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Nurses' Perceptions of Electronic Health Record Usability in Obstetrics and Gynecology

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Abstract
Background: Implementation of Electronic Health Records (EHRs) is recommended to enhance patient care quality. Nurses play a crucial role as key users in the successful adoption of EHR systems. *Purpose*: This study aimed to explore the perceptions of nurses working in obstetrics and gynecology regarding the usability of an EHR system. *Method*: A descriptive, quantitative, and cross-sectional design was used. Cluster random sampling was applied to obtain a representative sample from hospitals across the six regions of Northern Cyprus. Data were collected in 2022. One main health center from each region was selected to ensure representativeness. Data were collected using the Turkish version of Brooke's 1996 scale, translated by Demirkol and Şeneler, to assess the usability of EHRs. The data were used to evaluate nurses' usability of the EHR system. *Results*: The participants were predominantly young, female, bachelor's degree holders, and mainly employed in public hospitals with limited job experience. EHRs are mostly used for tracking lab results and patient care planning. The primary benefits were time savings and easier access to information. *Conclusion*: Nurses perceive that EHRs can reduce unnecessary workloads and improve patient care quality.

Keywords: Electronic Health Records (EHRs); Usability; Patient Health Records; Nursing Informatics; Obstetrics and Gynaecological Nursing

Introduction

Healthcare professionals, policymakers, and consumers consider health information technologies such as electronic health records, which are critical for transforming the healthcare industry. Information management is fundamental to healthcare delivery [1]. In health systems, information is the basis for decision making at all levels. This requires the integrity and interrelatedness of information in the form of a system that allows this resource to be captured, debugged, stored, recovered, updated, and processed to take advantage of it to optimize the functioning of healthcare. Health Systems, in fulfilling the mission for which they were designed, generated, and required a continuous flow of information. This ensured a high level of knowledge of the activities carried out at all levels of care for the management of management processes in services. In this way, the flow of information provided by Health Information Systems (HIS) that decision makers need for management is reflected [2]. Given these advantages, governments have offered financial incentives to health organizations to adopt and implement HIS registration as quickly as possible [3].

Through actions and processes based on prior knowledge in the area to be managed, the HIS fosters the entire information management process to provide decision-makers with tools to address the health challenges of populations. However, ideally, this information should meet the criteria of accuracy, completeness, and timeliness

to be best used for informed decisions [4]. Faced with the challenge of dealing with high volumes of health data, computer tools provide a competitive edge to the HIS management process, which has a recognized and widespread positive impact [5]. The World Health Organization (WHO) guidelines cover a broad concept of the use of HIS in-surveillance systems, prevention, promotion and health services, education, information, and research, and encourage the development of strategic plans for the implementation of technological infrastructure in health care [6].

Clinical care increasingly requires healthcare professionals to access patient record information that may be distributed across multiple sites, held in a variety of paper and electronic formats, and represented as a mixture of narrative, structured, coded, and multimedia entries [7]. This has shown great feasibility in the application of technologies to meet the demand for health services. Modern computerized health systems have enabled the application of theoretical knowledge and development of skills and abilities to improve the quality of health systems [8]. The implementation of a computerized information system is beneficial for both organizations and patients. There is evidence for the impact of this transformation on the prevention, treatment, and diagnosis of health problems. Technological capabilities of the HIS have enabled the development of electronic clinical records and electronic medical records, which have improved the doctor-patient relationship. These tools offer advantages in reducing the time spent producing and consuming information compared with traditional paper records [6]. A longitudinal person-centered EHR (Electronic Health Record) is a much-anticipated solution to this problem [7].

The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 was designed to support the diffusion of health information technology to improve patient care. The Medicare and Medicaid EHR incentive programs, authorized by HITECH, began providing incentive payments in 2011 to physicians and hospitals that demonstrated the meaningful use of EHRs. A national EHR certification program was established under HITECH to validate the capability of EHR systems to meet meaningful use requirements [9]. Electronic health record systems are tools that help healthy/sick individuals maintain their health self-management and communicate with their own healthcare personnel by allowing accessible medical records and other relevant information to be collected at a center [10-12]. Electronic health records have emerged as an important element in increasing the quality of care by reducing medical errors and increasing efficiency and accessibility in the healthcare system [11]. Over half of office-based physicians have adopted EHR [13].

The adoption of EHRs has fundamentally transformed health care delivery by enhancing the efficiency and accessibility of patient information. Nurses, as primary users of these systems, play a crucial role in leveraging EHRs to improve patient care and streamline clinical workflow. Given their central role, understanding nurses' evaluations of EHR systems is essential for optimizing their implementation and usage. This introduction explores the significance of nurses' user evaluations of EHRs, drawing on the recent literature to highlight key findings and considerations. Nurses' evaluations of EHR systems encompassed their perceptions of usability, functionality, and overall effectiveness in clinical practice. Functions such as managing patient data, documentation, and facilitating communication among healthcare teams are supported by EHR systems. However, the successful integration of EHRs into nursing practice is influenced by various factors including system design, training, and individual user characteristics [9]. Research indicates that while EHRs offer substantial benefits such as improved access to patient information and enhanced care coordination, they also present challenges that can affect user satisfaction and productivity [14].

A key area of interest in the evaluation of EHR systems is their usability. Usability concerns encompass the ease with which nurses can navigate the system, efficiency of data entry and retrieval processes, and overall user experience [15]. Studies have shown that user-friendly interfaces and streamlined workflows are crucial for minimizing the time spent on EHR-related tasks and reducing the risk of errors [16]. For instance, McCoy et al. [17] found that nurses who rated EHR systems as easy to use were more likely to have positive perceptions of their impact on patient care and job satisfaction. Educational background and job experience were significant factors that influenced nurses' evaluations of EHRs. Research has demonstrated that nurses with higher levels of education and more extensive experience are generally better equipped to navigate complex EHR systems and appreciate their benefits [18]. Conversely, less experienced nurses or those with limited training may encounter difficulties that affect their perceptions of the system's usefulness and efficiency [19]. Variability in user evaluations based on educational background and experience underscores the need for tailored training programs to address diverse user needs. The healthcare sector in which nurses work also impacts their evaluation of EHR systems. Studies

indicate that nurses in public hospitals often report different experiences than their counterparts in private settings, potentially due to differences in system implementation and resource allocation [20]. Public hospital environments may face unique challenges related to EHR integration, such as system customization and support, which can influence user satisfaction and perceptions. Perceptions of the necessity and benefits of EHRs play a crucial role in shaping nurses' evaluations. Evidence suggests that nurses who perceive EHRs as essential for their practice are more likely to view them positively and engage more effectively in the system [21]. The perceived benefits of EHRs, such as time savings and improved access to information, often contribute to more favorable evaluations, whereas concerns about system complexity and integration can lead to negative feedback [22].

According to the National Coordinator of Health Information Technologies and the American Nurses Association, nurses are obliged to introduce personal health information management and be familiar with technology [23]. Nurses use electronic health records in many arrangements in the clinical environment, including seizure schedules, medication orders, prescriptions, and care plans [3, 24]. Many studies have examined factors affecting the use of technology and electronic health records in clinics by nurses in health institutions. According to the results obtained from these studies, in order to use EHR effectively in institutions, principles of change management should be put into practice, stakeholders' opinions including nurses should be taken, training before and after the change should be provided, assessment should continue in the clinical setting, problems or deviations from current behaviors should be dealt with efficiently, and continuous communication should be provided [25-29]. These recent studies and reviews provide insights into how educational background, job experience, healthcare sector, and perceptions of EHR necessity and benefits influence user perceptions [30-33]. Nurses' evaluations of EHR systems are influenced by a complex interplay of usability, educational background, job experience, the healthcare sector, and perceptions of necessity and benefits. Understanding these factors is crucial to optimizing EHR systems and ensuring that they meet the needs of nursing professionals. Future research should continue to explore these dimensions to enhance EHR usability and support its effective implementation in diverse healthcare settings. However, there have been no studies on this subject in our country. To fill this gap in the literature, the purpose of this study was to investigate how nurses working in obstetrics and gynecology units experience the usability of the EHR system.

Materials and Methods

Selection and Description of Participants

A cross-sectional survey was conducted to gather nurses' opinions and experiences using Electronic Health Records (EHR). The study population consisted of nurses working in the obstetrics and gynecology units of six regional hospitals located in Nicosia, Kyrenia, Famagusta, Morfou, Lefke, and Iskele, all within the Turkish Republic of Northern Cyprus (TRNC). To obtain a representative sample, one primary health center was selected from each region. Random cluster sampling was employed to select participants, with the entire population divided into geographic clusters. Clusters were chosen randomly and all individuals within the selected clusters were sampled using systematic sampling. In systematic sampling, individuals were selected at regular intervals from the population. The hospitals were assigned numbers, and every participant with an odd number was enrolled until 60 subjects per hospital were selected. The overall sample size was 360 nurses, calculated to ensure a 95% confidence level, with a margin of error of 5% ($p=0.05$).

The inclusion criteria were as follows: (1) male or female nurses working in a healthcare center in the TRNC who had completed a nursing education program, (2) nurses with at least six months of work experience, (3) those providing direct patient care, and (4) those willing to participate in the study.

Technical Information

Data collection was conducted using a questionnaire designed to gather sociodemographic information and assess EHR usability using the System Usability Scale (SUS). The System Usability Scale, developed by John Brooke [34] in 1986, is a widely recognized tool for evaluating the usability of various systems, including software applications and devices. It provides a general measure of user satisfaction and system usability, without requiring extensive testing. The System Usability Scale consists of 10 items rated on a 5-point Likert scale, covering ease of

use, complexity, and user confidence. Odd-numbered questions (positive statements) are scored by subtracting 1 from the user's score, whereas even-numbered questions (negative statements) are scored by subtracting the user's score from 5. The total adjusted score is then multiplied by 2.5 to yield a final score ranging from 0 to 100, where higher scores indicate better usability.

The System Usability Scale has been widely validated for reliability, with Cronbach's alpha of 0.85 (34). In the Turkish context, Demirkol and Şeneler [35] confirmed the reliability and validity of the SUS, with a construct validity score of 0.92, as determined by factor analysis.

Statistical Analysis

The (IBM) Statistical Package for the Social Sciences (SPSS) for Windows, version 22.0 [36], was used for data analysis. Descriptive statistics, including frequencies, means, standard deviations, and percentages were calculated. The data for this study were collected between June and October 2022, following ethical approval from the Ethical Board at Cyprus Science University (CSU 2022/129). Prior to data collection, all participants were thoroughly informed of the objectives of the study. Informed consent was obtained from each participant voluntarily, ensuring adherence to the ethical standards for research involving human subjects, as outlined in the Declaration of Helsinki.

Results

The mean age of the participants was 30.5 (SD ±8.2) and half of them were up to 28 years (Table 1). Most of respondents were married female and had a bachelor's degree. Nearly three-quarters (73.1%) of respondents had worked in a public hospital for less than three years. The sample consists predominantly of young female professionals with a bachelor's degree, primarily working in public hospitals as staff nurses with relatively limited job experience. A summary of sociodemographic data is presented in Table 1.

Table 1. Sociodemographic data (n=360)

Demographic features	**n (%)**
Abe, years (median age (SD), mean)	28.0 (8.2), 30.5 years
Sex	
Female	295 (82)
Male	65 (18)
Educational Level	
Bachelor's degree	238 (66)
Diploma	83 (23)
Master / PhD	29 (11)
Health care sector	
Public hospital	331 (92)
Private hospital	29 (8)
Job position	
Nurse manager	65 (18)
Registered nurse	130 (36)
Staff nurse	165 (46)
Job experience	
0-3 years	165 (46)
4-7 years	101 (28)
8-11 years	29 (8)
>12 years	65 (18)
Marital status	
Married	202 (56)
Single	158 (44)

The average computer usage score of the participants was eight out of ten (SD = 6.9, Table 2). A median score of 8 suggested that the typical level of computer usage among the participants was moderate, with a standard deviation indicating some variability. The mean score of 8, which is higher than the median, indicates that a few

participants used computers more intensively, skewing the average upward. A strong majority of participants believed that EHR is necessary, with only a small percentage being indecisive or opposed to its necessity. This finding indicates a broad consensus on the importance of EHR in healthcare settings. EHRs are primarily used for tracking laboratory results, with less frequent use for monitoring consumables, medication follow-up, or receiving physician orders. This highlights the primary role of EHRs in supporting the diagnostic and laboratory processes. The main application of EHRs in the profession is in planning patient care, followed by research and administrative purposes. The most frequently cited benefit of EHRs is time saving, followed by easier access to information. Other features related to the EHR data are presented in Table 2.

Table 2. EHR-related characteristics of participants (n=360)

Features related to EHR	**n (%)**
Median computer usage score (SD), mean	6 (6.9), 8
Receive information technology education	
Computer-communication technologies and developments	162 (45)
No	119 (33)
Education and research	54 (15)
Health information systems	25 (7)
Computer usage fields	
Using social networks	220 (61)
Research on professional matters	79 (22)
Using office programs	61 (17)
Necessity of EHR	
Yes necessary	306 (85)
Indecisive	29 (8)
No, it is not necessary	25 (7)
Use of EHR in the institution fields	
Follow-up of laboratory results	263 (73)
To monitor consumable input-output	43 (12)
For medication follow-up from the pharmacy	32 (9)
To receive physician's orders	22 (6)
EHR usage fields in the profession	
Planning patient care	194 (54)
For research	97 (27)
For administrative applications	50 (14)
For discharge procedures	19 (5)
Benefits of EHR	
Saves time	223 (62)
Ease of access to information	75 (21)
Increase in quality of care	43 (12)
Increase in employee productivity	19 (5)

In this study, most of the items scored above 3; however, four questions stood out with score contributions below 3 (Table 3). All four questions that scored below 3 were related to the complexity of the system and whether the EHR were well integrated in the system. The SUS analysis showed that participants had a mixed but generally positive view of the system. While they found the system moderately easy to use and confident in using it, they also perceived some complexity and a need for technical support. The system is somewhat cumbersome and requires a significant amount of learning, though not excessively inconsistent. There is a moderate interest in frequent use, suggesting that with improvements, the system could become more user-friendly and integrated. The SUS score in this study was 73.8, which suggests acceptable usability.

Table 3. System Usability Scale analysis for all participants (n=360)

System Usability Scale Analysis Item	Score
I think that I would like to use this system frequently	3.72
I found the system unnecessarily complex	2.94
I thought the system was easy to use.	3.65
I think that I would need the support of a technical person to be able to use this system	3.57
I found the various functions in this system were well integrated.	2.97
I thought there was too much inconsistency in this system.	2.49
I would imagine that most people would learn to use this system very quickly	2.93
I found the system very cumbersome to use.	3.37
I felt very confident using the system.	3.54
I needed to learn a lot of things before I could get going with this system.	3.65

Table 4 shows that nurses with higher educational levels are associated with slightly higher mean scores, reflecting different perceptions based on academic background.

Table 4. EHR-related characteristics towards using SUS (n=360)

User characteristics	n	%	Mean	Test statistic F	*p* value
Educational Level					
Bachelor's degree	238	(66)	1.97	12.37	<0.0001
Diploma	83	(23)	2.24		
Master / PhD	29	(11)	2.29		
Job experience					
0-3 years	165	(46)	2.23	1.77	0.045
4-7 years	101	(28)	2.09		
8-11 years	29	(8)	2.12		
>12 years	65	(18)	2.16		
Job position					
Nurse manager	65	(18)	2.12	4.60	0.32
Registered Nurse	130	(36)	2.31		
Staff Nurse	165	(46)	2.45		
Health care sector					
Public hospital	331	(92)	1.94	51.02	<0.0001
Private hospital	29	(8)	2.35		
Necessity of EHR					
Yes necessary	306	(85)	1.96	19.13	<0.0001
Indecisive	29	(8)	2.12		
No, it's not necessary	25	(7)	2.30		
EHR usage fields in the profession					
Planning patient care	194	(54)	2.54	23.09	<0.0001
For research	97	(27)	2.29		
For administrative applications	50	(14)	2.13		
For discharge procedures	19	(5)	1.82		
Benefits of EHR					
Saves time	223	(62)	2.08	46.97	<0.0001
Ease of access to information	75	(21)	2.34		
Increase in quality of care	43	(12)	2.65		
Increase in employee productivity	19	(5)	1.97		

Some significant differences are noted, particularly among nurses with 4-7 years of experience, suggesting that experience level may influence perceptions. here are no statistically significant differences in perceptions based on job position. Significant differences are observed, with public hospital employees having more favorable perceptions of EHRs compared to those in other settings. There are significant differences in perceptions based on whether the EHR is deemed necessary, indicating that perceived necessity may impact user satisfaction. Significant variations in perceptions are also noted based on the primary field of EHR use, which may reflect

different demands across specialties. Perceptions vary significantly based on perceived benefits, with the highest mean score related to the belief that EHRs increase the quality of care.

Discussion

Electronic health record systems hold great promise for nurses in transforming clinical settings. The widespread use of EHR in healthcare services, such as patient admission, patient care, and transfer, requires readiness for change and a willingness to adapt to this technological innovation [37]. In addition, the availability of EHR systems is one of the most important factors in health-service delivery [38].

Usability evaluation methods include several usability assessment questionnaires. One of the most commonly used is the SUS. The System Usability Scale was developed in English [34]. The validity and reliability study of the SUS scale was conducted in Indonesian, Iranian, Spanish, Arabic, Chinese, French, German, and Turkish [35, 39]. The requirement for SUS scoring is that products must be at least passable, achieving SUS scores above 70, while better products typically score from the high 70s to the upper 80s. Truly superior product scores: better than 90. Products with scores less than 70 should be considered candidates for increased scrutiny and continued improvement [40]. The study yielded a score of 73, indicating an acceptable usability. Nurses who participated in the usability evaluation indicated that providing information trends over time on a patient's weight and vital signs, the use of visual displays for the data, and color coding to indicate measurements outside guidelines or recommendations were perceived to be extremely useful.

The data show that most participants view EHR as necessary and use them primarily for tracking laboratory results and planning patient care. Social networking is the predominant computer usage activity, and while EHRs are appreciated for their time-saving benefits, their impact on other aspects, such as care quality and productivity, is less emphasized. Most nurses in the study sample perceived that the EHR was beneficial; for example, it provided a good overview of the focus of patient care and treatment and allowed quick access to relevant information (Table 2).

Recent studies have shown a strong consensus on the necessity of EHRs to improve healthcare efficiency and quality. For example, a 2022 study found that the majority of healthcare professionals considered EHRs essential for effective patient care management [41]. Studies have shown that healthcare professionals often use social networking sites for both personal and professional purposes. A 2021 survey highlighted that social networking is a major activity among healthcare workers, impacting their professional networking and information-sharing [42]. The time-saving benefits of EHRs have been well-documented. A 2022 study reported that EHRs significantly reduce the time required for documentation and information retrieval [43]. Although EHRs are acknowledged for improving efficiency and access to information, their impact on overall care quality and productivity varies. A 2023 article found that although EHRs facilitate better documentation and information access, their direct impact on care quality and productivity can be less clear and sometimes mixed [44]. Quick access to the patient information provided by EHRs is frequently cited as a major benefit. Research from 2023 supports this, highlighting that EHRs improve the speed and efficiency of accessing patient data [45].

In previous studies, the positive effect of the EHR system on the quality of patient care has been determined [46]. After EHR, there was an increase in the time nurses spent in patient rooms and documentation but a slight decrease in the efficiency of care [47]. Earlier studies have found various advantages of EHR compared to traditional paper records in long-term care settings. These included the structured collection of and accessibility to information about patients' family histories, contact information, medications, current and previous care, medical treatments and procedures, and other relevant health-related information [48, 49]. Likewise, participants appreciated the various benefits of their EHR systems. EHRs improve the safety and quality of care by offering tools (e.g., alerts and reminders) to help avoid adverse events such as those related to medication errors [50-52], participants did consider the EHR useful for guaranteeing safe care and treatment. Conversely, nurses who are reluctant to participate in the EHR system cannot access records entered by other health professionals, which can lead to serious communication problems within the team, thus affecting the quality of nursing care [53].

The data reveal that perceptions of the system are influenced by educational background, job experience, the healthcare sector, and the perceived necessity and benefits of EHR, while job position did not show significant

differences (Table 3). Studies indicate that healthcare professionals' perceptions of EHR systems can be significantly influenced by their educational backgrounds. A 2024 study found that individuals with higher levels of education generally have more positive perceptions of EHR systems, often due to their greater familiarity with technology and information systems [54]. Job experience plays a crucial role in shaping the perceptions of EHR systems. According to a 2017 article, healthcare professionals with varying levels of experience report different attitudes towards EHRs, with those newer to the field often finding EHRs more challenging compared to those with more experience [55]. Perceptions of EHR systems can differ based on whether professionals work in the public or private health care sectors. A 2020 study found that employees in public hospitals often report more favorable views of EHRs than those in private settings, possibly due to different implementation practices and resource availability [56]. The perceived necessity of EHRs significantly affects their views. A 2022 study highlighted that healthcare professionals who view EHRs as necessary are more likely to have positive perceptions of their functionality and utility [32]. The perceived benefits of EHRs, such as time saving and improved access to information, influence user satisfaction and perceptions. A 2023 review found that while EHRs are valued for their efficiency and accessibility, their impact on the overall quality of care and productivity is perceived differently across various user groups [44]. Recent studies indicate that job position might not significantly affect perceptions of EHRs compared to other factors. For instance, 2022 study found that while different job roles interact with EHRs in varying ways, these differences do not always translate into significant variations in overall perceptions [57].

The functionality and usability of EHR systems have both positive and negative effects on nursing interventions [58]. Since usability is a fundamental dimension of patient safety and care, an EHR system should be compatible with nursing activities [59]. This study found that the use of EHR is necessary for planning patient care and increasing the quality of care. Similarly, a systematic review of the literature on the benefits and costs of EHR in hospitals showed clear economic benefits for EHR, as well as improvements in quality of care [60]. The expected effects of EHR on the work circumstances of nursing staff are generally positive, and EHR are mainly associated with a decreased workload. In other studies, hospital sector nurses' experiences with EHRs were more positive with respect to support for routine task completion, learnability, ease of obtaining patient information, and entry of patient data [61-64]. On the other hand, some studies have found negative perceptions of EHR among nurses. The reasons for this have been reported to include poor system design, significantly increased documentation time, wasted valuable time that could be spent on direct patient care, and slow response times in emergencies [65].

The main disadvantages of the EHR system were technology-related challenges, increased time required to enter records into the system, lack of hardware, increased workload, reduced patient time, lack of privacy and security, possibility of deletion or alteration of information entered the system, computer skills challenges, and inefficient time management [66, 67]. It is recommended that improvements in sharing information with frontline clinicians, insufficient data areas, patient safety, and documentation of nursing practice could facilitate the wider adoption of EHR.

Several factors prevent nurses from implementing EHR systems. These barriers can be divided into three categories: These can be summarized as the usability of the EHR system (ease of use, functionality, and impact on workload), physical environment, and individual characteristics of nurses. The EHR system must be acceptable to nurses to improve their utilization and provide quality care [58]. Nurses, who are the healthcare professionals who use EHR the most, should be included in the implementation, evaluation, development, and decision-making processes of the system. Accordingly, there is a need to continuously update EHR systems and keep nurses up to date on the use of EHR [68]. Considering all this literature, according to the results of the study, nurses working in gynecology clinics in our country think that EHR systems are usable.

The limitations of this study include the testing of one EHR system in a healthcare facility. First, the cross-sectional design of the study did not allow the inference of causal relationships. The fact that our study was conducted in multiple hospitals increases the generalizability of our results to larger populations. Second, this study did not measure when basic and/or continuous training care workers received to use the EHR or to what extent staff managers encouraged or monitored the care workers in using the EHR information. This study evaluated only nursing usability features. In addition, the use of an internationally accepted instrument will contribute to the global discussion of the results.

Conclusions

This study evaluated 360 nurses working in obstetrics and gynecology unit perceptions related to EHR in six health centers in the TRNC. The study found that bachelor's degree nurses' overall indication of EHR systems' usefulness was high. Recent studies EHRs are increasingly implemented EHRs in hospitals, and there is evidence that they influence the safety and quality of care, including efficiency. In addition, to ensure that gynecological nurses successfully integrate into the EHR system, possible barriers that restrict the use of the system should first be identified.

List of Abbreviations: The full list of abbreviations provides in the manuscript.

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