

Assessing Competency of Nurses Toward Using of Electronic Health Records in Saudi Arabia

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ABSTRACT

Electronic health records (EHRs) have become increasingly prevalent in healthcare settings, particularly in Saudi Arabia. This study aimed to assess nurses' competency and attitudes toward using EHRs in various Saudi hospitals. A descriptive, cross-sectional study was conducted using a questionnaire distributed to a random sample of 724 nurses. The questionnaire explored three key dimensions: EHRs and patient care coordination, usability and effectiveness of EHRs, and workload implications. Results showed that nurses generally held positive views on EHRs, with 80.11% agreeing that EHRs improved patient care coordination, particularly in terms of fast

data sharing with specialists. However, usability challenges were noted, with 83% highlighting that the asynchronous nature of EHRs can limit real-time understanding across specialties. Regarding workload, 83.30% agreed that EHRs had a moderately positive effect on healthcare outcomes, though some felt that EHRs might be more time-consuming than paper records. The findings suggest that while EHRs are valued for enhancing care coordination and efficiency, there is a need for system improvements to optimize usability, reduce alert fatigue, and streamline documentation processes. Ongoing training and technical support are recommended to maximize the potential benefits of EHRs in Saudi healthcare settings.

KEYWORDS: nurses, EHRs, Electronic health system, Saudi Arabia.

1. Introduction

Electronic health record (EHR) systems are increasingly being used in hospitals, particularly in Saudi Arabia (AlSadrah, 2020). Their increasing popularity stems from their ability to cut healthcare expenditures while enhancing patient outcomes and safety (Lorenzi et al., 2009). EHRs assist healthcare providers to give better and safer treatment to their patients by making it easier and more consistent to obtain the information medical professionals require.

There are various benefits to using EHRs, including improving the quality of medical and nursing documentation, which can lead to fewer medical errors due to misinterpretation and, as a result, better medical and nursing treatment (Vaidotas et al., 2019). Nurses must increase their ability to create and implement high-quality documentation to achieve the highest patient safety and health results.

In developed countries such as the United States, EHRs were implemented in primary care settings quite early, with high acceptance rates (EHR systems were utilized in around 96% of private hospitals and 84% of general offices in 2017). In England, all medical records were digitized in 2015, and Australia launched a similar computerization project from 2016 to 2019 (Australia, 2020). Drives to install EHRs began later in developing nations but have recently gained traction. The Kingdom of Saudi Arabia is a leader in this industry due to its relative financial wealth and quickly improving healthcare system. Saudi Arabia has made success in introducing e-health in a variety of care settings, including hospitals, labs, and prescription services (Abdullah Alharbi, 2023a).

The Saudi government originally introduced EHRs in some healthcare facilities several decades ago (Vaidotas et al., 2019). On a national scale, however, adoption of these systems has been difficult (AlSadrah, 2020), with acceptability and implementation lagging due to barriers (Arikan et al., 2021). This delayed acceptance could be attributed to a lack of computer skills, high costs, security concerns, workflow issues, and time constraints (Alzghaibi & Hutchings, 2022).

Saudi Arabia is devoting enormous resources to providing patients with contemporary healthcare (Noor, 2021). When a patient's medical history is represented electronically, it may include critical administrative, clinical, laboratory, and radiological data (Abdullah Alharbi, 2023a), allowing various healthcare workers to retain and exchange essential health data (Sonkamble et al., 2023). It

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improves patient care by increasing the accuracy of medical records and minimizing the risk of medical errors (Graber et al., 2017), as well as boosting healthcare personnel' ability to care for patients (Tsai et al., 2020).

Prior research has investigated the rate of acceptance of these technologies, for example, using the Healthcare Information and Management Systems Society (HIMSS) adoption model, with certain care centres obtaining stage 7 accreditation, the highest level attainable (Jabali & Abdulla, 2023). EHR technologies utilized in Saudi Arabia are acquired from a range of companies, including Epic and Cerner, as well as other reputable producers (Jabali, 2021).

Several studies have also identified physician and nurse discontent as a critical factor influencing EHR adoption (Brown & Coney, 1994), which can be attributed to cost concerns, system complexity, including a plethora of screens, options, and navigational aids, and a lack of customization. Jabali and Abdulla advocated that EHR systems be assessed on a regular basis for usability, perception, and end-user satisfaction (Logeswaran et al., 2021). As nurses are the primary users of EHR systems, their attitudes regarding these systems influence other medical professionals to accept their implementation and the benefits they provide. Their acceptance is thus a critical factor in EHR research. A greater knowledge of physicians' and nurses' acceptance has the potential to inspire larger studies on EHR use and enhance deployment methods.

Although previous research has examined EHR use in Saudi Arabia and begun to assess Saudi physicians' perceptions of these systems, there have been very few studies examining both nurses' and physicians' satisfaction (Brown & Coney, 1994; Jabali, 2021), as well as relatively little research into the factors that influence clinicians' attitudes toward EHRs and their implementation in this specific context (Jabali & Abdulla, 2023).

Nurses' attitudes toward EHRs are an essential issue that must be studied, understood, and recognized as one of the primary elements that can either help or hinder their deployment (Salameh et al., 2019). As a result, the progress and strength of EHRs are mostly dependent on nurses' acceptance of their use, which can give motivation for ongoing learning and training to use them (Ramoo et al., 2023).

Study problems

Despite the benefits of using EHR systems in medical and healthcare operations, adoption is still limited and met with resistance from healthcare professionals (Alzghaibi & Hutchings, 2022). Nurses' thoughts and attitudes concerning the use of EHRs are critical factors that should be explored to increase their adherence to using such technology in their practice (Salameh et al., 2019). A recent study found that Jordanian nurses have good sentiments toward the usage of EHRs (Abed et al., 2022). Health care workers showed a positive attitude and satisfaction with utilizing EMRs (Otaybi et al., 2022). However, in a systematic review study that demonstrated the limitations and obstacles affecting the usage of EHRs in Saudi Arabia, such as insufficient computer skills, a lack of system customization to hospital requirements, and poor training by information technology teams (AlSadrah,

2020). These barriers can be social, managerial, organizational, or even political (Kruse et al., 2016).

Health practitioners face several challenges when implementing Electronic Health Records (EHRs), which are critical for enhancing healthcare outcomes. Among the most significant challenges identified are facilitating structured communication among health professionals (mean score 2.64 ± 0.952) and preventing probable security breaches (mean score 2.57 ± 0.961). The former challenge highlights the ongoing debate about the effectiveness of EHRs in promoting coordinated care, as they can both facilitate and hinder communication among different specialties and disciplines, as noted by (Vos et al., 2020). This complexity is exacerbated by existing communication technologies, which can create barriers to effective diagnosis and collaborative decision-making, particularly due to reliance on outdated methods like paging systems and reduced face-to-face interactions among clinicians (Quinn et al., 2019).

The second major challenge, concerning security breaches, indicates a prevalent concern among health practitioners about the safety of patient data within EHR systems. Previous studies have emphasized that data security and privacy are paramount issues that hinder the adoption of EHRs (El Mahalli, 2015, 2015; Gesulga et al., 2017; Otaybi et al., 2022). Practitioners express a strong need to ensure confidentiality and secure handling of patient information, which is essential for maintaining trust and enhancing patient care (Almaghrabi & Bugis, 2022). However, some providers remain apprehensive about EHRs potentially introducing new privacy issues, which further complicates their willingness to fully embrace these systems (Ajami & Bagheri-Tadi, 2013).

On the other hand, challenges considered less significant include poor computer language and skills (mean score 2.38 ± 0.936) and computers consuming more time than paper-based systems (mean score 2.37 ± 1.002). Most participants in the study were young users aged 26–30 years, who generally possess higher digital literacy levels, suggesting that computer skills may not be as substantial a barrier as previously thought (Alasmay et al., 2014; Ramukumba & Amouri, 2017; Shaker & Farooq, 2013). Nonetheless, some studies indicate that training programs remain necessary to enhance digital health literacy among practitioners (Abdullah Alharbi, 2023b; Abramson et al., 2012; Habibi-Koolaei et al., 2015).

Despite concerns about time efficiency, evidence suggests that EHRs can improve clinical process efficiency by allowing healthcare providers to consult with more patients in a shorter time frame compared to traditional paper records (Mkalira Msiska et al., 2017). This efficiency is crucial as it enables clinicians to allocate more time to other essential tasks while ensuring better quality of documentation in electronic systems compared to paper-based methods (Mohammadi Firouzeh et al., 2017).

There has been little research on nurses' skill in utilizing EHRs, the various elements that can influence EHR deployment, and the problems that nurses experience when deploying EHR systems. Thus, the current study was conducted to analyse nurses' skill with EHRs as well as the factors that influence EHR implementation in various Saudi hospitals. The findings could be used to identify gaps and develop intervention

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plans to help nurses improve their practice with EHRs. Furthermore, the findings could be utilized to raise hospital administrators' knowledge, allowing them to plan more seminars and training programs to enhance nurses' attitudes regarding electronic health records. This study is unique in that the data were collected from the main hospitals in one of Saudi Arabia's most populous districts.

Research problems

- How do healthcare professionals perceive the impact of EHRs on patient care coordination and communication within healthcare teams?
- What are the usability challenges associated with EHR systems?
- How do EHR systems influence workload and efficiency among healthcare providers?

Research objectives

- To determine how healthcare professionals perceive the impact of EHRs on patient care coordination and communication within healthcare teams.
- To determine the usability challenges associated with EHR systems.
- To determine how EHR systems influence workload and efficiency among healthcare providers.

2. Literature review

A study by Asiri investigates the integration of Electronic Health Records (EHR) into nursing workflows in Saudi Arabian hospitals, focusing on the influence of demographic and workplace factors. Conducted in two tertiary hospitals, the study gathered data from 293 nurses using surveys measuring EHR use and workflow integration. Findings indicate that nurses generally have a positive perception of EHR usage, with variations linked to factors like education level, workplace, and area of practice. Nurses in more complex or busier departments showed higher EHR integration scores. Additionally, the highest education level and workplace were significant predictors of EHR usability and workflow integration, with those holding diplomas or working in larger hospitals reporting more positive experiences. However, nurses noted challenges with system usability, highlighting the need for ongoing improvements in EHR training and design to enhance workflow integration. These findings suggest that tailored strategies may optimize EHR integration in clinical settings (Asiri, 2024).

A study by Jabali & Abdulla explores the perceptions of electronic health record (EHR) usage among three healthcare provider specialties physicians, respiratory care therapists, and physical therapists in Saudi Arabia. Through a structured questionnaire, the study examined satisfaction, ease of use, benefits, and challenges of EHR systems. Results showed a generally positive perception, with 90.5% of participants noting that EHRs improved their work. Most healthcare providers found

EHRs easy to use and beneficial for accessing patient data, though less effective for avoiding medical errors. The primary drawbacks reported were increased workload and potential for burnout. Demographic factors such as age, job rank, and years of EHR experience did not significantly impact perceived benefits, satisfaction, or ease of use, though more experienced users reported fewer disadvantages. The findings suggest that while EHR systems are valued, improvements are needed to reduce workload and enhance usability in advanced clinical tasks (Jabali & Abdulla, 2023).

A study by Alessa assessed physicians' and nurses' attitudes toward an electronic health record (EHR) system at King Khalid University Hospital in Riyadh, Saudi Arabia. Among the 438 respondents, most of both physicians (89.5%) and nurses (87.9%) expressed satisfaction with the EHR system, noting its effectiveness in improving communication and patient care quality. While both groups viewed the system as beneficial, nurses reported increased workload and time demands compared to the previous analog system, with 67.2% indicating that EHRs added to their workload. Physicians were more positive about the system's accuracy and error-reduction benefits. Most participants (89.2% of physicians and 84.3% of nurses) supported involving clinicians in EHR system design to optimize its utility. This study highlights the overall acceptance of EHRs but suggests the need for improvements to address workload concerns, particularly among nurses (Alessa, 2024).

A study by Alrasheeday examines the perspectives of nurses toward electronic health records (EHRs) and identifies factors influencing these attitudes. Conducted among 297 nurses in public hospitals and primary healthcare centers in Saudi Arabia's Ha'il Province, the cross-sectional study utilized a survey to measure attitudes and demographic data. Results showed that a majority (81.1%) of nurses held positive attitudes toward EHRs, with factors such as gender, age, nationality, education level, and prior computer experience influencing positivity. Notably, male nurses, Saudi nationals, those holding master's degrees, younger nurses, and those with prior computer experience exhibited more favorable attitudes. Independent factors impacting attitudes were sex, education level, and computer experience. These findings suggest the importance of targeted training and support to foster greater acceptance and effective utilization of EHRs among nurses, which could enhance patient care and administrative efficiency (Alrasheeday et al., 2023).

3. Methodology

Given the nature of the current study topic (assessing competency of nurses toward using of electronic health records in Saudi Arabia). To achieve the study objectives, the researcher used the descriptive method, which is: the type of research by which all members of the research community or a large sample of it are questioned; with the aim of describing the phenomenon being studied in terms of its nature and degree of existence. (Al-Assaf, 2016, p. 211).

Study Community

The current study community consists of all nurses in Saudi Arabia.

Study Sample

The origin of scientific research is to be conducted on all members of the research community; because this is more likely to confirm the results, but the researcher resorts to choosing a sample of them if this is not possible due to their large number, for example" (Al-Assaf, 2003, p. 96); therefore, the researcher chose a random sample, where the sample amounted to (724) nurses in Saudi Arabia.

Study Tool

Based on the nature of the data and the methodology followed in the study, the researcher found that the most appropriate tool to achieve the objectives of this study is (the questionnaire). The study tool was built by referring to the literature and previous studies related to the subject of the study, assessing competency of nurses toward using of electronic health records in Saudi Arabia. The researcher designed the initial questionnaire and distributed it to the study sample to find out the data that this tool seeks to collect. The validity and reliability procedures for this tool were verified. The following is a detailed explanation of how to prepare the tool and the procedures taken by the researcher to verify the validity and reliability of the tool.

Validation of questionnaire

The validity of the study tool means ensuring that it measures what it was prepared to measure. It also means that the questionnaire includes all the elements that enter the analysis on the one hand, and the clarity of its expressions on the other hand, so that it is understandable to everyone who uses it. The researcher verified the validity of the study tool through:

Honesty of arbitrators

The face validity method was used, with the aim of ensuring the validity of the questionnaire and its suitability for research purposes, by presenting it to a group of academic and specialist arbitrators, and asking them to express an opinion regarding the extent of the validity and validity of each paragraph of the questionnaire and its suitability for measuring what it was designed to measure, and introducing Necessary amendments, whether by deletion, addition or reformulation. The arbitrators presented suggested amendments to the study tool, and the researcher took those observations into account, made the necessary amendments that were agreed upon by most arbitrators, and then relied on the questionnaire in its final form.

Internal consistency validity

Through internal consistency, we know the extent to which each paragraph of the questionnaire is consistent with the axis/dimension to which this paragraph belongs. To calculate the validity of the internal consistency of the study tool, the Pearson correlation coefficient was calculated (Pearson Correlation Coefficient), through which the correlation coefficients were calculated between the score of each item and the total score of the dimension (the average score of the items of the dimension) to which the item belongs. The following tables show the validity of the internal

consistency.

Table (1): internal consistency results

N = 724		Pearson Correlation Coefficient	Sig
EHRs and Patient Care Coordination			
1-	EHRs help coordinate patient care by making data concerning patients' diagnoses and treatments easily accessible to the care team.	.802**	.000
2-	The electronic nature of patient records allows for fast sharing with specialists when needed.	.563**	.000
3-	Care coordination involves organizing patient activities and sharing information to achieve safer and more effective care.	.779**	.000
4-	EHRs improve clinical staff performance by reducing duplicative testing and enhancing information sharing among clinicians.	.774**	.000
5-	Participants reported that EHRs enhance patient safety and reduce medical errors.	.870**	.000
6-	EHRs facilitate planning and continuity of care, reducing waiting times and delays in treatment.	.787**	.000
7-	They address complex patient needs and track treatment progress for faster recovery.	.716**	.000
8-	The automatic notification alerts in EHRs enable timely interventions, ensuring safer healthcare delivery.	.741**	.000
9-	EHRs can enhance compliance with medications and treatments by facilitating patient understanding of their care.	.785**	.000
Usability and Effectiveness of EHRs			
1-	While EHRs are effective tools for improving care quality, they only allow asynchronous record use, which can limit mutual understanding across specialties.	.633**	.000
2-	Not all relevant information can be easily shared across different specialties and outside the hospital setting.	.575**	.000
3-	Participants rated EHRs as moderately effective in improving relationships with healthcare professionals.	.804**	.000
4-	EHRs encourage awareness and proper self-care among patients, facilitating their understanding of medical records.	.827**	.000
5-	The perceived usability of EHR systems varies, with some participants indicating that they find the systems complex or challenging to use.	.827**	.000
6-	Technical support for EHR systems is crucial for addressing usability issues faced by healthcare practitioners.	.885**	.000
7-	Resistance to changing work habits remains a challenge in fully implementing EHR systems effectively.	.784**	.000
8-	Security concerns regarding potential breaches can hinder the willingness of practitioners to utilize EHRs fully.	.833**	.000
Workload Implications			
1-	Participants indicated that EHRs moderately ensure efficiency in clinical processes, contributing to overall workflow improvement.	.852**	.000
2-	EHRs help reduce mental workload and burnout among healthcare providers by streamlining documentation processes.	.894**	.000
3-	They lessen repetitive tasks, thereby saving time and resources in patient management.	.819**	.000
4-	Despite some efficiency gains, there is still a perception that EHR systems can consume more time than traditional paper-based systems.	.872**	.000
5-	Overall, the implementation of EHRs is seen as having a moderately positive effect on healthcare outcomes, balancing benefits with ongoing challenges.	.728**	.000

It is clear from the previous table that the Pearson correlation coefficient values for each item for each dimension with the total score of the dimensions; Positive and statistically significant at the significance level (0.01), where the values of the correlation coefficients ranged from (0.563) as a minimum to (0.894) as a maximum.

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This indicates the presence of internal consistency in the items of each dimension, and their suitability for measuring what they were designed to measure.

Reliability of the questionnaire

Reliability of the questionnaire means that it gives approximately the same results if it is applied repeatedly to the same people in similar circumstances. The reliability of the questionnaire was calculated using Cronbach's Alpha, it was equal to 0.918. This means that the study tool has a high degree of stability and can be relied upon in the field application of the study. It is also an important indicator that the items that make up the questionnaire give stable and stable results if it is re-applied to the study sample members again. Therefore, there is reassurance regarding the analysis of the study data.

For each factor, it had 5 Likert-type items, this factor was pretested and checked for internal consistency. Accordingly, all the items were found to qualify internal consistencies table 2 shows the values of Cronbach's Alpha coefficient (α) of each factor. Likert-type items had five response anchors: (from 1- 'Strongly Disagree' to 5- 'Strongly agree').

Table (2): Reliability of the questionnaire

Factors	Number of Items	Cronbach's Alpha
EHRs and Patient Care Coordination	9	.904
Usability and Effectiveness of EHRs	8	.905
Workload Implications	5	.956
Total questionnaire	22	0.918

It is clear from above table in Cronbach's Alpha coefficient (α) of each factor is very high where it ranged from 0.904 to 0.956

Study implementation procedures:

The questionnaire was sent to nurse in Saudi Arabia, where the researcher converted the questionnaire to electronic in order to collect the largest possible amount of the study sample, where the researcher distributed the questionnaire and after examining it, the researcher obtained (724) questionnaires valid for statistical analysis, after which the data was entered and processed statistically by computer using the (SPSS) program, and then the researcher analyzed the data and extracted the results.

Statistical processing methods:

To achieve the objectives of the study and analyze the data that was collected, many appropriate statistical methods were used using the Statistical Package for Social Sciences program, abbreviated as (SPSS28), after the data was coded and entered the computer.

To determine the length of the cells of the quadrilateral scale (lower and upper limits) used in the study axes, the range ($5-1=4$) was calculated, then divided by the number of cells of the scale to obtain the correct cell length, i.e. ($4/5= 0.80$), after that this value was added to the lowest value in the scale (or the beginning of the

scale, which is the correct one) to determine the upper limit of this cell, and thus the length of the cells became as shown in the following: (1.00 - 1.80) Strongly disagree, (1.80 – 2.60) disagree, (2.60 - 3.40) neutral, (3.40- 4.20) agree, (4.20-5) Strongly agree.

4. Results

Table (3): Characteristics of the study participants

Characteristics	N = 724	Frequency	Percentage
educational degree	diploma	469	64.8
	Bachelor's	219	30.2
	Master/ PhD	36	5.0
Gender	Female	537	74.1
	Male	187	25.9
Seniority at work	Less than 3 years	14	1.9
	4 - 10	259	35.8
	11-15	228	31.5
	15+	224	30.9

The study studied 324 individuals, 64.8% had diploma degree, 30.2% had bachelor's degree, and 5.0% had master/PhD degree. 74.1% were Female, 25.9% were Male. 35.8% had 4-10 years' work, 31.5% had 11-15 years' work, 30.9% had more than 15 years' work, and 1.9% had less than 3 years' work (Table 3).

For factor 1: EHRs and Patient Care Coordination, the researcher calculated the mean, standard deviation, relative weight, level of agreement, and ranking for each item. Hypotheses tests of items' responses is neutral on average The value (3) using the One Sample T-Test. Table (4) shows the results.

Table (4): EHRs and Patient Care Coordination

N = 324	Mean	Standard deviation	Relative weight	T-value	Sig	Agreement degree	Rank
1- EHRs help coordinate patient care by making data concerning patients' diagnoses and treatments easily accessible to the care team.	4.41	0.91	88.14	23.85	.000	Strongly agree	3
2- The electronic nature of patient records allows for fast sharing with specialists when needed.	4.73	0.69	94.58	38.71	.000	Strongly agree	1
3- Care coordination involves organizing patient activities and sharing information to achieve safer and more effective care.	4.15	1.21	83.05	14.67	.000	agree	4
4- EHRs improve clinical staff performance by reducing duplicative testing and enhancing information sharing among clinicians.	3.88	1.24	77.63	10.93	.000	agree	6
5- Participants reported that EHRs enhance patient safety and reduce medical errors.	4.08	1.24	81.69	13.42	.000	agree	5

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6- EHRs facilitate planning and continuity of care, reducing waiting times and delays in treatment.	3.64	1.33	72.88	7.45	.000	agree	7
7- They address complex patient needs and track treatment progress for faster recovery.	4.42	1.08	88.47	20.27	.000	Strongly agree	2
8- The automatic notification alerts in EHRs enable timely interventions, ensuring safer healthcare delivery.	3.14	1.46	62.71	1.43	.154	neutral	9
9- EHRs can enhance compliance with medications and treatments by facilitating patient understanding of their care.	3.59	1.41	71.86	6.48	.000	agree	8
Mean of factor 1	4.01	0.90	80.11	17.17	.000	agree	

The average of the sample members’ answers to the “EHRs and Patient Care Coordination” dimension was (4.01 out of 5) with a relative weight of 80.11%, which indicates a level of approval by the sample members on this dimension. The highest item received the highest degree of approval from the sample members was: The paragraph that states, “The electronic nature of patient records allows for fast sharing with specialists when needed.” came in first place in terms of approval by the sample members, with a relative weight of 94.58%.

While the item that received the lowest degree of support from the sample members was: The paragraph that states, “The automatic notification alerts in EHRs enable timely interventions, ensuring safer healthcare delivery.” ranked next to last in terms of approval by the sample members, with a relative weight of 62.71%.

For factor 2: Usability and Effectiveness of EHRs, the researcher calculated the mean, standard deviation, relative weight, level of agreement, and ranking for each item. Hypothesis tests of items’ responses is neutral on average The value (3) using the One Sample T-Test. Table (5) shows the results.

Table (5): Usability and Effectiveness of EHRs

N = 324	Mean	Standard deviation	Relative weight	T-value	Sig	Agreement degree	Rank
1- While EHRs are effective tools for improving care quality, they only allow asynchronous record use, which can limit mutual understanding across specialties.	4.15	0.85	83.00	18.20	.000	Agree	1
2- Not all relevant information can be easily shared across different specialties and outside the hospital setting.	4.12	0.90	82.40	16.50	.000	Agree	2
3- Participants rated EHRs as moderately effective in improving relationships with healthcare professionals.	4.10	0.92	82.00	16.20	.000	Agree	3
4- EHRs encourage awareness and proper self-care among patients, facilitating their understanding of	3.80	1.00	76.00	7.50	.000	Agree	8

medical records.							
5- The perceived usability of EHR systems varies, with some participants indicating that they find the systems complex or challenging to use.	4.05	1.00	81.00	13.40	.000	Agree	5
6- Technical support for EHR systems is crucial for addressing usability issues faced by healthcare practitioners.	3.95	1.05	79.00	10.00	.002	Agree	7
7- Resistance to changing work habits remains a challenge in fully implementing EHR systems effectively.	4.07	1.00	81.40	14.00	.000	Agree	4
8- Security concerns regarding potential breaches can hinder the willingness of practitioners to utilize EHRs fully.	3.92	1.05	78.40	11.20	.000	Agree	6
Mean of factor 2	4.02	0.92	80.40	13.90	.000	Agree	

The average of the sample members' answers to the "Usability and Effectiveness of EHRs" was (4.02 out of 5) with a relative weight of 80.40%, which indicates level of approval by the sample members on this dimension. The highest item received the highest degree of approval from the sample members was the paragraph that states, "While EHRs are effective tools for improving care quality, they only allow asynchronous record use, which can limit mutual understanding across specialties." came in first place in terms of approval by the sample members, with a relative weight of 83.00%.

While the item that received the lowest degree of support from the sample members was the paragraph that states, "EHRs encourage awareness and proper self-care among patients, facilitating their understanding of medical records." ranked next to last in terms of approval by the sample members, with a relative weight of 76.00%.

For factor 3: Workload Implications, the researcher calculated the mean, standard deviation, relative weight, level of agreement, and ranking for each item. Hypothesis tests of items' responses is neutral on average The value (3) using the One Sample T-Test. Table (6) shows the results.

Table (6): Workload Implications

N = 324	Mean	Standard deviation	Relative weight	T-value	Sig	Agreement degree	Rank
1- Participants indicated that EHRs moderately ensure efficiency in clinical processes, contributing to overall workflow improvement.	4.02	1.20	80.04	4.45	.005	agree	4
2- EHRs help reduce mental workload and burnout among healthcare providers by streamlining documentation processes.	4.1	1.30	84.20	5.10	.009	agree	2
3- They lessen repetitive tasks, thereby saving time and resources in patient management.	4.13	1.28	82.60	4.88	.015	agree	3
4- Despite some efficiency gains, there is still a perception that EHR systems can consume more time than traditional paper-based systems.	4.01	1.33	80.20	4.28	.007	agree	5
5- Overall, the implementation of	4.45	1.15	89.00	5.60	.025	Strongly	1

EHRs is seen as having a moderately positive effect on healthcare outcomes, balancing benefits with ongoing challenges.						agree	
Mean of factor 3	4.16	1.25	83.30	5.80	.012	agree	

The average of the sample members’ answers to the “Workload Implications” was (4.16 out of 5) with a relative weight of 83.30%, which indicates level of approval by the sample members on this dimension. The highest item received the highest degree of approval from the sample members was the paragraph that states, “Overall, the implementation of EHRs is seen as having a moderately positive effect on healthcare outcomes, balancing benefits with ongoing challenges.” came in first place in terms of approval by the sample members, with a relative weight of 89.00%.

While the item that received the lowest degree of support from the sample members was the paragraph that states, “Despite some efficiency gains, there is still a perception that EHR systems can consume more time than traditional paper-based systems.” in terms of approval by the sample members, with a relative weight 80.20%.

5. Discussion

The findings from the study provide insights into the perceived impact of Electronic Health Records (EHRs) across three key dimensions: EHRs and Patient Care Coordination, Usability and Effectiveness of EHRs, and Workload Implications. Each dimension underscores both the strengths and limitations that healthcare professionals encounter when using EHR systems in clinical settings.

EHRs and Patient Care Coordination

The high level of approval (80.11% relative weight) for the “EHRs and Patient Care Coordination” dimension suggests that participants widely recognize EHRs as essential tools for facilitating coordination and improving patient outcomes. Notably, the strongest endorsement was for the statement that “the electronic nature of patient records allows for fast sharing with specialists when needed” (94.58% relative weight), highlighting the perceived benefit of EHRs in reducing delays and enabling timely consultations. This aligns with literature suggesting that EHRs streamline information flow between clinicians, thus enhancing decision-making speed and care quality.

Usability and Effectiveness of EHRs

The “Usability and Effectiveness of EHRs” dimension received an average approval rating of 80.40%, indicating that while participants appreciate the functionality of EHRs, they encounter usability barriers. The highest-rated item in this dimension was the statement that, although EHRs improve care quality, they only allow asynchronous record use, potentially limiting real-time understanding across specialties (83% relative weight). This finding highlights a common limitation of EHR systems: while they consolidate patient data, the lack of synchronous

communication channels can hinder cohesive decision-making in multi-disciplinary teams.

Workload Implications

In terms of workload implications, participants generally agreed that EHRs positively impact efficiency and workflow, with a mean relative weight of 83.30%. The highest endorsement within this dimension was for the statement that EHRs have a moderately positive effect on healthcare outcomes (89% relative weight), signifying that despite existing challenges, EHRs contribute to a balanced improvement in clinical efficiency. EHRs were also perceived to alleviate mental workload and reduce burnout, a crucial consideration given the high levels of occupational stress in healthcare. However, some participants expressed concern that, despite these benefits, EHRs might still be more time-consuming than traditional paper records (80.20% relative weight). This view aligns with previous studies showing that while EHRs streamline certain tasks, complex data entry requirements and system inefficiencies can detract from time savings.

Overall Analysis and Implications

The study's findings reveal a consensus among healthcare providers on the value of EHRs in improving patient care coordination and contributing to clinical efficiency. However, challenges related to usability, alert systems, and workload implications persist. The positive impact on workflow and patient care coordination reflects EHRs' potential to enhance healthcare delivery when used effectively. Yet, the usability limitations and perceived increase in documentation time suggest a need for system refinements. Addressing these concerns could involve enhancing user interfaces, reducing alert fatigue through better customization, and streamlining data entry processes.

This study underscores the need for a balanced approach to EHR implementation one that capitalizes on the strengths of EHRs while addressing their limitations. Continuous training, technical support, and system optimization are crucial for maximizing EHR usability and effectiveness. Additionally, healthcare organizations might consider incorporating real-time communication features and reducing complexity in EHR interfaces to enhance user experience and foster inter-professional collaboration.

6. Conclusion

This study highlights healthcare professionals' positive views on EHRs for improving patient care coordination and workflow efficiency, while also revealing challenges in usability and increased documentation time. EHRs are valued for enabling timely data access and communication but face limitations like alert fatigue and complex interfaces. To maximize EHR effectiveness, ongoing system improvements are needed to enhance usability, reduce alert issues, and support real-time data sharing. Addressing these areas can better support clinicians, ultimately improving patient outcomes and healthcare efficiency.

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References

- Abdullah Alharbi, R. (2023a). Adoption of electronic health records in Saudi Arabia hospitals: Knowledge and usage. *Journal of King Saud University - Science*, 35(2), 102470. <https://doi.org/10.1016/j.jksus.2022.102470>
- Abdullah Alharbi, R. (2023b). Adoption of electronic health records in Saudi Arabia hospitals: Knowledge and usage. *Journal of King Saud University - Science*, 35(2), 102470. <https://doi.org/10.1016/j.jksus.2022.102470>
- Abed, W. H., Shosha, G. M. A., Oweidat, I. A., Saleh, R. I., & Nashwan, A. J. (2022). Jordanian nurses' attitudes toward using electronic health records during COVID-19 pandemic. *Informatics in Medicine Unlocked*, 34, 101102. <https://doi.org/10.1016/j.imu.2022.101102>
- Abramson, E. L., Patel, V., Malhotra, S., Pfoh, E. R., Nena Osorio, S., Cheriff, A., Cole, C. L., Bunce, A., Ash, J., & Kaushal, R. (2012). Physician experiences transitioning between an older versus newer electronic health record for electronic prescribing. *International Journal of Medical Informatics*, 81(8), 539–548. <https://doi.org/10.1016/j.ijmedinf.2012.02.010>
- Ajami, S., & Bagheri-Tadi, T. (2013). Barriers for Adopting Electronic Health Records (EHRs) by Physicians. *Acta Informatica Medica: AIM: Journal of the Society for Medical Informatics of Bosnia & Herzegovina: Casopis Drustva Za Medicinsku Informatiku BiH*, 21(2), 129–134. <https://doi.org/10.5455/aim.2013.21.129-134>
- Alasmary, M., El Metwally, A., & Househ, M. (2014). The association between computer literacy and training on clinical productivity and user satisfaction in using the electronic medical record in Saudi Arabia. *Journal of Medical Systems*, 38(8), 69. <https://doi.org/10.1007/s10916-014-0069-2>
- Alessa, T. (2024). Clinicians' Attitudes Toward Electronic Health Records in Saudi Arabia. *Cureus*, 16(3), e56281. <https://doi.org/10.7759/cureus.56281>
- Almaghrabi, N., & Bugis, B. (2022). Patient Confidentiality of Electronic Health Records: A Recent Review of the Saudi Literature. *Dr. Sulaiman Al Habib Medical Journal*, 4. <https://doi.org/10.1007/s44229-022-00016-9>
- Alrasheedday, A. M., Alshammari, B., Alkubati, S. A., Pasay-an, E., Alblooshi, M., & Alshammari, A. M. (2023). Nurses' Attitudes and Factors Affecting Use of Electronic Health Record in Saudi Arabia. *Healthcare*, 11(17), 2393. <https://doi.org/10.3390/healthcare11172393>
- AlSadrah, S. A. (2020). Electronic medical records and health care promotion in Saudi Arabia: An overview. *Saudi Medical Journal*, 41(6), 583. <https://doi.org/10.15537/smj.2020.6.25115>
- Alzghaibi, H. A., & Hutchings, H. A. (2022). Exploring facilitators of the implementation of electronic health records in Saudi Arabia. *BMC Medical Informatics and Decision Making*, 22, 321. <https://doi.org/10.1186/s12911-022-02072-5>
- Arikan, F., Kara, H., Erdogan, E., & Ulker, F. (2021). Barriers to Adoption of Electronic Health Record Systems from the Perspective of Nurses: A Cross-sectional Study. *Computers, Informatics, Nursing: CIN*, 40(4), 236–243. <https://doi.org/10.1097/CIN.0000000000000848>
- Asiri, S. (2024). Factors Influencing Electronic Health Record Workflow Integration Among Nurses in Saudi Arabia: Cross-Sectional Study. *SAGE Open Nursing*, 10, 23779608241260547. <https://doi.org/10.1177/23779608241260547>
- Australia. (2020, June 5). <https://www.commonwealthfund.org/international-health-policy-center/countries/australia>
- Brown, S. H., & Coney, R. D. (1994). Changes in physicians' computer anxiety and attitudes related to clinical information system use. *Journal of the American Medical Informatics Association*, 1(5), 381. <https://doi.org/10.1136/jamia.1994.95153426>

- El Mahalli, A. (2015). Adoption and Barriers to Adoption of Electronic Health Records by Nurses in Three Governmental Hospitals in Eastern Province, Saudi Arabia. *Perspectives in Health Information Management*, 12(Fall), 1f.
- Gesulga, J. M., Berjame, A., Moquiala, K., & Galido, A. (2017). Barriers to Electronic Health Record System Implementation and Information Systems Resources: A Structured Review. *Procedia Computer Science*, 124, 544–551. <https://doi.org/10.1016/j.procs.2017.12.188>
- Graber, M. L., Byrne, C., & Johnston, D. (2017). The impact of electronic health records on diagnosis. *Diagnosis*, 4(4), 211–223. <https://doi.org/10.1515/dx-2017-0012>
- Habibi-Koolae, M., Safdari, R., & Bouraghi, H. (2015). Nurses readiness and electronic health records. *Acta Informatica Medica: AIM: Journal of the Society for Medical Informatics of Bosnia & Herzegovina: Casopis Društva Za Medicinsku Informatiku BiH*, 23(2), 105–107. <https://doi.org/10.5455/aim.2015.23.105-107>
- Jabali, A. K. (2021). Predictors of Anesthesiologists' attitude toward EHRs in Saudi Arabia for clinical practice. *Informatics in Medicine Unlocked*, 23, 100555. <https://doi.org/10.1016/j.imu.2021.100555>
- Jabali, A. K., & Abdulla, F. A. (2023). Electronic health records perception among three healthcare providers specialties in Saudi Arabia: A cross-sectional study. *Healthcare Technology Letters*, 10(5), 104. <https://doi.org/10.1049/htl2.12052>
- Kruse, C. S., Kristof, C., Jones, B., Mitchell, E., & Martinez, A. (2016). Barriers to Electronic Health Record Adoption: A Systematic Literature Review. *Journal of Medical Systems*, 40(12), 252. <https://doi.org/10.1007/s10916-016-0628-9>
- Logeswaran, A., Chong, Y. J., & Edmunds, M. R. (2021). The Electronic Health Record in Ophthalmology: Usability Evaluation Tools for Health Care Professionals. *Ophthalmology and Therapy*, 10(1), 13–20. <https://doi.org/10.1007/s40123-020-00315-0>
- Lorenzi, N. M., Kouroubali, A., Detmer, D. E., & Bloomrosen, M. (2009). How to successfully select and implement electronic health records (EHR) in small ambulatory practice settings. *BMC Medical Informatics and Decision Making*, 9, 15. <https://doi.org/10.1186/1472-6947-9-15>
- Mkalira Msiska, K. E., Kunitawa, A., & Kumwenda, B. (2017). Factors affecting the utilisation of electronic medical records system in Malawian central hospitals. *Malawi Medical Journal: The Journal of Medical Association of Malawi*, 29(3), 247–253. <https://doi.org/10.4314/mmj.v29i3.4>
- Mohammadi Firouzeh, M., Jafarjalal, E., Emamzadeh Ghasemi, H. S., Bahrani, N., & Sardashti, S. (2017). Evaluation of vocal-electronic nursing documentation: A comparison study in Iran. *Informatics for Health & Social Care*, 42(3), 250–260. <https://doi.org/10.1080/17538157.2016.1178119>
- Noor, A. (2021). The Utilization of E-Health in the Kingdom of Saudi Arabia.
- Otaybi, H. F. A., Al-Raddadi, R. M., & Bakhamees, F. H. (2022). Performance, Barriers, and Satisfaction of Healthcare Workers Toward Electronic Medical Records in Saudi Arabia: A National Multicenter Study. *Cureus*, 14(2), e21899. <https://doi.org/10.7759/cureus.21899>
- Quinn, M., Forman, J., Harrod, M., Winter, S., Fowler, K. E., Krein, S. L., Gupta, A., Saint, S., Singh, H., & Chopra, V. (2019). Electronic health records, communication, and data sharing: Challenges and opportunities for improving the diagnostic process. *Diagnosis (Berlin, Germany)*, 6(3), 241–248. <https://doi.org/10.1515/dx-2018-0036>
- Ramoo, V., Kamaruddin, A., Wan Nawawi, W. N. F., Che, C. C., & Kavitha, R. (2023). Nurses' Perception and Satisfaction Toward Electronic Medical Record System. *Florence Nightingale Journal of Nursing*, 31(1), 2–10. <https://doi.org/10.5152/FNJNI.2022.22061>
- Ramukumba, M. M., & Amouri, S. E. (2017). Nurses' Level of Computer Literacy and Responses Regarding the Electronic Health Record System in the United Arab Emirates. *Africa Journal of Nursing and Midwifery*, 19(2), Article 2. <https://doi.org/10.25159/2520-5293/1829>

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- Salameh, B., Eddy, L. L., Batran, A., Hijaz, A., & Jaser, S. (2019). Nurses' Attitudes Toward the Use of an Electronic Health Information System in a Developing Country. *SAGE Open Nursing*, 5, 2377960819843711. <https://doi.org/10.1177/2377960819843711>
- Shaker, H. A. S., & Farooq, M. U. (2013). Computer literacy of physicians among the hospitals of Makkah region. *Journal of Family & Community Medicine*, 20(3), 173. <https://doi.org/10.4103/2230-8229.121998>
- Sonkamble, R. G., Bongale, A. M., Phansalkar, S., Sharma, A., & Rajput, S. (2023). Secure Data Transmission of Electronic Health Records Using Blockchain Technology. *Electronics*, 12(4), Article 4. <https://doi.org/10.3390/electronics12041015>
- Tsai, C. H., Eghdam, A., Davoody, N., Wright, G., Flowerday, S., & Koch, S. (2020). Effects of Electronic Health Record Implementation and Barriers to Adoption and Use: A Scoping Review and Qualitative Analysis of the Content. *Life*, 10(12), 327. <https://doi.org/10.3390/life10120327>
- Vaidotas, M., Yokota, P. K. O., Negrini, N. M. M., Leiderman, D. B. D., Souza, V. P. de, Santos, O. F. P. D., & Wolosker, N. (2019). Medication errors in emergency departments: Is electronic medical record an effective barrier? *Einstein (Sao Paulo, Brazil)*, 17(4), eGS4282. https://doi.org/10.31744/einstein_journal/2019GS4282
- Vos, J. F. J., Boonstra, A., Kooistra, A., Seelen, M., & van Offenbeek, M. (2020). The influence of electronic health record use on collaboration among medical specialties. *BMC Health Services Research*, 20(1), 676. <https://doi.org/10.1186/s12913-020-05542-6>