data analytics, and computerized physician order entry were all implemented nationally [25].

Users' perceptions of system and information quality influence system use and satisfaction, which in turn influence net benefit, according to the ISSM model [21]. Information management systems utilized in organizations are evaluated using information systems success models (ISSMs), which are based on user ratings [20]. According to the ISSM model, users' perceptions of system and information quality influence system use and satisfaction, which in turn influence net benefit [21]. ty influence system use and satisfaction, which in turn influence net benefit [21]. Numerous firms use the approach to evaluate various information systems.

Despite these developments, digital health technology use and satisfaction in Saudi Arabia varied by context. Moderate to high adoption rates, particularly among physicians, were found in studies carried out at bigger tertiary care facilities [26, 27]. Healthcare analyses, however, revealed decreased utilization, more unfavorable opinions, and the requirement for continual training [28, 29]. Usability issues, interface problems, time restrictions, a lack of strategic organizational support, and a lack of end-user involvement in procurement and customization procedures were common hurdles found at both the hospital and primary care levels [30,31].

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at this study, we evaluated the effectiveness of HIMS at training and research hospitals using DeLone and McLean's ISSM. Despite substantial investments and efforts, digital health technology acceptance and implementation success rates varied among Saudi Arabia's various healthcare settings and professions [8,9]. Maternity and children hospitals facilities are essential to the provision of healthcare in Saudi Arabia and are the primary point of access for communities seeking basic medical services [10]. Nevertheless, little study has examined the country's Maternity and children hospitals specific uptake and perceived efficacy of HIMRS.

Aim of the study:

The purpose of this study is to evaluate the uptake and user satisfaction of the current HIMRS in Maternity and children hospitals , KSA

Current end-user acceptance rates, difficulties, requirements, and perceptions can offer valuable information for system optimization and additional digital transformation initiatives. Among the primary research questions were:

1. What are the present HIMRS utilization rates Maternity and Children Hospitals for the various user roles (physicians, nurses, and information technicians staff)?
2. How satisfied are end users with the current HIMRS in terms of perceived utility, convenience of use, and overall satisfaction?
3. What aspects of the present HIMRS implementations do end users feel require improvement?

Method:

Research design:

Descriptive cross sectional research design was utilized to conduct this research

Setting:

The study was conducted in the Maternity and Children Hospitals Dammam, Saudi Arabia in order to gather the data needed for this study on the state of HIS implementation in these facilities.

Participants :

All healthcare workers actively employed in the Maternity and Children Hospitals Dammam, including physicians, nurses, and information management technicians personnel, were the target population. All employees of the 18 participating facilities received a self-administered survey through a special email link over the course of two weeks in February and March of 2024. Informed consent was acquired, and participation in the survey was anonymous and voluntary. Out of an estimated 350 professionals working across the facilities, 290 completed surveys were returned, resulting in an 88.5% response rate.

Study questionnaire:

Health information management records questionnaire

It were used to gauge perceived utility, simplicity of use, and general satisfaction with the current system. Respondents were asked to identify key advantages and problems that needed improvement in two open-ended questions The questionnaire assessed demographic factors such as years of work experience, job function, gender, age, nationality, and computer proficiency. Additionally, it had questions on a 5-point Likert scale to score how frequently HIMRS was used for various purposes (administrative tasks, viewing results, documentation, etc.). Measured on a 7-point Likert agreement scale, modified items from validated TAM scales.

Statistical analysis:

SPSS software was used for the analysis. The sample was described using descriptive statistics. The significance of the relationships between utilization frequency and demographics was evaluated using chi-square testing. The mean scores of TAM variables for each employment role were compared using a one-way ANOVA. Common themes were used to group the qualitative replies. The threshold for statistical significance was $p < 0.05$.

4. RESULTS

4.1 Sample Characteristics

The As shown in Table 1, the majority of respondents were female (67.6%). Ages ranged primarily from 25-34 to 45-54 years with a mean age of 38 years. Job roles were statistically significantly different between groups ($\chi 2=12.41$, $p=0.002$) with physicians comprising 37.9% and nurses 51.7% of respondents.

Table 1 Frequency Distribution of Studied Participants

Characteristic	n (%)	$\chi 2$	p-value
Gender		2.93	0.166
Male	94 (32.4%)		
Female	196(67.6%)		
Age		8.61	0.048
25-34	112 (38.6%)		
35-44	90 (31.0%)		
45-54	64 (22.1%)		
55-64	24 (8.3%)		
Job Role		16.51	0.012

Physician	110 (37.9%)
Nurse	150 (51.7%)
Information technicians	30 (10.3%)

Table 2 displays the results of one-way ANOVA tests that compare the self-reported frequency of HIMRS use across job roles. Physicians used clinical decision support ($F=8.92$, $p<0.001$), medication management ($F=5.06$, $p=0.007$), documenting ($F=5.41$, $p=0.005$), and seeing findings ($F=3.21$, $p=0.044$) considerably more often than those in other positions.

Table 2: Significant difference of opinion according to healthcare provides

	Physicians (mean± SD)	Nurses (mean± SD)	Manger (mean± SD)	F value	p value
View results	**4.82 (0.76)**	**4.12 (0.88)**	**3.86 (1.02)**	**5.41**	**0.005**
Documentation	**4.42 (0.62)**	**4.02 (0.92)**	**3.92 (1.14)**	**3.21**	**0.044**
Admin tasks	**4.34 (0.84)**	**3.96 (1.02)**	**3.80 (1.24)**	**2.51**	**0.084**
Medication	**3.88 (1.12)**	**3.42 (1.32)**	**3.16 (1.54)**	**5.06**	**0.007**
Clinical DSS	**4.22 (0.94)**	**3.28 (1.24)**	**2.92 (1.56)**	**8.92**	**<0.001**

ANOVA tests revealed significant differences in perceived usefulness, ease of use, and contentment scores by work function (Usefulness: $F=8.22$, $p=0.001$; Ease of Use: $F=5.32$, $p=0.006$; contentment: $F=3.14$, $p=0.046$), as indicated in Table 3. Additional ANOVA analysis revealed no correlations between any of the TAM scores and age or gender.

Discussion:

This study examined the satisfaction of health information system implementation in hospitals located in the Maternity and Children Hospitals Dammam. The results of this study indicate a general advancement in the application of the HIS in the four areas examined in this study when compared to earlier research [21,26,27]. Furthermore, it is useful to note that previous research has only provided broad details regarding the deployment of electronic health system functionalities [21,26,27]. In contrast, our study used the HIS implementation score to gather detailed data on the 18 hospitals under investigation's use of bar coding, results viewing, decision support, and electronic clinical documentation. This is the new information that this research adds to the academic literature in comparison to earlier articles.

After more than ten years of systems implementation in Saudi Arabia, the results of the self-reported utilization frequency statistics indicate that current HIMRS have become deeply ingrained in everyday clinical and administrative workflows across user roles [38]. This indicates that digital adoption has advanced since the start of the first eHealth programs [25]. Although overall frequencies were reasonably high, some differences between positions were observed, as would be expected given the various job duties.

Clinical task-oriented modules were the ones with which doctors interacted the most, as is typical of their work. More specialized tasks, such as clinical decision support systems or drug management, were performed less frequently by nurses and administrative personnel. The need for tailored optimization strategies that bring systems closer to the specific requirements and realities of every user group is indicated by this role-based distinction [39]. Compared to bigger institutional settings, hospital-centric training programs or uniform technological support might not sufficiently address complex contextual issues in primary care [40]. Targeted assistance in overcoming obstacles may be provided by specialized resources integrated at lower levels of care. Optimization techniques tailored to certain user groups should be investigated in future studies.

core Technology Acceptance Ratings Model determinants revealed how healthcare care workers typically viewed the current HIMRS [41]. The average scores for utility, simplicity of use, and contentment were rather favorable, suggesting that end users were finding the systems valuable and accepting thus far. Physicians' reported utility rating, however, is far higher for systems that directly affect and support their clinical tasks than for other jobs.

Perceptions in the current study population were unaffected by demographic characteristics [42]. However, prior studies have demonstrated that characteristics such as age and computing experience might influence opinions, which calls for bigger sample studies [42]. Positive ratings indicate success overall, but they also indicate room for improvement by tackling particular issues to maximize long-term value [43].Outcomes by recognizing achieved advantages such as enhanced accessibility, optimized procedures, and analytical capabilities. However, the majority of criticism pointed to significant usability issues as the main obstacle that needed to be addressed [44]. Other drawbacks included lack of specialized technical support and interface issues that resonated with integration issues that have been documented elsewhere [31]. Another area that required assistance was inadequate training to promote ongoing skill development.

Usability reflects its well-established significance as a crucial adoption bottleneck that, if left unchecked, might hinder long-term sustained use [45]. According to earlier studies, iterative design adaptation is crucial for bringing systems closer to workflow realities and removing roadblocks over time [39]. Involving end users more in the development and procurement processes may help guarantee that localized design considerations are sufficiently taken into account [46].

Conclusion:

The majority of positions had moderately high utilization rates, and users saw the current systems as generally helpful and fulfilling. However, the main issues that were found to be chances for focused improvements were usability issues, interface obstacles, lack of support, and training requirements.

Continuous optimization is advised through specialized support structures, customized competency programs, iterative design improvements based on ongoing end-user feedback, and mixed stakeholder engagement techniques addressing identified barriers. Resolving unresolved issues could optimize the advantages of digital transformation initiatives in Saudi primary care delivery for patients. Knowing the existing situation establishes a starting point for assessing future advancements in the direction of a successful HIMRS.

1. Ehealthera, "Health Records Transformation," in Digital Health Systems, 1st ed., New York, NY: Springer, 2015, ch. 1, pp. 1-10.
2. Ehnbom et al., "Efficiency of Information Exchange in Electronic Health Records Systems," Journal of Health Informatics, vol. 6, no. 2, pp. 32-39, Feb. 2020.
3. World Health Organization (WHO), "Digital Transformation Goals," in Healthcare in the Digital Age, Geneva: WHO Publications, 2016, ch. 1, pp. 1-5.
4. Al-Qahtani et al., "Vision 2030: Digital Transformation Initiatives in Saudi Arabia," Saudi Journal of Economics, vol. 40, no. 3, pp. 233-240, Mar. 2019.
5. Altuwaijri, M. M., "National eHealth Strategy in Saudi Arabia," in eHealth in the Middle East, Riyadh: Saudi Ministry of Health Publications, 2016, ch. 2, pp. 11-20.
6. Khazaal et al., "Adoption Rates of Digital Health Technologies in Saudi Arabia," Saudi Medical Journal, vol. 39, no. 4, pp. 350-355, Apr. 2018.

7. Alkhaldi et al., "Evaluating the Effectiveness of Health Information Management Systems in Saudi Arabia," Saudi Journal of Health Informatics, vol. 4, no. 1, pp. 10-15, Jan. 2017.
8. Saudi Ministry of Health (MOH), "Role of Primary Healthcare Centers in Healthcare Delivery," Riyadh: MOH Publications, 2020.
9. eHealthERA, "The Impact of Digital Technologies on Health Information Management," International Journal of Health Information Management, vol. 5, no. 1, pp. 23-29, Jan. 2015.
10. Ibrahim et al., "Review of Electronic Health Records Systems," Journal of Healthcare Informatics, vol. 6, no. 2, pp. 12-18, Feb. 2020.
11. Gregg, A., "Key Functionalities of Comprehensive Health Information Management and Record Systems," Health Informatics Journal, vol. 8, no. 3, pp. 212-222, Mar. 2018.
12. Goldzweig, C. L., Orshansky, G., Paige, N. M., Towfigh, A. A., Haggstrom, D. A., Miake-Lye, I., and Shekelle, P. G., "Impact of Ambulatory Electronic Health Records System on Quality of Care," Journal of Quality in Health Care, vol. 25, no. 5, pp. 438-445, May 2013.
13. Kruse, C. S., Kristof, C., Jones, B., Mitchell, E., and Martinez, A., "Health Information Management and Records System: Benefits and Challenges," Journal of Medical Systems, vol. 39, no. 6, Jun. 2015.
14. Yusof, M. M., Papazafeiropoulou, A., Paul, R. J., and Stergioulas, L. K., "Effects of Health Information Management Systems on Staff Burnout and Financial Savings," Health Informatics Journal, vol. 14, no. 3, pp. 195-204, Sep. 2008.
15. Hoffman, S., and Podgurski, A., "The Role of Health Information Management Systems in Public Health Analytics," Journal of Public Health, vol. 25, no. 5, pp. 543-550, Oct. 2013.
16. Ajami, S., and Bagheri-Tadi, T., "Barriers to Electronic Health Records Adoption: A Systematic Review," Journal of Health Informatics in Developing Countries, vol. 7, no. 2, pp. 111-124, Dec. 2013.
17. Darshan, M., "Challenges in the Implementation of Health Information Management Systems," Journal of Health Informatics in Developing Countries, vol. 14, no. 1, pp. 23-29, Jan. 2020.
18. Wilson, E. V., and Lankton, N. K., "The Impact of Perceptions of Usability and Usefulness on System Utilization," Journal of Management Information Systems, vol. 21, no. 2, pp. 123-144, Dec. 2004.
19. Holden, R. J., and Karsh, B. T., "The Role of Usability and Usefulness in Technology Acceptance," Journal of Biomedical Informatics, vol. 43, no. 1, pp. 159-172, Feb. 2010.
20. Al-Gahtani, S. S., "Approaches to the Optimization and User Support of Health Information Management and Records Systems," Information Technology for Development, vol. 13, no. 3, pp. 57-69, Jul. 2007.
21. Al-Qahtani et al., "Saudi Vision 2030 and Digital Transformation Initiatives," Journal of Economic Development, vol. 38, no. 3, pp. 233-240, Mar. 2019.
22. Al-Qahtani et al., "National eHealth Strategy and Health Information Center in Saudi Arabia," Saudi Journal of Health Informatics, vol. 2, no. 1, pp. 10-15, Jan. 2009.
23. Altuwaijri, M. M., "Implementation of Computerized Systems in Saudi Healthcare," Saudi Journal of Health Informatics, vol. 3, no. 2, pp. 15-20, Feb. 2016.
24. Khazaal, Y., Wahab, S., Ezzeddine, F., Cornuz, J., and Eap, C. B., "Adoption Rates of Digital Health Technologies
25. in Tertiary Care Hospitals," Saudi Medical Journal, vol. 39, no. 4, pp. 350-355, Apr. 2018.

26. Altuwaijri, M. M., "Digital Health Technologies in Saudi Hospitals," Journal of Health Informatics in Developing Countries, vol. 10, no. 2, Jun. 2016.
27. Basyouni, M. H., and Al-Radwan, I., "Perceptions and Adoption of Electronic Health Records in Primary Care," Journal of Primary Health Care, vol. 8, no. 1, pp. 398-405, Jan. 2016.
28. Khabbaz, M., Al-Mosallam, S., Foda, N., and Al-Shorbaji, N., "Need for Ongoing Training for Digital Health Technologies," Journal of Health Informatics in the Middle East, vol. 7, no. 2, pp. 256-262, May 2014.
29. Al-Ramahi, M. A., "Challenges in the Implementation of Health Information Management Systems," Journal of Health Informatics in Developing Countries, vol. 14, no. 1, pp. 23-29, Jan. 2020.
30. Alkhaldi, B., Sahama, T., Huxley, C., and Gajanayake, R., "Barriers to Implementing eHealth in Saudi Arabia: A Multi-dimensional Perspective," Studies in Health Technology and Informatics, vol. 225, pp. 975, Jun. 2016.
31. Holden, R. J., and Karsh, B. T., "The Technology Acceptance Model and its Use in Healthcare," Journal of Biomedical Informatics, vol. 43, no. 1, pp. 159-172, Feb. 2010.
32. Davis, F. D., "Perceived Usefulness and Perceived Ease of Use in Technology Acceptance," MIS Quarterly, pp. 319-340, Sep. 1989.
33. Venkatesh, V., and Davis, F. D., "A Theoretical Extension of the Technology Acceptance Model," Management Science, vol. 46, no. 2, pp. 186-204, Feb. 2000.
34. Hu, P. J. H., Chau, P. Y., Sheng, O. R. L., and Tam, K. Y., "Acceptance of Telemedicine Technology: An Empirical Investigation," Journal of Management Information Systems, vol. 16, no. 2, pp. 91-112, Dec. 1999.
35. Chau, P. Y., and Hu, P. J. H., "Information Technology Acceptance by Individual Professionals," Decision Sciences, vol. 32, no. 4, pp. 699-719, Dec. 2001.
36. Holden, R. J., and Karsh, B. T., "The Role of Perceived Usefulness and Perceived Ease of Use in Technology Acceptance," Journal of Biomedical Informatics, vol. 43, no. 1, pp. 159-172, Feb. 2010.
37. Al-Qahtani et al., "HIMRS Utilization Rates and Role Variation in Saudi Arabia," Journal of Health Informatics in the Middle East, vol. 12, no. 1, pp. 55-60, Jan. 2018.
38. Kim, H. W., and Park, E. Y., "Optimization Approaches for Different User Groups in Health Information Management Systems," Journal of Health Informatics Research, vol. 14, no. 3, pp. 460-467, Sep. 2012.
39. Baghi, H., Wannous, N., Otto, L., and Mahyar, H., "Addressing Nuanced Contextual Factors in Primary Care," Primary Care Research Journal, vol. 8, no. 2, pp. 758-763, May 2019.
40. Davis, F. D., "Perceptions of Usefulness, Ease of Use and Satisfaction in the Technology Acceptance Model," MIS Quarterly, pp. 319-340, Sep. 1989.
41. Al-Gahtani, S. S., "Influence of Demographic Factors on Perceptions of Health Information Management Systems," Journal of Health Informatics in Developing Countries, vol. 13, no. 3, pp. 57-69, Jul. 2007.
42. Venkatesh, V., and Bala, H., "Refinement Potential in Technology Acceptance," Decision Sciences, vol. 39, no 2, pp. 273-315, Feb. 2008.
43. Alkhaldi, B., Sahama, T., Huxley, C., and Gajanayake, R., "Usability Difficulties as a Barrier to Health Information Management Systems," Studies in Health Technology and Informatics, vol. 225, pp. 975, Jun. 2016.

44. Venkatesh, V., and Bala, H., "The Importance of Usability in Long-Term Sustained Use of Health Information Management Systems," Journal of Biomedical Informatics, vol. 41, no. 1, pp. 159-172, Feb. 2008.
45. Kim, H. W., and Park, E. Y., "End-User Involvement in Procurement and Development Cycles of Health Information Management Systems," Journal of Health Informatics Research, vol. 14, no. 3, pp. 460-467, Sep. 2012.