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The Open Nursing Journal

Content list available at: https://opennursingjournal.com

RESEARCH ARTICLE

Nurses' Views on the Use, Quality, and Satisfaction with Electronic Medical Record in the Outpatient Department at a Tertiary Hospital

Mohammad J. Jaber[1], Ahmad M. Al-Bashaireh[2,*], Ola M. Alqudah[1], Omar M. Khraisat[2], Khaldoun M. Hamdan[2], Hind M. AlTmaizy[1], Diana S. Lalithabai[1] and Rabia S. Allari[2]

[1]*King Fahad Medical City, Second Health Cluster in Central Region, Riyadh, KSA*
[2]*Faculty of Nursing, Al-Ahliyya Amman University, Amman, Jordan*

Abstract:

Background:

Many nurses perceive that the Electronic Medical Record (EMR) reduces the workload, improves the quality of documentation, and improves safety and patient care. However, other nurses reported that the system and environment of healthcare might impede EMR documentation at the bedside.

Objective:

The study aimed to describe the nurses' views of the use, quality, and satisfaction with EMR in daily practice in outpatient settings. Furthermore, the relationships among the use, quality, and user's satisfaction of EMR were assessed in the study.

Methods:

The proposed study employed a cross-sectional, descriptive correlational design. Inclusion criteria were nurses willing to participate in the study, fluent in the English language, and have been working in the Outpatient Department for more than three months until the time of study implementation. A self-reported questionnaire with strong validity and reliability was used to assess nurses' views of use, quality and satisfaction of EMR.

Results:

The response rate was 77.2% (170 out of 220), 91.2% of the participants were females. Results about the use of EMR have shown positive views ranging from 51.2% to 84.7%, with the lowest scores reported when to write nurse care worksheets (Kardex). For the quality of EMR, the results have shown positive views ranging from 70% to 87.6% with the lowest scores reported related to the EMR system problems and crashes, and for the user's satisfaction, the results have shown positive views ranging from 76.5% to 87.1%. There were significant positive correlations between the three elements use, quality, and user's satisfaction of EMR.

Conclusion:

Participants reported positive views in the domain of use, quality, and satisfaction with EMR. Furthermore, positive correlations were reported between the use, quality, and satisfaction domains of EMR.

Keywords: Electronic medical record, Outpatient department, Nurses, Health care, Safety, Patient care.

Article History	Received: April 27, 2021	Revised: August 20, 2021	Accepted: August 23, 2021

1. INTRODUCTION

1.1. Literature Review

The evolution of the paper record to the electronic record is considered a significant change in contemporary healthcare, where the impact is not limited to the quality of care and patient safety but also to the organizational priorities such as revenues/reimbursement, risks, and legal concerns, and meeting the accreditation and quality standards [6]. The opportunity to improve the quality of care outcomes and the collaborative processes among the multidisciplinary teams were presented due to the fast movement and shifting from paper-based to computer-based or electronic record systems. Using electronic medical records helps to assess and communicate nursing care by utilizing objective data to reach

* Address correspondence to this author at the Faculty of Nursing, Al-Ahliyya Amman University, Amman, Jordan; Tel: +962-5-305-222-11, Fax: +962-5-305-222-11, E-mails: a.albashaireh@ammnu.edu.jo, aalbashaireh@gmail.com

the quality indicators as patient and healthcare providers' satisfaction as well to help hospitals identify potential problem areas that might need further study [7].

In many countries, embracing and implementing technology in the healthcare field, such as electronic health records, slowly progresses because of the obstacles of cost, computer literacy, and lack of supporting policies [8, 9]. Conversely, to successfully adopt the electronic medical record, the designers, systems architects, and project managers should investigate the factors affecting the adoption of the electronic health record and recognize the needs and the requirements of the users' satisfaction that match with patient safety and quality of care [10]. Furthermore, in a study conducted in long-term post-acute care settings utilizing one-on-one interviews of twenty direct care nurses perceived that using electronic records for documentation of nursing care is easy, improving patients' satisfaction through efficiencies gained in communication with the care team, and positively affect the quality of care [11]. Moreover, using the electronic record for nursing documentation instead of paper-based documentation has led to time-saving, decreased number of documentation errors, reduced incidents of falls and infection rates and positively impacts the quality of care [11, 12]. Furthermore, the EMR helps in cost containment [13], improvement in healthcare and service deliveries [14], enhancement of clinical judgment and decision-making, improvement of communication and collaboration among healthcare professionals [15]. In a qualitative study, despite the rapid integration between EMR and different health care issues, nurses' views and acceptance of the new electronic system should be improved at the level of implementation and used since they were accustomed to the old paper system [16].

A systematic review of 120 papers identified measures useful to inform a quality assessment framework to measure the benefits of EMR on nursing care and showed variability of the impacts of EMR on nursing workflow and care deliveries in Australian hospitals [5]. In a field study, conducted on 325 nurses working in private hospitals, general university hospitals and ministry of health (general public) hospitals in Turkey, the nurses perceived the implementation of EMR are variant. They were satisfied as their jobs became easier, having improved decision making in relation to patients' care, increased accessibility to more legible patients' information, improved communication with other care providers, time-saving, enhanced patient safety, and quality care [17].

In Saudi Arabia, a pilot study was conducted in a single clinic on 200 female nurses to assess the nurses' knowledge, perception, and attitude on using EMR has revealed no significant relationship between the years of using the computer and the knowledge of EMR. Furthermore, widely different views among the participants on how the EMR is effective and preferable approaches to know more about EMR [18]. Another study conducted on 333 healthcare professionals, including nurses working in seven public hospitals, emphasized that the increase in the knowledge and use of a computer is positively affecting the staff's preferences and attitudes towards using EMR; however, computer literacy skills and English language proficiency remain the basis of using an EMR [19]. Recent exploratory study analysis of twelve studies that used quantitative and qualitative methods has shown 12 factors which considered barriers to adoption and successful implementation of electronic records; lack of computer experience, lack of perceived ease of by healthcare professionals, lack of user support, lack of perceived usefulness by healthcare professionals, technical limitations of the software system, lack of quality in patients' information, confidentiality concerns, resistance to change, hospital size, lack of electronic health record standards, uncertainty about electronic health record vendors, and hospital's level of care [20].

Most nursing care documentation is paper-based. These paper-based forms are changeable in response to many factors, such as practice change managers' preferences, but rarely due to the availability of evidence-based practice. A major challenge that the nurses encounter in daily practice is related to patient safety and quality of care [21]. Safety in nursing documentation is considered an important pillar of the quality indicator of patient care [2]. Furthermore, electronic integration and removal of redundant documentation are essential and crucial for nurses to perceive an improvement in their practice and workflow [22]. Another challenge is to improve the clinical data utilization and communication among healthcare providers to reach patient safety [23].

The implementation of EMR in outpatient resulted in a significant variant of benefits. In a study conducted on 83 providers, the use of EMR was associated with positive effects on the review of medical records, medications, and follow-up to testing results with patients; however, the use of EMR and the perception of its effectiveness had a negative effect on the provider-patient connection, and no association between the provider's time spent [24]. Another outpatient study found a significant reduction in emergency department visits and non-elective hospitalization, but not with office visit rates [25]. Despite similar limited studies conducted in Saudi Arabia, one study was conducted on 377 patients to assess their satisfaction regarding the use of electronic health records in outpatient in relation to consultation and various healthcare services; the results showed a significant satisfaction compared with the paper record system [26].

In our study, an electronic medical record system was adopted in the tertiary hospital in 2004 and initially was exclusive for medical staff who are authorized to use it for ordering medications, requesting lab and radiology tests, writing reports, reviewing results, and doing many other tasks. In 2016, nursing staff in the Outpatient Department (OPD) started to use the EMR system for documentation, patient and family education, nursing care plans, reporting allergies, and even more privileges, such as the request for laboratory tests. Many changes were made to the nursing module based on the safety and quality improvement' reports. Also, great efforts were spent to overcome the barriers and challenges of using electronic documentation in daily practice. Hence, assessing the staff nurses' views is essential. The KFMC Nursing Administration is planning to implement electronic documentation in all departments. Therefore, this study aimed to describe the nurses' views of the use, quality, and

satisfaction with EMR in daily practice in outpatient settings. Furthermore, the relationship between the use, quality, and user's satisfaction with EMR was assessed.

2. METHODS

2.1. Study Design

A cross-sectional, descriptive, correlational design was adopted to assess the nurses' views and determine relationships between the use, quality, and user's satisfaction with EMR in the outpatient setting.

2.2. Setting

Researchers recruited participants from the Outpatient Department (OPD) at a tertiary hospital, Riyadh, KSA. There are several sections under the outpatient department, including clinics of cardiac, cancer, neuroscience, medical and surgical, children's, gynecology/obstetrics, obesity, endocrine, and metabolic specialty. Around 220 nurses were providing care for patients and families who were visiting these clinics.

2.3. Study Population and Sampling

170 participants were consequently recruited between December 2019 and March 2020. Inclusion criteria were the nurse willing to participate in the study, fluent in the English language and have been working in the Outpatient Department for more than three months until the time of study implementation.

2.4. Ethical Consideration

This study was approved by the Nursing Research Committee and the Institutional Review Board at King Fahad Medical City (IRB00010471). This study followed the guidelines of the Declaration of Helsinki. Before enrollment of any potential participant, researchers explained the purpose of the study and that participation in the study is voluntary. Furthermore, all participants were informed about the anonymity, confidentiality issue, and the option of voluntary termination at any time without any repercussion on their current or future work. If the participant verbally gives his consent, he will be enrolled in the study and asked to fill the required questionnaires.

2.5. Sample Size Estimation

The calculation methodology of sample size for population survey was used "Raosoft sample size calculator." According to this method, a minimum of 141 participants is needed; given that the margin of error alpha (α) = 0.05, the confidence level is = 95%, total population = 220, and the response of distribution = 50%.

2.6. Data Collection: Questionnaires

2.6.1. Demographic Data

A self-reported questionnaire was used to obtain participant's demographics, which include age, sex, level of education, professional title, OPD specialty, years of experience in nursing and current institution, years of using computer and EMR, and if they received any official training for the use of EMR (Supplementary **1**).

2.6.2. Use, Quality, and User's Satisfaction with EMR

A valid and reliable questionnaire developed by Otieno *et al*. (2007) was used for measuring the three constructs of use, quality, and satisfaction concerning the EMR [27]. This questionnaire has 34 items: 12 items for the use of EMR (7 items for the domain of nursing care management and 5 items for the domain of frequency of use of order entry), 13 items for the quality (11 items for the domain of information quality and 2 items for the domain of service quality), and 9 items for users' satisfaction which include one item as a global measure about overall satisfaction with the EMR system [27]. Each item in the questionnaire is measured through 5 points Likert scale ranging from 1 to 5. Nurses' perception within the three domains is charted as a percent of positive or negative. Likert scales '4' and '5' within a given domain are charted as a positive percentage, while the Likert scales '1' and '2' within a given scale are charted as a negative percentage. A higher score of items and the total score for the questionnaire and domains indicate a positive perception of EMR.

The former Cronbach's alpha coefficients of the domain in this questionnaire were 0.88 for nursing care management, 0.79 for the frequency of use of order entry, 0.94 for the domain of information quality and 0.87 items for domains of service quality), and 0.90 for the 8 items for users' satisfaction [27]. The internal consistency in our study was found to be high for the whole 34 items (Cronbach's $\alpha = 0.97$). The Cronbach's Alpha was ranged between 0.92 and 0.97 for the three domains. All subdomains had a score ranged between 0.83 and 0.97, with an exception for the subdomain of service quality (Cronbach's $\alpha = 0.52$). Two items were responsible for this finding.

2.7. Data Analysis

IBM SPSS version 22 was used to analyze data [28]. All collected data were evaluated using descriptive statistics to examine the distribution of data values, including outliers and patterns of missing values. All nominal and ordinal data were reported in frequencies and percentages, and numerical data was reported in terms of means and standard deviations. Both negative and positive nurses' perceptions toward use, quality, and satisfaction about medical records were reported as frequencies and percentages. Spearman coefficient was used to assess the association between the use, quality, and satisfaction of EMR in the outpatient setting.

3. RESULTS

The response rate was 77.2% (170 out of 220). The majorities of participants were female nurses (91.2%), above 30 years old (68.8%), with a bachelor's degree (87.6%), and worked as staff nurses at Outpatient Department (91.2%). About their nursing experience, around 83% of participants have more than 5 years of total experience, and 93.5% of them with more than one year of experience in the current working setting (Table **1**). There are 88.2% of the participant using a computer for more than 5 years, and there are 92.4% using an EMR for more than 1 year. Moreover, 62.4% of the

participants were received formal training about the use of EMR (Table **1**).

Table **2** shows negative and positive nurses' views toward use, quality, and satisfaction about EMR. Concerning the use of EMR, participants have reported positive views of all 12 items. The percentages of positive views were ranged between 51.2% and 84.7% for the seven items that reflect the nursing care management while using the EMR. The lowest score in these seven items used the EMR system to write nurse care worksheets (Kardex). The positive percentages of the five items about the frequency of use of order entry were ranged between 83.5% and 90.6%. In general, participants reported higher positive views about the frequency of use of order entry than that of nursing care management while using the EMR.

The views of participants about the quality of the EMR system were positive. Participants reported positive views ranged between 70% and 87.6% about the 11 items of information quality, and between 56.5% and 72% for the two items of service quality. The lowest percentage of satisfaction was related to the EMR system problems and crashes (Table **2**). The last 9 items reported positive percentages ranged between 76.5% and 87.1%. These nine items reflect participants' satisfaction and views of the impact of the EMR system on clinical care (Table **2**).

Table 1. Participant's characteristics (N = 170).

Variables	Number (%)
Age (Years)	
≤ 25	5 (2.9)
26-30	8 (28.2)
31-35	64 (37.6)
> 35	53 (31.2)
Sex	
Male	15 (8.8)
Female	155 (91.2)
Education	
Master	2 (1.2)
Bachelor	149 (87.6)
Diploma	19 (11.2)
Other	0 (0.0)
Professional Title	
Nurse Manager	1 (0.6)
Head Nurse	5 (2.9)
Charge Nurse	9 (5.3)
Staff Nurse	155 (91.2)
English Language Proficiency	
Very good	89 (52.4)
Good	66 (38.8)
Competent	14 (8.2)
Limited	1 (0.6)
Very limited	0 (0.0)
Years of Experience in Nursing	
< 5	29 (17.1)
6-10	70 (41.2)
11-15	36 (21.2)
> 15	35 (20.6)
Years of Experience in Current Setting	
< 1	11 (6.5)
1-2	16 (9.4)
3-5	65 (38.2)
> 5	78 (45.9)
Years of using computer	
< 1	1 (0.6)
1-5	19 (11.2)
6-10	41 (24.1)
>10	109 (64.1)
Years of using Electronic Medical Record (EMR)	
< 1	13 (7.6)
1-5	85 (50.0)
6-10	36 (21.2)
>10	36 (21.2)
Former Training on the use of EMR	
Yes	106 (62.4)
No	64 (37.6)

EMR: Electronic Medical Record.

Table 2. Item description as positive versus negative response (N = 170).

Items	Mean (SD)	Median (Q3-Q1)	Negative n (%)	Positive n (%)
Use of EMR	-	-	-	-
Nursing Care Management	-	-	-	-
To what extent do you use the EMR system to review the patient's problems?	4.29 (0.92)	5 (4-5)	8 (4.7)	144 (84.7)
To what extent do you use the EMR system to enter daily nursing care notes?	4.34 (0.94)	5 (4-5)	10 (5.9)	144 (84.7)
To what extent do you use the EMR system to capture patient observations at the bedside?	3.76 (1.22)	4 (3-5)	26 (15.3)	110 (64.7)
To what extent do you use the EMR system to write nursing care plans?	4.13 (1.06)	4 (4-5)	15 (8.8)	130 (76.5)
To what extent do you use the EMR system to write nurse care worksheets (Kardex)?	3.19 (1.52)	4 (1.8-5)	56 (32.9)	87 (51.2)
To what extent do you use the EMR system to collect patient's info for discharge reports?	3.79 (1.22)	4 (3-5)	27 (15.9)	120 (70.6)
To what extent do you use the EMR system to document the physical assessment of patients?	4.28 (0.96)	5 (4-5)	9 (5.3)	142 (83.5)
Frequency of Use of Order Entry	-	-	-	-
To what extent do you use the EMR system to obtain information on investigation or treatment procedures?	4.29 (0.96)	5 (4-5)	10 (5.9)	142 (83.5)
To what extent do you use the EMR system to obtain the results from new tests or investigations?	4.35 (0.96)	5 (4-5)	10 (5.9)	144 (84.7)
To what extent do you use the EMR system to answer questions concerning general medical knowledge (concerning treatment, symptoms, complications, etc.)?	4.19 (0.92)	4 (4-5)	9 (5.3)	139 (81.8)
To what extent do you use the EMR system to obtain the results of tests and investigations?	4.38 (0.84)	5 (4-5)	6 (3.5)	151 (88.8)
To what extent do you use the EMR system to check drug information (such as allergy and interactions)?	4.42 (0.83)	5 (4-5)	6 (3.5)	154 (90.6)
Quality of EMR system	-	-	-	-
Information Quality	-	-	-	-
How often does the system provided the precise information you need?	4.19 (0.74)	4 (4-5)	3 (1.8)	149 (87.6)
How often does the information content meet your needs?	4.12 (0.78)	4 (4-5)	6 (3.5)	142 (83.5)
How often does the system provide reports that seem to be just exactly what you need?	4.12 (0.84)	4 (4-5)	6 (3.5)	138 (81.2)
How often does the system provide sufficient information?	4.12 (0.81)	4 (4-5)	6 (3.5)	142 (83.5)
How often is the system accurate?	4.04 (0.78)	4 (4-5)	6 (3.5)	140 (82.4)
How often are you satisfied with the accuracy of the system?	3.95 (0.81)	4 (4-4)	7 (4.1)	130 (76.5)
How often do you think the output is presented in a useful format?	3.97 (0.80)	4 (3-5)	4 (2.4)	128 (75.3)
How often is the information clear?	4.05 (0.81)	4 (4-5)	4 (2.4)	132 (77.6)
How often is the system user-friendly?	3.84 (0.93)	4 (3-4)	14 (8.2)	119 (70.0)
How often do you get the information you need in time?	4.02 (0.81)	4 (4-5)	5 (2.9)	133 (78.2)
How often does the system provide up-to-date information?	4.02 (0.84)	4 (4-5)	6 (3.5)	133 (78.2)
Service Quality	-	-	-	-
How often can you count on the system to be up and available?	3.90 (0.80)	4 (3-4)	7 (4.1)	123 (72.4)
How often is the system subject to frequent system problems and crashes?	3.54 (1.00)	4 (3-4)	29 (17.1)	96 (56.5)
User's Satisfaction	-	-	-	-
Impact of EMR System on Clinical Care	-	-	-	-
To what extent do you feel EMR is useful?	4.26 (0.75)	4 (4-5)	3 (1.8)	148 (87.1)
To what extent do you feel your performance has improved due to EMR?	4.08 (0.83)	4 (4-5)	5 (2.9)	134 (78.8)
To what extent do you feel the quality of your work has improved?	4.03 (0.80)	4 (4-5)	4 (2.4)	130 (76.5)
To what extent Do you feel EMR is worth the time and effort required to use it?	4.02 (0.85)	4 (4-5)	7 (4.1)	133 (78.2)
To what extent do you feel the quality of information has improved due to EMR?	4.07 (0.75)	4 (4-5)	3 (1.8)	137 (80.6)
To what extent do you feel EMR has been successful in your hospital?	4.12 (0.79)	4 (4-5)	4 (2.4)	139 (81.8)
To what extent do you feel EMR is an important system for your hospital?	4.18 (0.78)	4 (4-5)	4 (2.4)	142 (83.5)
To what extent do you feel the safety of patients has improved due to EMR?	4.09 (0.81)	4 (4-5)	5 (2.9)	138 (81.2)
Overall, are you satisfied with the EMR system?	4.10 (0.77)	4 (4-5)	4 (2.4)	139 (81.8)

Table **3** shows the mean and median scores of participants for the overall (total) and in the three major domains and subdomains of use, quality, and satisfaction about EMR. Relative to the number of items in each domain, the highest score was reported in the domain of the use of EMR, followed by users' satisfaction. However, the least score was recorded in

the domain of the quality of the EMR system. The lowest scores were recorded in the subdomain of service quality, followed by the subdomain of nursing care management.

Table 3. Electronic medical record scores: total, domains and sub-domains for use, quality and satisfaction (N = 170).

-	Mean (SD)	Median (Q3-Q1)
Use of EMR Nursing care management subscale Order entry subscals	49.42 (9.07) 27.78 (5.61) 21.64 (4.04)	51 (45-56) 28 (24-28) 23 (20-23)
Quality of EMR systems Information quality subscale Service quality subscale	51.83 (8.77) 44.39 (7.82) 7.44 (1.49)	52 (48-52) 41 (44-51) 8 (6-8)
User's Satisfaction: Impact of EMR system on clinical care	36.93 (6.42)	36 (34-36)
Total score	138.18 (21.39	141 (129-141)

EMR: Electronic Medical Record.

Table **4** demonstrates the correlation between the three domains of the use of EMR, the quality of the EMR system, and the users' satisfaction. There were significant positive correlations between the three elements. The highest correlation was reported between the extent of use of EMR and quality of the EMR system ($r = 0.69$, $p < 0.01$), followed by the correlation between the quality of the EMR system and user's satisfaction ($r = 0.64$, $p < 0.01$). The lowest score was reported between the extent of use of the EMR and the users' satisfaction ($r = 0.49$, $p < 0.01$).

Table 4. Correlation between the major domains: use, quality and satisfaction (N = 170).

-	The extent of use of EMR	Quality of EMR systems	User's satisfaction: Impact of EMR system on clinical care systems
User's satisfaction: Impact of EMR system on clinical care systems	0.49**	0.64**	1
Quality of EMR	0.69**	1	0.64**
Extent of use of EMR	1	0.69**	0.49*

EMR, Electronic Medical Record.
***P* < 0.01 (Spearman's coefficients).

4. DISCUSSION

This study aimed at assessing the use of EMR, quality, and user's satisfaction from the nurses' views. Besides, the relationship between the domains of use, quality, and user's satisfaction of EMR was also assessed. Concerning the use of the EMR domain, the results were positive and ranged from 51.2% up to 84.7% for nursing care management, indicating that the nurses get more familiar with the use of electronic record documentation. Results were similar to other studies [29, 30]. Also, the results were positive for the frequency of use of order entry; the results ranged up to 90.6%, meaning that the use of EMR facilitates nurses' work, implementing orders, retrieving data, and accessing necessary information. Comparing both subscales showed higher positive views found in the frequency of use of order entry than that of nursing care management while using the EMR. However, positive views in both subscales indicated a strong recommendation to use the EMR in daily practice to improve workflow; these results are consistent with those of Abu Raddaha *et al*. (2018) [30].

The outcomes for the EMR domain were all positive, ranging from 87.6 percent for information quality to 72 percent for service quality; this means that the quality of nurses' work has improved with the use of the EMR system, which provides easy access to information, data that is clear and legible, and can be easily sorted as a backup database. Similar to Raddaha *et al*.'s (2018) results [30], nurses showed high confidence in the importance of using EMR that will help in improving the quality of care and patients' safety. Our study shows positive views of nurses toward quality due to several reasons, such as reported by Sahney and Sharma (2018) [31], including quality of data storage in a secure cloud and provides easier access. However, the paper record is more susceptible to be lost, damaged, or stolen due to human error and/or a natural disaster [32]. Also, our results are consistent with Sahney and Sharma (2018), who claim that in EMR, accessing or sharing the information is instantly more efficient [31], whenever and wherever is needed, EMR enhances communication among the healthcare professionals and between different hospitals, allowing faster patient service [33].

The findings of the user satisfaction category showed that 87.1 percent of nurses were satisfied with the EMR system's positive impact on their performance, quality of care, and patient safety. This finding was consistent with Moreland's study (2012) [34]. However, less satisfaction was reported about EMR related problems and crashes. Similar findings were reported in other studies concerning software and system problems [32, 35, 36].

Assessing the relationship among three domains has shown positive correlations between all three domains; the strong correlation indicated that the domains were closely relevant to the EMR. The highest association was between the use of the EMR and the quality of the EMR system ($r = 0.69$, $p < 0.01$). Such finding is logical as the major goal of nursing practice is to provide high quality and safe patients' care since EMR proved to achieve the goal, so the nurse will definitely and frequently use EMR. This finding is in concordance with other studies [27, 35]. The second highest positive correlation was between the quality of the EMR system and user's satisfaction ($r = 0.64$, $p < 0.01$). Similar to other studies [37], this study showed that EMR eases the workflow, saves time and effort, and accurately saves patients data. Therefore, this will improve the quality of care and accordingly will improve the nurses' satisfaction.

The lowest score was reported between the extent of use of EMR and the users' satisfaction ($r = 0.49$, $p < 0.01$), indicating that even if the nurses are convinced about the importance of using EMR and are confident about the benefits of EMR on improving the care quality and patients' safety, this must be approved by experience. Thus, if the nurses have a good experience and positive impacts were reflected by using EMR, then this may improve their satisfaction. Similar results were reported by other studies [30, 36].

Our study shows positive views of nurses toward the use, quality, and satisfaction of the EMR. Several reasons behinds

such positive views toward EMR compared with the paper medical record as reported by Sahney and Sharma (2018) [31], which include: (1) EMR is cost-effective since it saves workforce, time, and physical storage space that reduces the cost at a long run; (2) data are stored in a secure cloud and provides easier access; (3) both are equally susceptible to security threats. However, the paper record is more susceptible to be lost or damaged; (4) accessing or sharing the information is instantly more efficient, whenever and wherever is needed, (5) EMR data are readable, accurate, and legible since they are often written in a standardized way, (6) EMR enhances communication among the healthcare professionals and between different hospitals which enabled faster patient service, and (7) enables efficient prescription management through a quick update to the pharmacy, reduces the cost burden and speeds up the procedure [31]. Adopting and using EMR is perceived differently, and these perceptions are driven by different stakeholders and the different aspects of EMR's performance and capabilities [33]. Besides, the nurses' perception of EMR is highly correlated with their readiness for implementation [36].

The study has several limitations; it is cross-sectional with a small number of participants, and the design precludes causality. Further, the setting of the study was limited to the Outpatient Department, and the subjects of the study were only nurses. A large-scale study targeted other healthcare professionals, and inpatient units were required to have a more comprehensive view about the use, quality, and satisfaction concerning the EMR.

CONCLUSION

Participants reported positive views in the domain of use, quality, and satisfaction with EMR. Furthermore, positive correlations were reported between the use, quality, and satisfaction domains of EMR.

NURSING /PRACTICE IMPLICATIONS

Understanding the nurses' views and perceptions of healthcare technologies is crucial. Use, quality, and user's satisfaction are three ways to assess the acceptance of EMR. In the clinical practice setting, EMR facilitates communication between nurses and other health professionals, such as physicians, pharmacists, clerical desk staff, etc. Using EMR speeds up the process of patients' information retrieval, and enhances the exchange of clinical information among health care workers. Moreover, successful implementation of EMR enhances the nurses' confidence in writing nursing care plans, chronologically tracing the patient's condition, improves the quality of nursing practice, and increases their satisfaction. The key factor of successful implementation of EMR is readiness, preparation, education, and training of nurses. Inadequate computer skills and lack of workflow-related processes negatively affect the nurses' satisfaction.

Nurses' participation in the decision-making process is vital to accept, adopt, and incorporate technology into practice, so their feedback must be considered. Pilot testing is important to identify the potential barriers that impede successful implementation. Enough training and education of nursing staff are necessary to enhance the implementation of EMR. A further study on other healthcare professionals is important.

AUTHORS' CONTRIBUTIONS

A I-T maizy and Lalithabai collected the data from participants. Jaber and Alqudah conducted the literature search, reviewed the article, and prepared the original draft of the manuscript. AI-Bashaireh and Khraisat participated in methods, data extraction and analysis, and writing the result section. Allari reviewed and edited the discussion section. AL-Bashaireh and Hamdan edited the last version of the manuscript. All authors approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Nursing Research Committee and the Institutional Review Board of King Fahad Medical City, Riyadh, KSA.

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

All participants were informed about the anonymity, confidentiality issue, and the option of voluntary termination at any time without any repercussion on their current or future work. If the participant verbally gives his consent, he will be enrolled in the study and asked to fill the required questionnaires.

STANDARDS OF REPORTING

STROBE guidelines were followed in this study.

AVAILABILITY OF DATA AND MATERIALS

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary material.

FUNDING

This study was funded by King Fahad Medical City under the intramural research fund (RFA 019-047).

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

The content of this publication is solely the responsibility of the authors and does not necessarily represent the official views of King Fahad Medical City.

SUPPLEMENTARY MATERIAL

Supplementary material is available on the publisher's website along with the published article.

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