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Evaluation of User's Satisfaction of Electronical Medical Record System at Phreah Ang Doung Hospital

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ABSTRACT

Background : Electronic Medical Record (EMR) has been implemented in hospitals and clinics worldwide. The implementation of this system was to improve the quality of patient care, reduce medical errors, and provide facilities that not only improve patient safety but also enhance workflow in healthcare facilities. In Cambodia, the government encourages the use of the EMR system. Preah Ang Duong Hospital is the national hospital that implemented the EMR system for the first time launched on 06 June 2019. Therefore, this study aimed to determine User Satisfaction with the Electronic Medical Record System (EMR) at Preah Ang Duong Hospital in 2022.

Methods: A cross-sectional study was conducted to evaluate the satisfaction of 236 health staff using the EMR system in Preah Ang Duong Hospital. Data was collected using Google Forms, and data entry and analysis were performed in IBM SPSS version 20. A descriptive analysis was performed to calculate the percentage of each variable related to participants> characteristics and users> satisfaction with EMR System Quality, Information Quality, and Service Quality.

Results: This study showed that among 236 participants, there were 129 female participants (54.7%) and 107 male participants (45.3%), and the most numerous age groups were around 26 to 45 years old. Most are doctors (29.2%) with computer experience (96.2%). Users> satisfaction related to system quality was between 86.9% and 93.3%, service quality was between 86.5% and 90.2%, and information quality was between 84.7% and 89%.

Conclusion: This study revealed that the users were strongly satisfied with the system, service, and information quality of the EMR system. EMR should be expanded to be implemented in other health facilities since it provides users with systems, service quality, and information.

I. Introduction

An Electronic Medical Record (EMR) is an electronic record of health-related information on a person that can be created, obtained, managed, and operated by authorized health providers. The aim was to store medical data and other patient records for long periods and simultaneously ease the accessibility of such information. The EMR has been implemented in many different hospitals and clinics worldwide. The implementation of this system was to improve the quality of patient care, reduce medical errors, and provide facilities that not only improve patient safety but also enhance workflow in healthcare facilities. In the United States, the government signed the HITECH Act through the Patient Protection and Affordable Care Act in 2009 to give healthcare providers the to implement EMR technology. As a result, it has increased health insurance for millions of uninsured Americans. In the United Kingdom in 2002, the national program for I.T. wanted to create a national electronic health record system for the entire U.K.

The government contracted four companies to implement the system to eliminate the interoperability problems between the different EHR systems. However, the project could have been better implemented due to cost and time constraints. In France, as in the United States, most citizens are medically insured mainly through their employers. France has successfully implemented EMR with a current adoption rate of 67%. EMR indicates that France has a stronger hold on HIE, privacy laws, and interoperability that can create enhanced frameworks for future electronic health records systems to successfully connect and operate with more complex capabilities. In India, the healthcare system is made up of both public and private hospitals. The country has a target of providing better healthcare. In 2011, the Integrated National Health system was started by the Indian government to provide universal quality health services by the year 2020. India is behind other countries, such as France and the U.S. In Saudi Arabia, most healthcare service providers use the manual patient record-keeping system,

and only a few hospitals have embraced an EMR system with limited functionality [1-3].

In Cambodia, the government encourages the use of the EMR system. However, linking patient records still needs to be challenging, because Hospital A's records differ from Hospital B's. Preah Ang Doung Hospital is the national hospital that implemented the EMR system for the first time launched on 06 June 2019. Moreover, it was introduced by the Minister of Health Cambodia and operated by the hospital's director (Prof. LOU LYKHEANG) to modernize the hospital management information system. The rationale of this research is to evaluate user satisfaction with EMRs at Preah Ang Duong Hospital since June 2019. The benefit of this system has not been evaluated; hence, findings from this research will improve the quality of EMRs for future expansion to other public and private sectors [4,5].

1.2 Literature Review

Hospital information systems (HISs) have changed spectacularly since the introduction of computers in healthcare organizations. Not only the change in information technology (IT) but mainly corresponding to computerized hospital offers. HIS also plays a part in financial management and stock control, and some departments such as laboratory, pharmacy, and medical records have already been using HIS to record the data and reduce medical errors. HIS is essential to avoid mistakes and errors that lead to the satisfaction and effectiveness of the system [6].

1.3 IT and Healthcare

Paper-based records or traditional systems complete the need of modern healthcare because of their limit. HIS replaces the traditional system since it provides patient safety and changes the workflow in healthcare. A HIS or EMR facilitates communication, performs record-keeping, and supports the organization's function. Furthermore, EMR can be defined as a hospital's complete information processing and information storing sub-system, including both computer-based and paper-based information processing tools. Multiple benefits could assess the value of EMR by comparing paper-based and electronic medical records. EMR provides the healthcare provider with a complete patient profile that leads to better patient care, and positively raises the quality of diagnosis and storing documents over a long period, which causes benefits for some researchers [7-12].

1.4 Information System Evaluation

Due to the development of information technology in the healthcare sector, medical errors have been reduced, improving the healthcare system. In contrast, HIS also has disadvantages; it is expensive to implement, and users' satisfaction differs due to their different preferences. The beginning of the system is hard to implement for both systems and users. The evaluation of user satisfaction is hard to measure and has no standard because it is a complex phenomenon. It is vital that during the evaluation process, both the technology used and the role of users that participate and their relation to the technology must be taken into account. The measurement of HIS success can be viewed from many angles and has two perspectives: the organizations and socio-technical viewpoints. The organization's viewpoint focuses on the information system that provides users with how the information system interacts with users. The socio-technical viewpoint means the individual needs. Furthermore, information system success has been identified by six dimensions: system quality, information quality, information use, individual impact, and organizational impact. Moreover, they add another dimension of service quality [15-22].

Later, the discussion primarily focused on three different measures of success: cost-benefit analysis, system usage, and user satisfaction. The cost-benefit analysis is the difference between benefits regarding organizational effectiveness. System usage means trust in the effectiveness of users. The user's satisfaction can be defined as the IS end user's overall affective and cognitive evaluation. The HIS end users refer to non-technical personnel who use or interact with the system directly. When the user cannot understand the system's function, it explicitly shows users' non-satisfaction [23].

1.5 Hospital Information System Evaluation 1.5.1 User's Background Information

HIS can be categorized into internal and external users. Internal users refer to nursing staff, doctors, administrative staff, and all those who directly use the system. External users refer to the company suppliers; everyone indirectly relates to IS. The evaluation of user satisfaction is measured by the user's background (User experience, skill, user training), service quality (internal support and external support), information quality (content, accuracy, format, timeliness, and data security) and system quality (ease of use, system speed, screen interface, error recovery). User's satisfaction related to user background: User background can be measured with experience, training, and user skill, and it is associated with HIS success by leading to greater satisfaction. User experience related to computer anxiety decreases the users' confidence and satisfaction Training and user skills are also part of the user's background since they can help the user accept new computer applications and increase their involvement with information systems [24-32].

1.5.2 System Quality

The most critical factors influencing user satisfaction are ease of use, system speed, screen interface, and error recovery. When the system is easy to implement and speedy due to the information system's development, it positively affects the user's satisfaction. It means that when the system is easy to use and complex procedures do not exist, the user will more likely accept it. According to Igbaria et al., a system must be developed based on the user's abilities and needs to achieve ease of use. Furthermore, system speed is another variable that leads to high user satisfaction. The screen interface and error recovery are among the most significant variables affecting user satisfaction [32,33].

1.5.3 Information Quality

User satisfaction related to information quality: measurement

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of information quality contains accuracy, timeliness, and data security [34]. The content of the information system will satisfy users as it fits their needs, such as availability, confirmation, and confidence of data that lead to greater satisfaction [35]. In the same way, the researchers have shown that measures that refer to information, such as the accuracy of the output information and the format and the availability, positively influence user satisfaction. Finally, the confirmation and the confidence that data are secured from unauthorized alteration or loss lead to greater user satisfaction.

1.5.4 Service Quality

User satisfaction related to service quality: typical measurement of service quality includes internal and external support. Internal support or the information system department in the hospital continues support while our healthcare providers need urgency so that they can assist immediately. External support or the company selling their system to the hospital can solve every problem and perfectly correspond to the user's purpose. According to DeLone and Mclea, service quality is another factor that affects user satisfaction and IS effectiveness. It is certain that when the IT department (internal support) and external vendor (external support) provide assistance and solutions to different problems that derive from computer usage, the users feel more confident about overcoming obstacles, which, in turn, leads to greater satisfaction and system usage.

2 Objectives

2.1 General Objective

This study aimed to determine User Satisfaction with the Electronic Medical Record System (EMR) at Preah Ang Doung Hospital in 2022.

2.2 Specific Objectives

• To determine the socio-demographic characteristics of participants/users.

• To identify the level of satisfaction of participants with the EMR System Quality implemented in Preah Ang Duong Hospital

• To identify the level of satisfaction of participants with the EMR Information Quality implemented in Preah Ang Duong Hospital

• To identify participants' satisfaction level with the EMR Service Quality implemented in Preah Ang Duong Hospital.

3 Methods

3.1 Type of Study

A Cross-sectional study was conducted to evaluate EMR satisfaction among staff working at Preah Ang Duong Hospital.

3.2 Place of Study

The study was conducted in Preah Ang Duong Hospital, Phnom Penh, Cambodia. Preah Ang Duong Hospital has been enlarged from an ophthalmology and ENT specialist to a multi-specialist hospital. Recently, the hospital created more departments, such as obstetric-gynecology, general surgery, and other specialist departments. The hospital receives patients from any part of Cambodia.

3.3 Sample Size

464 staff currently work at the Preah Ang Duong Hospital, including 124 specialized doctors, 43 doctors, 26 midwives, 140 nurses, 63 administrative staff, 13 receptionists, 15 laboratory technicians, and 40 cleaners. Among 424 eligible staff, 236 participated in the study.

3.4 Duration Of Study

Data collection in this study was conducted from 29 May 2023 to 05 June 2023 by Google form and drop-in group working telegram in every department by getting permission from every head department and ensuring all the staff gets all the questionnaires.

3.5 Inclusion Criteria

All Preah Ang Duong Hospital staff were eligible to participate in the study during the data collection period. Staff who are finally selected into the study unless he/she is

- Both permanent and contract.
- Volunteers to participate in the study
- User of EMR system

3.6 Exclusion Criteria

- Staff who refused to participate
- Not meet the inclusion criteria

3.7 Measurement

All variables related to System quality, Information quality, and Service quality were measured to evaluate the level of satisfaction divided into strongly disagree, disagree, neutral, agree, and strongly agree.

3.8 Data Analysis and Data Management

Data was entered and analyzed by IBM SPSS version 20, and double data entry was performed to reduce typing errors. Data were cleaned to check for completeness, consistency, and outliers. Final data wasexported to IBM SPSS (Version 20) for analysis. A descriptive analysis was performed to assess frequencies and percentages of each variable was calculated as the level of satisfaction of EMR users.

3.9 Ethical Considerations

This study has been approved by the Cambodia National Ethic Committee for Health Research on 5 July 2021 (Ref:134 NECHR). Informed consent has obtained from each selected female teacher before each interview.

4. Results

4.1 Socio-Demographic of Participants

Of 420 eligible staff, 236 volunteered to participate in the study.

Characteristics of participants	N	Percent						
Gender								
Male	107	45,3						
Female	129	54.7						
Age group								
18-25	44	18.6						
26-45	179	75.8						
46-60	13	5.6						
Professional qualification								
Doctor	69	29.2						
Specialized doctor	46	19.4						
Nurse	46	19.4						
Midwife	38	16.1						
Receptionist	13	5.5						
Lab technician	13	5.5						
Administrative staff	11	4.6						
Using computer before								
Yes	227	96.2						
No	9	3.8						
How often using paper-based record								
Always	61	25.8						
Often	47	19.9						
Sometimes	61	25.8						
Rarely	25	10.5						
Never	42	17.7						
How often using EMR								
Always	50	21.1						
Often	45	19						
Sometimes	122	51.6						
Rarely	9	3.8						
Never	10	4.2						
Certificate in computer								
Yes	157	66.5						
No	79	33.4						

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Table 1 shows that among 236 participants, we have 107 female participants (54.7%) and 107 male participants (45.3%), and the most numerous age groups were around 26 to 45 years old. Most of them were doctors (29.2%) and have experience in using computers before (96.2%). The number of participants who constantly use paper-based records was 25.8%, and never use paper-based records was 17.7%.

Participants who always used EMR were 21.1%, often used 19%, sometimes used 51.6%, rarely used 3.8%, and never used 42%. The participants with a computer certificate were 66.5%.

4.2 User Satisfaction with the System Quality



Figure1: Some Questions Related to System Quality

Figure 1 shows that participants or users were satisfied with system quality. There were many questions related to system quality, such as the advantage of EMR in reviewing the patients' problems, following the results of the tests, obtaining the result of treatment, obtaining the result of the paraclinical examination, and transferring from one department to another. After surveying, it was revealed that most participants agreed with the advantages of EMR, about 90%.



Figure 2: Some Questions Related to System Quality

Figure 2 shows that most participants agreed that EMR has changed our department's quality and performance by almost 90%. Furthermore, the workflow has become accessible, such as registering codes, getting declaration

forms, completing sick leave, referring patients from one department to another, and obtaining discharge information.

4.3 User Satisfaction with Service Quality



Figure 3: User Satisfaction with Service Quality

Figures 3 showed that the service quality was assessed based on two parameters: 1) the company support users and 2) the hospital IT team support users. 62.3% of participants strongly agreed, and 24.2% agreed that the company

supports users. 62.7% of participants strongly agreed, and 27.5% agreed that the hospital IT team supports users.

4.4 User Satisfaction Related to Information Quality



Figure 4: User Satisfaction with Information Quality

Figure 4 shows that information quality also takes part in user satisfaction since some points affect such as how precise the information is, the sufficient information we need, the accurate information, the layout, and the userfriendliness of the system. This figure showed that almost 90% of participants agreed that the information quality is satisfied.



Figure 5: User Satisfaction with Information Quality

Figure 5 shows that most of the participants almost agreed that the system provided sufficient information and timely information we need.

5. Discussions

5.1 Summary of Remarkable Findings

This study evaluated the EMR system implemented in Preah Ang Doung Hospital. Participating staff showed an 86.8% satisfaction score, which is higher than other satisfaction scores from other studies (Private hospital in Ethiopia (66.9%), Ethiopia public hospital (35.6%), Southern India hospital (61.4%), China hospital (70.7%)). This study aims to assess user satisfaction with the EMR and determine factors that affect the EMR system. The user satisfaction of healthcare providers with EMR is a valuable component of the quality of health information systems. The study revealed user satisfaction in other countries; some countries have excellent user satisfaction, but others are not. The possible explanation could be the infrastructure difference, the quality of EMR, and the study setting [36, 37].

5.2 System Quality

The users who received the excellent system quality were more likely satisfied with the EMR system than those who could have been better. This result is similar to the study done in South Africa, Greece, and Ethiopia. This study shows that the higher the system quality, the higher user satisfaction, and the positive impacts on individual productivity [38-41].

5.3 Information Quality

The information quality is more satisfied by users. It is also shown in a study conducted in Greece, Saudi Arabia, Nigeria, and Ethiopia. The information quality has accuracy, completeness, currency and format influence, up to date, precise and secure. These essential elements of EMR mean sufficient information is available, ensuring good accuracy, timely updating, format, and layout is regularly understandable by users [44].

5.4 Service Quality

The service quality is also taking part in user satisfaction. It is demonstrated in studies in Turkey, Greece, Nigeria, America, and Ethiopia [38-41, 44, 45]. Developing a welcoming environment of EMR toward users mostly leads to the success rate of implementing EMR by providing immediate system support, both internal (hospital IT) and external support (system company). That is why the success of implementing EMR must be cooperated by the hospital directors, system companies, and users [41].

5.5 Limitation of The Study

There were a few limitations observed in this study, and those were: 1) cross-sectional study design can be measured as snapshot data related to EMR user satisfaction, 2) The user's satisfaction may vary from time to time during the evaluation. User satisfaction results in this study cannot be generalized to other health professionals. However, it can be generalized to other health professionals with similar sociodemographic characteristics, and 3) Due to the busy working time, the participant may have neglected to pay attention to fill out the questionnaire.

6. Conclusion

This study revealed that the system, service, and information

quality of the EMR system were strongly satisfied by users participating. EMR should be expanded to be implemented in other health facilities since it provides users with systems, service quality, and information. Evaluation of user satisfaction should be conducted every year to measure the consistency of the quality of the EMR system.

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