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FACTORS AFFECTING THE INTEGRATION OF ELECTRONIC HEALTH RECORD WORKFLOWS AMONG NURSES, MIDWIVES, MEDICAL SECRETARIES, AND HEALTH INFORMATICS SPECIALISTS IN RIYADH HOSPITALS

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ABSTRACT

Integrating electronic health records (EHRs) into daily clinical practice is essential for improving documentation quality, communication, and workflow efficiency. Understanding the factors influencing EHR integration across various healthcare professions is crucial for driving digital transformation in Saudi Arabia. This study assessed EHR usage, identified system- and user-related factors affecting workflow integration, and examined differences among professional groups. A cross-sectional survey was conducted among 315 healthcare professionals, including nurses, midwives, medical secretaries, and health information specialists. Data were collected using a structured questionnaire that addressed the use of electronic health records, ease of use of the system, user efficiency, organizational support, perceived benefit, and barriers. Overall EHR use was high among participants (M = 4.10). System usability (M = 3.94) and perceived usefulness (M = 4.07) were the strongest positive domains, while organizational support (M = 3.68) and barriers (M = 3.55) scored lower. Significant differences were found across professional groups (F = 7.84, p < .001), with health informatics specialists reporting the highest workflow integration. Workflow integration showed strong positive correlations with system factors (r = .62), user competence (r = .55), and perceived usefulness (r = .59), and a moderate negative correlation with barriers (r = –.44). Regression analysis identified system factors (β = .41) and perceived usefulness (β = .24) as the strongest predictors, explaining 50% of the variance. The integration of electronic health records (EHRs) is primarily influenced by system quality, user capabilities, and regulatory conditions. Enhancing ongoing training, improving technical support, and streamlining workflows can promote EHR adoption across various healthcare professions and support national digital health initiatives.

KEYWORDS: Electronic Health Records, Digital Health, Healthcare Professionals, Workflow Integration.

1. INTRODUCTION

The digital transformation of healthcare has redefined how information is generated, shared, and used to support clinical decision-making and patient safety worldwide. A key development in this transformation has been the adoption of electronic health records (EHRs), which have revolutionized documentation practices, data accessibility, and interdisciplinary coordination (Stoumpos, Kitsios, & Talias, 2023). However, integrating EHRs into daily clinical workflows remains a complex and multifaceted process, influenced by human, organizational, and technological factors (Vos et al., 2020). Effective workflow integration is crucial to ensuring that digital health innovations translate into tangible improvements in the efficiency and quality of healthcare (Zayas-Cabán, Okubo, & Posnack, 2022).

In Saudi Arabia, the Health Transformation Program under Vision 2030 has contributed to the digitization of healthcare systems through initiatives by the Saudi Ministry of Health. Vision 2030 aims to create a unified health information infrastructure that enhances operational compatibility, reduces duplication, and promotes evidence-based decision-making (Suleiman, & Ming, 2025). However, disparities persist in the adoption and use of electronic health record (EHR) systems across different professional groups (Tsai et al., 2020). Many healthcare institutions still suffer from fragmented implementation, inadequate staff training, and a failure to adapt EHR systems to clinical and administrative hospital workflows (AlSadrah, 2020; Al-Anzi et al., 2020). According to Asiri (2024), the challenges faced by nurses in Saudi public hospitals included their level of education, work environment, and frequency of use of electronic health records (EHRs), which are considered predictive factors for workflow integration in hospitals. A study by Alrasheeday et al. (2023) revealed that 81.1% of nurses held a positive attitude toward her use, while 18.9% expressed negativity. Investigating how nurses' attitudes influence their use is essential in understanding its adoption. Technology adoption alone does not guarantee professional integration. Therefore, organizational support, user competence, and contextual compatibility are important (Stoumpos et al., 2023). However, the study's scope was limited to nursing staff, leaving it without exploring how other essential professionals such as midwives, medical secretaries, and health informatics specialists experience and influence EHR workflow integration.

The integration of these disciplines contributes to the effective collection, analysis, and flow of patient information, which in turn supports clinical decision-making. Therefore, it is essential to examine their interaction with electronic health record (EHR) systems (Keshta, Odeh, 2021). Extending Asiri (2024) framework to include a multidisciplinary context will provide a more comprehensive understanding of the determinants of effective EHR workflow integration in Saudi hospitals. This study aims to investigate the factors influencing EHR workflow integration among nurses, midwives, medical secretaries, and health informatics specialists in Riyadh hospitals.

1.1. Problem Statement

Globally, healthcare institutions have adopted electronic health record (EHR) systems instead of paper-based documentation to improve healthcare efficiency and enhance accuracy, thereby ensuring patient safety (Akhu-Zaheya et al., 2018). In Saudi Arabia, the implementation of EHRs began in 2008, but faced several challenges, including variations in EHR system design, limited user readiness, and inadequate technical support (AlSadrah, 2020). Despite substantial government investments exceeding US$1 billion, challenges persist, such as technological complexity, inconsistent access, and data security issues (AlSadrah, 2020; Alzghaibi & Hutchings, 2022). Most studies focus primarily on nurses, demonstrating that education level, computer skills, and attitudes significantly influence the use of EHRs (Tsai et al., 2020). However, healthcare delivery relies on coordinated work among nurses, midwives, medical secretaries, and health informatics specialists, all of whom interact with EHR systems differently. This impacts roles and competencies, ultimately affecting workflow integration and the overall system performance.

Improving the implementation of electronic health records and aligning systems with actual clinical and administrative workflows requires a prominent role for multidisciplinary expertise. Therefore, this study aims to examine the factors influencing the integration of electronic health record workflows among nurses, midwives, medical secretaries, and health informatics specialists in Riyadh hospitals.

1.2. Research Significance

This study addresses a critical gap in understanding how different healthcare professionals integrate electronic health records (EHRs) into their workflows. It engages nurses, midwives, medical secretaries, and health

informatics specialists, encompassing a broader, multidisciplinary approach to EHR use in healthcare. This contributes to policymakers' recommendations for the effective implementation of EHRs, aligning with the Saudi Vision 2030 goals of operational compatibility, efficiency, and digital transformation in healthcare.

1.3. Research Aims and Objectives

This study aims to determine the factors affecting the integration of Electronic Health Record (EHR) workflows among nurses, midwives, medical secretaries, and health informatics specialists in Riyadh hospitals.

The objectives of this research are

1. To examine the current EHR use and workflow integration among the targeted healthcare professionals
2. Identify differences in EHR workflow integration based on demographic and professional characteristics.
3. To determine the association between the predictive factors and the level of EHR workflow integration.

1.4. Research Questions

This study aims to answer the following questions

1. What is the current Electronic Health Record (EHR) use and workflow integration among nurses, midwives, medical secretaries, and health informatics specialists in Riyadh hospitals?
2. Are there significant differences in EHR workflow integration among these professional groups based on their demographic and role-related characteristics?
3. What are the relationships between predictive factors and the level of EHR workflow integration?

2. LITERATURE REVIEW

The concept of Electronic Health Records (EHRs) dates to the 1960s, aiming to empower clinicians and healthcare teams with real-time access to patient data. This enhances their ability to diagnose and manage diseases and adapt to rapidly evolving and complex healthcare needs (Evans, 2016).

EHRs are defined as the electronic version of a patient's health information, including clinical visits, laboratory and imaging results, medications, and other valuable patient management data. With the rapid transformation of healthcare, EHRs play a pivotal role, contributing to the digital documentation and classification of patient data and facilitating coordination among multidisciplinary healthcare teams. According to Alzghaibi, & Hutchings, (2025), EHRs play a crucial role in clinical decision-making and healthcare improvement. This has led global healthcare systems to adopt the integration of EHRs into digital health, and the Saudi Ministry of Health, as part of its Vision 2030, has embraced digital transformation and the integration of EHRs (Suleiman & Ming, 2025). According to Stombus et al. (2023) digital documentation significantly reduces clinical variability and improves workflow efficiency among frontline staff. These findings are consistent with those of Zayas-Kaban et al. (2022), who found that workflow automation supported by electronic health records (EHRs) reduces redundancy and facilitates safer patient care transitions. Similarly, Akho-Zahia et al. (2018) observed significant improvements in nursing documentation and medication accuracy after the transition from paper to digital records, reinforcing the consensus that EHRs positively impact the quality of care.

One of the most important advantages of electronic health records (EHRs) is their interoperability within healthcare facilities. EHRs facilitate the sharing and exchange of patient information among multidisciplinary healthcare teams across multiple locations, creating a lifelong medical record. Furthermore, EHRs enable efficient, accurate, and real-time access to patient information. They also enhance the ability of physicians and healthcare teams to easily access and retrieve patients' medical histories. EHRs can also be used to document patients' drug allergies, develop treatment protocols for chronic diseases, and create scheduled follow-up appointments or examination reminders. The implementation of EHRs has proven to be a significant financial investment, leading to reduced medication costs, improved utilization of radiology tests, and other benefits. In addition, EHRs can support medical research by generating up-to-date data for disease surveillance, which is crucial for public health policy and planning. Despite these advantages, studies consistently indicate that the adoption of electronic health records (EHRs) faces numerous barriers related to user, organization, and system. Tsai et al. (2020) reported that nurses' and midwives' acceptance levels are largely influenced by digital literacy, perceived usefulness, and the alignment between system functions and actual clinical tasks. In contrast, Al-Rashidai et al. (2023) found that while the majority of Saudi nurses have positive attitudes toward EHRs, a significant minority expressed negative perceptions due to the

increased documentation burden. Conversely, Akhu-Zaheya et al. (2018) suggest that EHRs are effective in reducing workload compared to traditional systems. This is attributed to varying levels of readiness to use EHRs and a lack of training for healthcare teams. Vos et al. (2020) indicate that effective collaboration among physicians, nurses, radiologists, pharmacists, administrative staff, and others depends on the extent to which electronic health record (EHR) systems support communication and interoperability between departments. This aligns with the study by Keshta and Odeh (2021), which emphasized the crucial role of health informatics professionals in ensuring system usability and data security. However, studies examining nurses, midwives, medical secretaries, and health informatics professionals within a single analytical framework remain limited.

On the other hand, organizational readiness is a key factor in the success of EHRs. According to Al-Zughaibi and Hutchings (2022), inconsistent implementation strategies and limited operational compatibility hinder the integration of EHRs in Saudi hospitals. Zayas-Kaban et al. (2022) also underscore the need for leadership support, ongoing technical assistance, and dedicated training time. As Al-Sadr (2020) points out, despite the challenges, Saudi hospitals demonstrate high potential for digital transformation when appropriate administrative support is available, indicating that organizational culture may mediate the impact of technical barriers.

The literature demonstrates the effectiveness of electronic health records (EHRs) in improving clinical documentation, interdisciplinary coordination, and patient care quality, despite some limitations related to technology, training, and preparedness. However, a significant gap remains in research examining the integration of EHR workflows among nurses, midwives, medical secretaries, and health informatics professionals.

3. METHODOLOGY

3.1. Study Design

This is a cross-sectional study design to assess the factors influencing Electronic Health Record (EHR) workflow integration among nurses, midwives, medical secretaries, and health informatics specialists working in Riyadh hospitals. The study was conducted between January and March 2025.

3.2. Study Participants

The study included nurses, midwives, medical secretaries, and health informatics specialists working in selected hospitals in the Riyadh region. These participants were chosen from diverse clinical and administrative backgrounds to ensure a comprehensive and representative understanding of the integration of electronic health record workflows across multiple professional roles. Convenience sampling was used. The final sample consisted of 315 participants, representing all targeted professional categories.

3.3. Inclusion Criteria

Participants were included if they were employed as nurses, midwives, medical secretaries, or health informatics specialists and used the Electronic Health Record (EHR) system as part of their daily responsibilities. Only staff with at least six months of experience with the current EHR platform and who provided informed consent were eligible.

3.4. Exclusion Criteria

The exclusion criteria applied to all trainees. Those with less than six months of experience using electronic health records or who were unable to complete the questionnaire were also excluded.

3.5. Data Collection Procedure

After obtaining ethical approval and permissions from the selected hospitals, eligible participants were contacted during their shifts and informed of the study's purpose. Participation was voluntary, and informed consent was obtained before data collection. A hybrid approach to data collection was used, combining paper questionnaires and secure electronic forms to ensure flexible participation. Self-administered questionnaires were completed in a timely manner and submitted either directly to the researcher or electronically via a secure link. All responses were collected anonymously and treated confidentially throughout the process.

3.6. Questionnaire

Data were collected using a self-assessment questionnaire adapted from previously validated instruments used in studies evaluating electronic health record (EHR) adoption, workflow integration, and digital health readiness. The instrument consisted primarily of closed-ended items measured on a five-point Likert scale ranging from "strongly disagree" to "strongly agree," allowing for a standardized assessment across all participants. The questionnaire comprised three main sections. Section 1 assessed sociodemographic and occupational characteristics, including gender, age, highest educational qualification, and years of experience. Section 2 evaluated participants' use of the EHR

system through eight items measuring routine clinical, administrative, and communication tasks performed within the system. Section 3 examined factors affecting EHR workflow integration, encompassing **several sub-areas** system-related factors, user competence and training, organizational support, perceived benefit, and workload-related barriers. The content was validated through expert review by nursing informatics and health information management specialists. A pilot test was conducted with a small group of participants to ensure clarity, relevance, and reliability. Cronbach's alpha coefficient indicated excellent internal consistency across the questionnaire domains, with values exceeding 0.80 for all subscales.

4. DATA ANALYSIS

Data were analyzed using IBM SPSS Version 28. Descriptive statistics were calculated to summarize demographic characteristics, EHR use, and workflow integration scores. One-way ANOVA was performed to examine differences across the four professional groups, and Pearson correlation coefficients were used to assess associations between key study variables. Multiple linear regression analysis was conducted to identify significant predictors of EHR workflow integration. Significance was determined at $P < .05$.

4.1. Ethical Considerations

Ethical approval for this study will be obtained from the Institutional Review Board (IRB) at General Directorate of Health Affairs and the Center for Natural and Health Sciences Research. The study is expected to pose no risks, harms, or discomforts to participating. To ensure confidentiality and privacy, no personal identifiers such as names will be collected alongside the data. Any information that could potentially identify participants will be securely stored, accessible only to the principal investigator, and destroyed upon completion of data collection. The results will be presented in aggregate form only, to maintain the anonymity of all participants.

5. RESULTS

A total of 318 questionnaires were completed. The demographic and baseline characteristics of the participants are presented in Table 1.

Table 1: Sociodemographic Characteristics of Participants (N = 315).

Variable	Category	Frequency	Percent (%)
Gender	Male	102	32.4%
	Female	213	67.6%
Age group	20–24 years	38	12.1%
	25–29 years	84	26.7%
	30–34 years	96	30.5%
	35–39 years	59	18.7%
	More than 40 years	38	12.1%
Highest qualification	Bachelor	228	72.4%
	Master's	71	22.5%
	PhD	16	5.1%
Years of experience	Less than 5 years	71	22.5%
	5–9 years	103	32.7%
	10–14 years	82	26.0%
	15–20 years	41	13.0%
	More than 20 years	18	5.7%
Profession	Nurses	132	41.9%
	Midwives	48	15.2%
	Medical Secretaries	71	22.5%
	Health Informatics Specialists	64	20.3%

The majority of participants were female (67.6%), while males represented 32.4% of the sample. Most respondents were between 25 and 39 years of age, with a mean age of 34.7 years (SD = 8.0). A large proportion held a bachelor's degree (72.4%), followed by master's (22.5%) and PhD degrees (5.1%). Regarding professional experience, the mean number of years in practice was 16.0 years (SD = 7.3), with most participants reporting 5–14 years of experience. Nurses constituted the largest professional group (41.9%), followed by medical secretaries (22.5%), health informatics specialists (20.3%), and midwives (15.2%).

Participants reported high levels of engagement with the electronic health record (EHR) system across multiple functional areas. As shown in Table 2, the

highest mean scores were associated with accessing and recording patient information (mean = 4.32, SD = 0.71) and documenting clinical observations and procedures (mean = 4.18, SD = 0.74), indicating strong integration of EHR use into direct patient care activities. Functions related to care planning and coordination, communication with other departments, and documentation of clinical interventions also showed high and consistent use (mean = 4.05 to 4.15). In contrast, administrative tasks and preparing discharge summaries received relatively lower scores (mean = 3.87 to 3.92), suggesting that these non-clinical processes may be less integrated into routine workflows. Overall, the high average utilization score (M = 4.10, SD = 0.82; 82%) indicates substantial adoption of EHR systems among all participating professional groups.

Table 2.Use of the EHR among Participants.

No	Item	Mean	SD	Mean %
1	Accessing and recording patient information, including medical history, assessments, and diagnostic data.	4.32	0.71	86.4%
2	Researching patient-related data, such as lab results, imaging, and reports.	4.21	0.76	84.2%
3	Planning or coordinating patient care and clinical decisions within the electronic health record (EHR) system.	4.09	0.82	81.8%
4	Implementing care or documenting interventions, such as administering medications or updating treatment protocols.	4.15	0.79	83.0%
5	Communicating and exchanging information with colleagues, departments, or external providers through the EHR system.	4.05	0.88	81.0%
6	Documenting services, clinical observations, or procedural details within the EHR system.	4.18	0.74	83.6%
7	Performing administrative or clerical tasks, such as admissions, discharges, scheduling appointments, or preparing reports.	3.92	0.93	78.4%
8	Evaluating care outcomes or preparing discharge summaries using EHR tools and data.	3.87	0.95	77.4%
The Average		4.10	0.82	82

Table 3: Factors Influencing EHR Workflow Integration.

Item	Mean	SD	Mean %
System-related factors			
The electronic health record system is easy to use and navigate.	3.96	0.78	79.2%
The system is reliable and rarely experiences downtime.	3.88	0.83	77.6%
The electronic health record functions align with my professional tasks and workflow.	4.02	0.74	80.4%
The system design supports effective communication between departments.	3.89	0.81	77.8%
The Average	**3.94**	**0.79**	**78.8%**
User competence and training			
I received sufficient training to use the electronic health record system effectively.	3.78	0.88	75.6%
Ongoing support and refresher sessions are provided to electronic health record users.	3.72	0.92	74.4%
I feel confident performing my job duties using the electronic health record system.	3.99	0.80	79.8%
User competence and training	**3.83**	**0.87**	**76.6%**
Institutional and organizational support			
My organization encourages the use of electronic health records in all my daily activities.	3.81	0.85	76.2%
Technical support is available should I encounter any system problems.	3.74	0.90	74.8%
The administration provides sufficient time and resources for accurate documentation.	3.49	0.97	69.8%
The Average	**3.68**	**0.91**	**73.6%**
Perceived usefulness and impact			
Electronic health records (EHRs) improve the quality of patient care and decision-making.	4.22	0.70	84.4%
The use of EHRs reduces redundancy and administrative burden.	3.89	0.83	77.8%
Integration of EHRs enhances communication and teamwork among staff.	4.11	0.76	82.2%
The Average	**4.07**	**0.76**	**81.3%**
Barriers & Workload Factors			
Using the EHR increases my documentation time and workload.	3.57	0.95	71.4%
Frequent system updates or technical issues disrupt workflow.	3.68	0.90	73.6%
There is resistance among some staff to fully adapt the EHR system.	3.41	0.97	68.2%
The Average	**3.55**	**0.94**	**71.1%**

Analysis of the factors influencing the integration of electronic health record (EHR) workflows revealed

significant variation across the five areas assessed (Table 3). System-related factors showed strong positive perceptions, with users reporting high agreement regarding the system's ease of use, reliability, and compatibility with their clinical workflow (78.8%). The perceived benefit area was rated the highest (81.3%), indicating that participants viewed the EHR as an effective tool for improving the quality of care, reducing duplication, and enhancing communication among healthcare teams.

User competence and training also showed positive scores (76.6%), suggesting that most participants felt confident in their ability to use the system, although the low means of ongoing support highlights opportunities for strengthening training programs. Organizational support showed moderate levels of agreement (73.6%), primarily due to low ratings related to the time and resources allocated to documentation, which could hinder optimal workflow integration. Barriers and workload factors were the least rated area (71.1%), with participants indicating that increased documentation time, technical glitches, and resistance from some staff negatively impacted the smooth use of electronic health records.

Overall, these results reveal that while the system design and perceived utility greatly facilitate the integration of electronic health records, organizational constraints and workflow barriers remain significant challenges that may impede the consistent adoption of electronic health records across different roles.

Table 4: One-Way ANOVA: Differences Across Professional Groups.

Source	df	F	p-value
Between Groups	3	7.84	0.000
Within Groups	311		
Significant differences were found between groups			

Table 5: Pearson Correlations between Key Study Variables.

Variable	1	2	3	4	5	6
Workflow Integration	1	.62**	.55**	.48**	.59**	–.44**
System Factors	.62**	1	.57**	.51**	.49**	–.38**
User Competence & Training	.55**	.57**	1	.46**	.42**	–.29**
Organizational Support	.48**	.51**	.46**	1	.37**	–.31**
Perceived Usefulness	.59**	.49**	.42**	.37**	1	–.27**
Barriers	–.44**	–.38**	–.29**	–.31**	–.27**	1
* p < .05, ** p < .01, *** p < .001 Negative correlation coefficients indicate an inverse relationship between the variables.						

The one-way ANOVA revealed statistically significant differences in workflow integration scores among the four professional categories included in the study ($F = 7.84$, $p < 0.001$), indicating that perceptions of electronic health record (EHR) integration varied considerably by role (Table 4). Health informatics specialists demonstrated the highest levels of integration, which may reflect their advanced familiarity with digital systems and their routine involvement in EHR-related tasks. Nurses also reported relatively high integration scores, consistent with their frequent use of EHRs for basic clinical documentation and patient care coordination. Medical secretaries scored the lowest average scores, suggesting potential challenges related to system ease of use, adequate training, or aligning EHR functions with administrative responsibilities. Midwives scored moderately, reflecting more balanced but less intensive involvement in EHRs compared to informatics specialists and nurses. These differences highlight the need for role-specific strategies to promote the integration of electronic health records, particularly for administrative staff who may need targeted support and workflow adaptation.

Table 6: Multiple Linear Regression Predicting Workflow Integration.

Variable	B	SE	β	t	p
System Factors	0.38	0.06	.41	6.33	< 0.001
User Competence & Training	0.21	0.07	.23	3.12	0.002
Organizational Support	0.14	0.06	.16	2.33	0.020
Perceived Usefulness	0.28	0.08	.24	3.52	< 0.001
Barriers	–0.19	0.05	–.22	–3.78	< 0.001

Correlation analysis revealed strong positive correlations between workflow integration and system factors ($r = .62$, $p < .01$), perceived utility ($r = .59$, $p < .01$), and user efficiency ($r = .55$, $p < .01$). Organizational support showed a moderate positive correlation ($r = .48$, $p < .01$). Conversely, barriers were negatively correlated with workflow integration ($r = -.44$, $p < .01$), suggesting that workload and technical challenges reduce the effectiveness of electronic health records (EHRs). Overall, the correlations support the impact of system quality, user capability, and organizational conditions on EHR integration.

6. DISCUSSION

The findings of this study demonstrate generally high levels of electronic health record (EHR) use across clinical and administrative functions, with strong integration into routine patient-care activities. Participants reported the highest commitment with documentation and information accessibility, reflecting a mature level of EHR adoption. These results align with previous research indicating that EHRs enhance documentation quality, accuracy, and efficiency in clinical workflows (Akhu-Zaheya et al., 2018). Similarly, the strong perceived usefulness observed in this study is consistent with prior evidence showing that EHRs support clinical decision-making and improve overall patient-care processes in Saudi healthcare settings (AlSadrah, 2020; Alrasheeday et al., 2023). High system-related scores in usability, reliability, and workflow alignment further support findings from Asiri (2024), who reported that well-designed EHR interfaces are key predictors of workflow integration among nurses. The correlation results in our study reinforced this relationship, as system factors were the strongest correlation of workflow integration. This is consistent with multiple regional studies emphasizing system quality as a foundational component of EHR acceptance in Gulf countries (Alanazi et al., 2020; Alzghaibi & Hutchings, 2022).

User competence and confidence with the EHR showed favorable levels but were lower than system usability and perceived usefulness. This pattern mirrors prior findings that lack of continuous training remains a recurring challenge in EHR implementation, even in institutions with established digital infrastructures (Tsai et al., 2020). Ongoing technical support gaps reported in this study also echo concerns identified by Keshta and Odeh (2021) regarding the necessity of sustained education and system support to maintain secure and efficient EHR practices.

Organizational support scored moderately, with insufficient documentation time being the most notable barrier. This finding is widely documented in international literature, where workload pressure and insufficient staffing are consistent barriers to digital integration (Vos et al., 2020). Under Saudi Arabia's Vision 2030 transformation model, strengthening organizational readiness and infrastructure is considered essential to optimizing digital workflows and maximizing EHR benefits (Suleiman & Ming, 2025).

The lowest-scoring domain in this study was barriers and workload factors, which also showed a significant negative correlation with workflow integration. Increased documentation time, system updates, and staff resistance appeared to hinder EHR use. These findings align with global evidence highlighting technical disruptions, workflow misalignment, and change resistance as persistent obstacles in EHR adoption (Zayas-Cabán et al., 2022; Tsai et al., 2020). The regression model in our study further supports this, showing barriers as a significant negative predictor even after controlling for system, competence, and organizational factors.

Significant differences were observed across professional groups, with health informatics specialists reporting the highest integration levels and medical secretaries reporting the lowest. This variation is expected, as informatics specialists typically receive formal digital-health training and work daily with EHR infrastructures. Lower integration among medical secretaries reflects findings from regional reviews showing that administrative staff often lack tailored training and experience greater workflow misalignment (Alanazi et al., 2020). These differences reinforce the importance of role-specific EHR strategies, especially for non-clinical staff whose system interaction patterns differ significantly from clinicians.

7. IMPLICATIONS

The findings of this study have several important implications for healthcare organizations seeking to improve the integration of electronic health records (EHRs). First, the strong impact of system usability and perceived usefulness highlights the need for continued investment in system design, ease of use, and interoperability to ensure alignment with clinical workflows. Enhancing user competence through structured and ongoing training programs is also crucial, as confidence and skill were key predictors of workflow integration. Furthermore, improving organizational support and reducing barriers related to workloads and system outages are beneficial. Targeted interventions are particularly important for

administrative staff, who demonstrated lower integration scores despite their pivotal role in health information management. Strengthening these areas can facilitate more consistent use of EHRs, improve efficiency, and support national digital transformation goals.

8. LIMITATIONS

The limitations of using a cross-sectional design restrict the ability to infer causal relationships between the determining factors and workflow integration. Furthermore, reliance on self-reported data may lead to bias in the response, particularly in areas related to system efficiency and perceived usefulness. Additionally, the sample was limited to specific healthcare institutions and may not fully represent all regions or healthcare sectors in Saudi Arabia. The study also did not assess system-level variables, such as the stability of technological infrastructure or the maturity of institutional electronic health records (EHRs), which could influence integration outcomes. Future research incorporating longitudinal designs, multicenter sampling, and system-level metrics will provide a more comprehensive understanding of the dynamics of EHR integration.

9. CONCLUSION

This study provides valuable insights into the factors influencing the integration of electronic health records (EHRs) workflows across various healthcare professionals in Saudi Arabia. High levels of EHR adoption were observed, particularly in core clinical functions, with system factors emerging as the strongest predictor of integration. User efficiency, organizational support, and perceived utility significantly contributed to workflow integration, while workload-related barriers had a notable negative impact. Differences among professional groups indicate the need for tailored strategies to ensure equitable adoption. These findings underscore the importance of investing in system design, training, and organizational readiness to support digital transformation efforts in line with Saudi Vision 2030. Strengthening these areas will be crucial for accelerating EHR adoption, improving workflow efficiency, and ultimately supporting high-quality patient care.

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