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A Cross-sectional Study of Nurses' Perception Toward Utilization and Barriers of Electronic Health Record

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Abstract

Background: The utilization of electronic health records (EHRs) is crucial. This study aimed to determine the perception of nurses on the utilization and barriers to the use of EHRs.

Methods: This descriptive cross-sectional study on 327 participants was conducted at the government hospitals of Hail City that use EHRs. Data collection was conducted between March and April 2022. The adapted questionnaire was used to collect the data.

Results: Nurses perceived EHRs as useful (5.76 ± 1.71), easy to use (4.74 ± 1.56), and intend to use (5.85 ± 1.81). Sex had no effect on perceived usefulness ($p > 0.671$), perceived ease of use ($p > 0.605$), or intention to use ($p > 0.880$). A significant difference was found in the perceived usefulness based on age ($p = 0.045$). On training, a significant difference was noted in perceived usefulness ($p = 0.039$) and intention to use ($p = 0.007$).

Conclusions: An EHR system is useful and easy to use, and nurses intended to use it. Sex had no effect on perceived usefulness, perceived ease of use, or intention to use. Age showed a significant difference in perceived usefulness. Moreover, training has a significant difference in perceived usefulness and intention to use. Policymakers can use these findings to create a program that targets the needs of nurses so that they can fully utilize EHRs.

Keywords: electronic health records, hospitals, intention, nurses

INTRODUCTION

The implementation of electronic health records (EHRs) and other digital technologies in healthcare continues to lag, and hospitals continue to face professional resistance to their use.[1] The health industry has looked into several elements that influence healthcare professionals' acceptance of software programs. Unfortunately, because different investigations focus on various technology uses and occupational categories, conflicting findings have been reported.[2] As a result, more studies regarding the effects of contemporary technologies, such as electronic medical records, are being conducted.[3] Consequently, the use of electronic medical records has aided in minimizing patient waiting times, reducing prescription-ordering errors, directing healthcare processes, and simplifying the creation of obligatory reports to higher authorities.[4]

Several studies have suggested that EHR systems fail because of the lack of user participation and evaluation of system input.[5] It is normal to experience opposition from many users when a new system is introduced and made available over the counter for organizations and populations to use. This is especially true for conventional viewers who have got accustomed to utilizing a management and review system for years. Over time, this level of resistance may deteriorate, and the system may transform from being a resistant to a convenient user system. The high cost and lack of return on investment for small practices and safety net providers, undervaluation of organizational processes and change management required, failure to redesign the clinical process and workflow to incorporate communication components and processes that will become obsolete, and scarcity of skilled resources are just a few examples.[6] Although deploying an EHR system will improve clinical efficiency, research reveals the opposite.[7] User adaptation and simplicity of use influence the efficiency potential of data-intensive environments, enabling electronic patient and provider interactions.[8] According to Otto and Nevo, various mitigating factors such as political and economic constraints have limited the adoption of an EHR system in addition to safety issues.[9] Scholars such as Jamoom *et al*. provided a counterbalance to what little is known about nurses' perspectives on EHR adoption and use.[10]

The Ministry of Health launched a program in 2008 to increase and improve the use of EHRs in public healthcare facilities,[11] there has been a dearth of literature in Saudi Arabia,[12] and an ambitious goal still faces significant challenges, such as the unfavorable views of some healthcare professionals concerning the technology.[11]

Numerous studies have examined nurses' perspectives on EHR's perceived ease of use, attitudes toward use, and how EHRs affect care practices and patient outcomes.[13] While some nursing staff saw the benefits of EHRs, Higgins

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et al., McBride *et al*., and others were dissatisfied with their use, considered them difficult and time-consuming to use, and doubted EHRs' ability to improve patient care.[14–17] In a study of intensive care unit nurses, Carayon *et al.* discovered that the usability and utility of an her system influenced nurses' acceptance of it.[18] Lorenzi discovered that 50% of EHR implementations failed because of nurses' unwillingness to embrace and use the system.[19]

The utilization of EHR is critical and should not be overlooked, as it could affect the success or failure of its deployment. Assumingly, when the user recognizes the significance of high-quality patient data, their satisfaction with the system and its use is likely to rise. Nurses have access to everything they need to offer high-level care because the EHR includes all the vital information of a patient. Therefore, this study is of significance as it determines the usefulness, ease of use, and intention to use EHRs so that intervention and change should be made toward safe and quality care.

METHODS

This descriptive cross-sectional study was conducted to determine the usefulness, ease of use, and intention to use and barriers to EHR use so that intervention and change can be made.

Ethical approval

The Institutional Review Board of the University of Hail approved this study (H-2021-021). Completion of the questionnaires also indicated that the respondents provided written consent.

Setting/participants

This study was conducted at the government hospitals of Hail City that use EHRs, including the King Khalid Hospital, King Salman Specialist Hospital, and Hail General Hospital, and the sampling units were hospital staff nurses. As a result of convenience sampling, a total of 327 hospital staff nurses participated in this study, and they were readily available. Moreover, convenience sampling enables data collection with minimum advanced planning, making it valuable in time-sensitive research. The recommended samples according to the number of hospitals involved in this study were based on the RAOSOFT (http://www.raosoft.com/samplesize.html) online calculator, with a margin of error of 5%.

The inclusion criteria were as follows: (a) have been using EHRs for at least 3 months, (b) can write and understand English, and (c) provided informed consent.

Instrument

The questionnaire used in this study has two parts. The first part asked about the demographic profile of the participants such as sex, age, years of experience, and job title. The second part contains 28 items that measure perceived usefulness (PU), perceived ease of use, and additional three items to assess the likelihood of utilization (IU).[20] The items were scored on a five-point Likert scale, where 1 and 5 indicate strong disagreement and strong agreement, respectively. All of the subscale components were added to reach the overall score. On this basis, a mean score was calculated. As the mean score increased, the positive effects on PU and perceived ease of use were stronger; thus, the median point of the scale (1–5) was used to consider the cut-off point of the mean score. The tool was subjected for the validity test with three experts in the field and was pretested with 20 staff nurses, yielding to Cronbach's alpha of 0.89.

Data collection

The researcher explained to each hospital's nurse the purpose of the study, breadth of their participation, and researchers' expectations of them. The nurses then signed a consent form, confirming their willingness to participate. The survey took at least 10 min to complete. The nurses were instructed to submit their answered survey questionnaire to the person in charge in the unit. Data collection was conducted between March and April 2022.

Data analysis

IBM SPSS Statistics for Windows version 22 (IBM Corp., Armonk, NY, USA) was used. The Kolmogorov–Smirnov test was used to determine data distribution under the presumption that they were normally distributed. The Kolmogorov–Smirnov test result was higher, i.e., at 0.94 with a p-value of 0.05, showing that the data were normally distributed. Therefore, variations in the years of experience and PU, perceived ease of use, and intention to use were examined using analysis of variance (F-test). The t-test was employed to ascertain sex differences, age, number of trainings, and job title. Each statistical analysis was conducted with a significance threshold of 0.05. The frequency and percentage were used to determine the demographic profile of the nurses using EHRs and the barriers to EHR use. The weighted mean was used to determine the PU, perceived ease of use, and intention to use.

RESULTS

Of the 327 participants, female nurses dominate (61%) the nursing workforce and were 30 years old and below (59%) with 1–2 years of experience (35%). The participants mostly have had 1–5 trainings (52%), and the majority of them were staff nurses (54%) (Table 1).

Table 2 presents the PU, perceived ease of use, and intent to use. Accordingly, the nurses perceived EHRs as useful (5.76 ± 1.71) and easy to use (4.74 ± 1.56), and they intend to use it (5.85 ± 1.81).

TABLE 1. Demographic profiles of the nurses (N = 327)

Demographics	Frequency (N)	Percentage (%)
Sex		
Male	127	39
Female	200	61
Age		
30 and below	194	59
30 and above	133	41
Duration of experience		
1–2 years	115	35
3–4 years	100	31
5 years	112	34
Number of trainings		
1–5	171	52
≥5	156	48
Job title		
Staff nurse	178	54
Head nurse/supervisory	149	46

TABLE 2. Descriptive statistics on perceived usefulness, perceived ease of use, and intention to use

	Mean	SD
Perceived usefulness	5.76	1.717
Ease of use	4.74	1.561
Intention to use	5.85	1.817

Table 3 presents the differences between demographic profiles and PU, perceived ease of use, and intention to use. No significant sex difference in the PU ($p > 0.671$), perceived ease of use ($p > 0.605$), and intention to use ($p > 0.880$) was found.

Regarding age, a significant difference was found in the PU ($p = 0.045$) but not in the perceived ease of use ($p > 0.883$) and intention to use ($p > 0.223$). As regards trainings, a significant difference was noted in the number of trainings and PU ($p = 0.039$) and intention to use ($p = 0.007$), but no significant difference in the perceived ease of use ($p > 0.142$). Meanwhile, the duration of experience was not significant different in the PU ($p > 0.708$), perceived ease of use ($p > 0.577$), and intention to use ($p > 0.949$).

Table 4 presents the barriers to the utilization of EHRs among nurses. Accordingly, the lack of training was seen as the most frequent barriers (77.9%), followed by resistance to adopt EHRs (65.1%) and the lack of technical support (57.8%).

DISCUSSION

This study aimed to investigate nurses' perceptions on the usefulness, ease of use, and intention to use EHRs. In this study, nurses positively perceived the usefulness and intended to use EHRs. This might be because nurses understood that EHRs help improve the productivity of healthcare organizations with the increasing demand for digital information. According to Abdekhoda *et al*., the usefulness and intention to use EHRs were well worthwhile to both patients and healthcare professionals to obtain medical history, treatment results, and past diagnoses; thus, an increasing number of healthcare professionals have shifted to EHRs.[21] The results of the present study agree with those of Shaker *et al*. where more than half of their participants, independent of

TABLE 3. Differences between demographic profiles and PU, perceived ease of use, and intention to use

Variables	Perceived usefulness		Perceived ease of use		Intention to use	
	Mean ± SD	*p*	Mean ± SD	*p*	Mean ± SD	*p*
Sex						
Male	5.70 ± 1.74	0.671	3.68 ± 1.40	0.605	5.82 ± 1.87	0.880
Female	5.84 ± 1.69		3.81 ± 1.31		5.87 ± 1.76	
Age						
≤30	5.65 ± 1.79	0.045	3.73 ± 1.34	0.883	5.71 ± 1.90	0.223
≥30	6.01 ± 1.52		3.77 ± 1.41		6.14 ± 1.58	
Number of trainings						
1–5	4.94 ± 1.72	0.039	3.89 ± 1.17	0.007	5.10 ± 1.97	0.142
≥5	6.25 ± 1.13		3.68 ± 1.16		6.33 ± 1.07	
Duration of experience in using EHRs						
1–2 years	5.66 ± 1.76	0.708	3.64 ± 1.35	0.577	5.82 ± 1.81	0.949
3–4 years	5.70 ± 1.66		3.91 ± 1.34		5.81 ± 1.76	
≥5 years	5.97 ± 1.76		3.64 ± 1.41		5.93 ± 1.94	

TABLE 4. Barriers to the utilization of electronic health record (N = 327)

Barriers	Frequency (N)	Percentage (%)
Lack of training	255	77.9
Resistance to adopting the electronic health record	213	65.1
Lack of technical support	189	57.8
Difficult-to-use technology	164	50.2
Computer literacy	158	48.3

designation category, nationality, sex, age, or practice environment, have a favorable opinion of EHRs.[22] Such a result adds to the body of knowledge on topics linked to the adoption of technology to enhance safety and quality nursing care.

Meanwhile, the participants had the modest perception on the ease of use, which may be because of the complexities of navigating it. Further, the modest perception of the nurses could be due to problems in comprehending the values and benefits. In an earlier study, Nour El Din posited that the perceived ease of use of EHRs resulted in enthusiastic acceptance by physicians and nurses;[23] however, in Saudi Arabia's eastern province, the benefits of EHRs are not fully realized because of the underutilization of many of its core functions. As such, this can be improved through EHR training and improvement of its key identified aspects. During HER implementation, nurses must be continuously engaged. Nurse participation in all facets of EHR adoption is encouraged. In addition to streamlining nurses' workflow, gathering feedback from nurses regarding the system will help in efforts to provide patients with high-quality treatment.

In this study, no significant difference was found between sex, PU, perceived ease of use, and intention to use. This means that both male and female nurses perceived that they and healthcare organizations could all benefit from EHRs. The present study disagrees with that of Tubaishat, claiming that sex influences the PU, perceived ease of use, and intention of current healthcare professionals to use EHR.[24] Conversely, the findings of the present study agree with those of Shahbahrami *et al*., where no significant sex difference was found in PU, perceived ease of use, and intention to use.[25] Indeed, the value of diversity and fairness is being recognized in the context of sex.

As regards age, a significant difference was found in the PU, but no significant difference was found with perceived ease of use and intention to use. This suggests that older nurses compared with their younger counterparts have had problems with the PU of EHRs, which may be because they prefer traditional practice. As such, Laramee *et al*. mentioned that younger healthcare professionals were more tolerant of EHRs than older healthcare providers.[26] This is presumably associated with their experience with technology and computers. Managers must recognize the constraints in the perception of the healthcare providers of EHRs on the PU, perceived ease of use, and intention to use. Thus, managers should, for example, pay more attention to senior nurses, as this may be a contributing factor in the PU, perceived ease of use, and intention to use EHRs.

Meanwhile, the duration of the experience was not significantly different with PU, perceived ease of use, and intention to use. This implies that regardless of their exposure in their work using EHRs, nurses have perceived themselves to using EHRs, optimistically have the ease of use, and intention to use. The non-significant outcomes in this study can be attributed to the nurses' ongoing use of EHRs. As a result, these findings can be used to reassure and empower nurses that they can learn the usefulness, ease of use, and eventual usage of EHRs regardless of their duration of experiences. These considerations can help nurses become more enthusiastic about the usefulness, ease of use, and intention to use EHRs in their workplace. Thus, nurses learning regardless of experience can be facilitated, which is critical to the successful use of EHRs.[27] However, policymakers should understand the thoughts and sentiments of nurses who have limited experience in utilizing an EHR system and who have been reported to have problems with using the system.

A significant difference was found between the number of training and PU and intention to use, but no significant difference was noted in the perceived ease of use. Obviously, the significant difference between the number of training and PU and intention to use is due to the ongoing professional development. Indeed, the perceptions of EHRs alongside training are expected to make a significant influence on healthcare data quality, healthcare outcomes, and clinical practices.[28,29] In this context, nurses could develop a clear vision, build a credible team, engage staff, and sustain momentum through training. Thus, education and timely information are provided, supporting the change initiative to promote a positive self-image and confidence in EHRs.

The PU has no significant relationship with the perceived ease of use but with a significant relationship with the intention to use. This means that regardless of the complexity of use, nurses think that they certainly employ it. Moreover, while it is coupled by complexity, end users such as nurses have the willingness to use it. The results of the present study disagree with those of Mijin *et al*. who confirmed the positive relationships between perceived ease of use and PU.[30] In this context, healthcare practitioners must carefully create and manage work environments to promote confidence in the use of HER. To achieve a successful implementation of EHRs, a framework to change the management would be required, in addition to providing training, EHR acceptance, and quality improvement.

Accordingly, the lack of training was seen as the foremost barrier, followed by resistance to EHR use and the lack of technical support. This means that before system installation, employees' preparedness and training should be assessed, as they may not be willing to accept changes to a new system within their present work process. The lack of training as a barrier agrees with the result of the earlier study about clamors of the participants. According to Ajami and Bagheri-Tadi, participants were unhappy with their vendor's training and after-sales service.[31] Rather than a training schedule like that indicated in the

literature, the participants reported that their vendor only supplied one-half- to a full-day training session. Moreover, the focus of resistance is not on a specific information system but on the changes in the status quo that are brought about by information system modifications.[32] To this end, policymakers and administrators should search for a means to increase the self-efficacy of their nurses. Indeed, a user with high self-efficacy will optimistically accept a new information system without experiencing any worries and will be more interested in the information system's high value and proportional advantage.

To support nursing practice, policymakers should build systems that address the issues highlighted in this study. Nurses' involvement in tailoring their needs can make electronic records more user-friendly. Indeed, the findings of this study consider the needs of EHR users and must be interpreted from their perspective. Individual issues can be exacerbated by the lack of involvement of healthcare practitioners in the design, development, and use of EHRs.

This study has certain limitations to consider. The use of convenience sampling should be taken into account when generalizing the results. Furthermore, because the study was limited to a single location in Saudi Arabia, the conclusions cannot be applied to other situations. These drawbacks can be overcome by expanding the study and using probability sampling in a national survey.

CONCLUSIONS

Nurses perceived EHRs as useful and easy to use and something that they intended to use. Sex had no effect on PU, perceived ease of use, or intention to use. A significant difference was found in PU based on age. On training, a significant difference in PU and intention to use was noted. Policymakers can use the present findings to develop a program that tailor-fit the needs of nurses to fully use EHRs. A consistent positive learning environment from healthcare facility managers improves nurses' views on the use of health information technology, fosters acceptance, and raises awareness to improve high-quality patient care. More research addressing the challenges in the implementation of EHRs in different settings and with different groups of nurses is needed.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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