Original Article

The role of field studying practices in improving understanding and skills for using electronic medical records among medical records and health information students

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Abstract

Background & Objective: Understanding the theoretical concepts of Electronic Medical Records (EMRs) alone is insufficient to prepare students for the professional world. Through Field Study Practices (FSPs), students gain a direct understanding of EMR implementation. The aim of the study was to analyze the role of FSPs in enhancing the skills of Medical Record and Health Information (MRHI) students in using EMR.

Materials & Methods: The study used a cross-sectional method conducted on students of the MRHI Department. The samples were taken using a simple random sampling technique totaling 259 students. Data were analyzed descriptively, a Chi-square test and binary logistic regression. Those methods were performed to determine the association in students' understanding and skills of EMR with a significance level of p-value < 0.05 and Adjusted Odds Ratio (AOR) with 95% Confidence Interval (CI).

Results: The study found that, the students who had performed FSP in the hospital were 56.4% and Community Health Center (CHC) was 43.6%. There was a significant association between students who participated in the FSP at a Health Care Facility (HCF) and various improvements in their understanding and skills related to Electronic Medical Records (EMR). Specifically, the students showed increased understanding of the concepts and basic functions of EMR (p = 0.001), as well as technical skills for using EMR (p = 0.001). They also demonstrated enhanced knowledge of data security and privacy (p = 0.002), and a better understanding of workflows and procedures for using EMR (p = 0.041). Additionally, students improved their understanding of EMR system integration and interoperability (p = 0.008) and showed compliance with EMR ethics and regulations (p = 0.001). They developed soft skills in the practice environment (p = 0.018) and were better able to analyze and make decisions based on EMR data (p = 0.025).

Conclusion: The surdents who participated in FSP can improve their understanding of concepts, technical skills, Data security, workflows, system integrations, regulatory compliances, soft skills developments, and analytical skills.

Keywords: electronic medical record, field study practice, health information system, medical record and health information student, health informatic

Introduction

In the digital era, the use of health information technology in health services has increased. The development of information technology has a significant impact on various sectors, including the health sectors [1]. One important aspect of a modern healthcare system is efficient and integrated medical record management. Health Information System (HIS) plays a key role in managing patient data securely, accurately, and quickly, thus supporting better medical services [2]. Therefore, an in-depth understanding of HIS is important for professionals in the field of medical records, including students studying in this field [3]. Advances in technology have brought about new challenges related to data security and privacy. Therefore, it is important for healthcare students to have a strong understanding of these issues, especially through their Field Study Practice (FSP) in a Health Care Facility (HCF). The target HCFs where the FSP was implemented were hospitals and

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Community Health Centers (CHCs). The main differences were in service complexity, functionality focus, and data integration needs. Hospitals require more complex EMR applications to support multisectoral services. CHCs highly focused on primary health services and community health reporting based on specific areas [4]. FSP is one of the effective learning methods for students to apply the theory they have learned in a real context [5]. The implementation of FSP in medical record students is designed to equip them with practical knowledges, technical skills, and professional attitudes that support work readiness in the field of health information management. With hands-on experience, students are expected to be able to contribute significantly in improving the quality of technology-based health services. In a healthcare environment, students not only gain insight into medical procedures and patient interactions, but are also faced with challenges related to data security [6]. Through this practical experience, they can see first-hand how patient data is managed and protected [7]. For medical record students, FSP provides a space to interact directly with HIS [8], get to know various medical data management software, and understand the workflow and procedures in medical record management in health facilities [9].

The need for an efficient and accessible medical record system is increasing. EMR has become an important component in the health information system, replacing manual medical records that have been widely used in various health facilities [10]. EMR enables faster, more accurate, and secure patient data management, and supports data integration between healthcare facilities [11]. Given its important role, mastery and understanding of EMR are essential for prospective health workers, including medical record students [12].

However, understanding EMR concepts theoretically is not enough to prepare students to face the challenges of the working world [13]. Through FSP, students can gain a direct understanding of the implementation of EMR in the field [14]. The practice provides an opportunity for medical record students to interact directly with EMR systems [15], learn procedures and workflows, and understand the technical and operational challenges that may be faced in medical data management [16].

FSP not only helps improve students' technical skills in using EMR, but also reinforces their understanding of the importance of security and confidentiality of medical data [17]. In addition, hands-on practice allows students to understand the regulatory and policy aspects related to EMR as outlined in the Regulation of the Minister of Health of the Republic of Indonesia Number 24/2022 concerning Medical Records which describes the implementation of EMRs and the security also protection of patient data [18]. This study aims to analyze the role of FSP in improving medical record students' skills in the use and management of EMR. With this study, it is hoped that more in-depth information can be obtained about the effectiveness of the FSP in equipping medical record students with the necessary understanding to operate and utilize EMR optimally.

Materials & Methods

Design and setting(s)

The study used a cross-sectional method that aimed to understand and measure the role of FSP in improving Medical Record and Health Information (MRHI) students' understanding and skills towards EMR. This method was chosen because it can describe the impact of FSP on student competence in understanding and managing EMR. The study was conducted from February to August 2024, starting from preliminary studies and data collection to report preparation. The study has undergone the ethics committee process and received approval from the Ethics Committee for Health Research (ECHR) at the Institute for Research and Community Service, Politeknik Medica Farma Husada Mataram. The approval is designated under Number: 13/LPPM/ECHR/2024.

Participants and sampling

The population in the study were 857 students of the Department of MRHI at Politeknik Medica Farma Husada Mataram, Lombok, West Nusa Tenggara (WNT), Indonesia who participated in the FSP at HCF, namely hospital and CHC. Students had completed FSP at HCFs using EMR. The sampling technique used simple random sampling that met the inclusion and exclusion criteria. Inclusion criteria included active students in the MRHI department who have taken EMR courses, have carried out FSP at HCF, and are willing to participate in the study and provide information according to research needs. Exclusion criteria included students who were inactive or on leave, students who started their studies and had not taken EMR courses, and were not willing to participate in the study. Sample size calculation was performed using the Sample Size Determination in Health Studies software, version 2.0. A representative sample of 259 students participated in this study.

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Tools/Instruments

The questionnaire was designed as a checklist by the FSP location field supervisor. This checklist is based on student competency indicators for EMR that must be achieved according to FSP guidelines. Students who participated in the FSP were categorized into two groups based on their location: "hospital" and "CHC". Gender was categorized as "male" and "female. Measurements related to understanding the basic concepts and functions of EMR were categorized as "understood" or "less understanding." Students were classified as having "understood" if they grasped the competency indicators related to the definition, purpose, and differences between manual and electronic medical records. They also needed to identify patient data, medical history, and clinical data in EMR. Conversely, students were marked as having "less understanding" if they did not fully comprehend some of these indicators. Technical skills in using EMR were categorized as "skilled" or "less skilled." Students were considered "skilled" if they could accurately input and update patient data, master medical data search and retrieval procedures, and effectively use the main features of EMR software. These features include recording medical history, treatment, and examination results in the EMR system. On the other hand, students were labeled as "less skilled" if they did not understand some of these indicators. Understanding of data security and privacy related to EMR was categorized as "understood" or "less understanding." Students were classified as "understood" if they knew the basic rules of data security in EMR, recognized the importance of maintaining the confidentiality of patient data, understood authorization procedures, and were aware of limited access during EMR use. Additionally, students needed to be familiar with the standards and regulations related to medical data security. Conversely, students were marked as having "less understanding" if they did not comprehend some of these indicators. Understanding of the workflow and procedures for using EMR was categorized as "understood" or "less understanding." Students were classified as "understood" if they comprehended how EMR is integrated into the workflow and recognized the proper procedures for recording medical data and ensuring data completeness. Additionally, they should be able to adapt to existing procedures to minimize errors in using EMR. In contrast, students were labeled as having "less understanding" if they did not grasp some of these indicators.

Understanding of EMR system integration and interoperability (ordinal scale) was categorized as "understood" if students know how EMR functions in supporting data integration, the importance of interoperability for patient data transfer, able to explain the benefits and challenges of integrating EMR data between HCFs, and "less understanding" if students do not understand some of these indicators. Compliance with EMR ethics and regulations (ordinal scale) was categorized as "understood" if students understand the code of ethics for using EMR data in health practices, rules related to protecting patients' rights to personal data, understand policies and regulations governing access rights and user obligations in EMR management, and "less understanding" if students do not understand some of these indicators. The ability to develop soft skills in the practice environment was categorized as "capable" or "incapable." Students were considered "capable" if they could communicate effectively with supervisors, colleagues, team members, and patients or their families during practice. They should also be able to work collaboratively in multidisciplinary teams to complete EMR-related tasks, adjust to the work culture, and take responsibility for the quality and accuracy of the data managed in the EMR system. Additionally, students needed to complete EMR-related tasks according to predetermined deadlines and manage task priorities effectively in a dynamic work environment. Conversely, students were labeled as "incapable" if they did not understand some of these indicators. The ability to analyze and make decisions based on EMR data was categorized as "capable" or "incapable." Students were deemed "capable" if they could analyze report data from EMR to assist in making medical or administrative decisions. They should understand how to use EMR data to support diagnosis, treatment, and care planning. Additionally, students needed to recognize potential errors in the data and understand how to correct them to improve service quality. Conversely, students were labeled as "incapable" if they did not comprehend some of these indicators. Before the instrument was distributed to the subjects, the validity was tested using the Pearson product-moment test, with a significance level of p-value < 0.05. The gender variable has a correlation coefficient of 0.575 (valid). The measurement of students' understanding of EMR who follow FSP has a correlation coefficient of 0.792 (valid). Understanding the basic concepts and functions of EMR has a correlation coefficient of 0.571 (valid). Technical skills in using EMR have a correlation coefficient of 0.644 (valid).

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Understanding of data security and privacy has a correlation coefficient of 0.524 (valid). Understanding of the workflow and procedures for using EMR has a correlation coefficient of 0.532 (valid). Understanding of EMR system integration and interoperability has a correlation coefficient of 0.641 (valid). Compliance with EMR ethics and regulations has a correlation coefficient of 0.492 (valid). The ability to develop soft skills in the practice environment has a correlation coefficient of 0.593 (valid). Analyzing and making decisions based on EMR data has a correlation coefficient of 0.440 (valid). Each variable has an rtable value of 0.138. The questionnaire was tested for reliability before being used in the study. According to Pallant (2020), an instrument with a Cronbach's Alpha value above 70% is considered reliable and suitable for measuring research variables [19]. The results of the instrument reliability test revealed that the Cronbach's alpha value was 0.723 or 72%.

Data collection methods

Data were collected by distributing questionnaires directly to students after they completed the FSP. Prior to completion, students were given informed consent and an explanation of the purpose of the study, and data confidentiality was guaranteed. Data collection lasted for two weeks to ensure that the number of respondents was sufficient and the data obtained was varied. To reduce the risk of bias in the sampling process, the authors listed the population criteria as study subjects based on the inclusion and exclusion criteria.

Data analysis

The data were analyzed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) version 26.0. Data were analyzed descriptively, including frequency distribution and percentages of respondents' answers regarding their understanding of EMR. In addition, the Chi-square test and Binary Logistic Regression were conducted to determine the association between participation in the FSP at HCF and the improvement of students' understanding and skills in managing EMR. A significance level of p-value < 0.05 was used. The depth of the association between the variables was further reviewed through the Adjusted Odds Ratio (AOR), with a 95% Confidence Interval (CI).

Results

Table 1 reveals that an almost equal percentage of males (51%) and females (49%) participated in the FSP. The majority of students participated in FSP in hospitals (56.4%), while 43.6% participated in CHCs. This indicates that more students attended FSP at secondary HCF. Table 2 shows that there was a significant association between FSP students participating at HCF in improving students' understanding of the basic concepts and functions of EMR ($p < 0.001$), improving technical skills in using EMR ($p < 0.001$), understanding of data security and privacy ($p < 0.001$), and understanding of EMR workflow and usage procedures ($p < 0.001$).

Table 1. Frequency distribution of students who participated in FSP

Variables	n	%
Gender		
Male	127	49.0
Female	132	51.0
Following FSP		
Hospital	146	56.4
CHC	113	43.6

Note: Descriptive analysis was conducted to see the distribution of participants.
Abbreviations: n, number of participants ; %, percentage.

The results of the analysis revealed that there was a significant association between students who FSP participated in improving their understanding of EMR system integration and interoperability ($p < 0.001$), improving compliance with EMR ethics and regulations ($p < 0.001$), ability to develop soft skills in their practice environment ($p < 0.001$), and ability to analyze and make decisions based on EMR data ($p < 0.001$) (**Table 2**).

Based on the results of the binary logistic regression analysis (**Table 3**), there is a significant association between students who participate in the FSP and their understanding of the basic concepts and functions of EMR ($p = 0.001$, AOR: 3.728). Students who participated in FSP at the hospital had technical skills in using EMR 3.491 times better than students who participated in FSP at CHCs. In addition, there was a significant association between students who attended FSP and technical skills in the use of EMR ($p = 0.001$, AOR: 3.491). Students who FSP participated at the hospital had technical skills in the use of EMR 3.491 times better than students who FSP participated at CHC.

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Table 2. The results of bivariate analysis of students who participated in FSP

Variables	Following FSP		χ^2	p
	Hospital	CHC		
Understanding EMR basic concepts and functions n (%)				
Understood	117 (72.7)	44 (27.3)	45.968	< 0.001
Less understanding	29 (29.6)	69 (70.4)		
Technical skills in EMR usage n (%)				
Skilled	118 (76.1)	37 (23.9)	61.273	< 0.001
Less skilled	28 (26.9)	76 (73.1)		
Understanding data security and privacy n (%)				
Understood	101 (74.3)	35 (25.7)	37.284	< 0.001
Less understanding	45 (36.6)	78 (63.4)		
Understanding of EMR workflow and usage procedures n (%)				
Understood	113 (70.2)	48 (29.8)	33.023	< 0.001
Less understanding	33 (33.7)	65 (66.3)		
Understanding of EMR system integration and interoperability n **(%)**				
Understood	96 (80.7)	23 (19.3)	52.864	< 0.001
Less understanding	50 (35.7)	90 (64.3)		
Compliance with EMR ethics and regulations n (%)				
Understood	91 (74.6)	31 (25.4)	31.130	< 0.001
Less understanding	55 (40.1)	82 (59.9)		
Ability to develop soft skills in a practice environment n (%)				
Capable	100 (76.3)	31 (23.7)	42.961	< 0.001
Incapable	46 (35.9)	82 (64.1)		
Ability to analyze and make decisions based on EMR data n (%)				
Capable	90 (70.9)	37 (29.1)	21.289	< 0.001
Incapable	56 (42.4)	76 (57.6)		

Note: Chi-square test was employed to compare participants.
Abbreviations: FSP, field study practice; CHC, community health center; χ^2, Chi-square test; p, p-value.

There was a significant association between students who FSP participated and the level of understanding of data security and privacy (p = 0.002, AOR: 3.221). Students who participated in FSP at the hospital had a better understanding of data security and privacy, 3.491 times higher than students who participated in FSP at CHCs. In addition, there was a significant association between students who take FSP and the level of understanding of workflow and procedures for using EMR (p = 0.041, AOR: 2.191). Students who FSP participated at the hospital had a level of understanding of the workflow and procedures for using EMR 2.191 times better than students who FSP participated at CHC (**Table 3**). The results of the study showed that there was a significant association between students who attended FSP and understanding of EMR system integration and interoperability (p = 0.008, AOR: 2.765). Thus, Students who participated in FSP at the hospital had a better understanding of EMR system integration and interoperability, 2.765 times higher than those at CHCs.

In addition, there was a significant association between students who attended FSP and compliance with EMR ethics and regulations (p = 0.001, AOR: 3.370). Students who FSP participated at the hospital had compliance with EMR ethics and regulations 3.370 765 times better than students who FSP participated at CHC (**Table 3**). There was a significant association between students who attended FSP and the ability to develop soft skills in a practical environment (p = 0.018, AOR: 2.397). This indicates that students who take FSP at the hospital have the ability to develop soft skills in the practical environment 2.397 times better than students who take FSP at CHC. In addition, there was a significant association between students who attended the FSP and the ability to analyze and make decisions based on EMR data (p = 0.025, AOR: 2.294). Thus, students who FSP participated at the hospital have the ability to analyze and make decisions based on EMR data 2.294 times better than students who FSP participated at CHC (**Table 3**).

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Table 3. Results of multivariate analysis of students who participated in FSP

Variables	AOR	95%CI	p
Understanding of EMR basic concepts and functions (ref: Understood) Less understanding	3.728	1.694 - 8.203	0.001
Technical skills in EMR usage (ref: Skilled) Less skilled	3.491	1.622 - 7.516	0.001
Understanding of data security and privacy (ref: Understood) Less understanding	3.221	1.561 - 6.647	0.002
Understanding of EMR workflow and usage procedures (ref: Understood) Less understanding	2.191	1.032 - 4.651	0.041
Understanding of EMR system integration and interoperability (ref: Understood) Less understanding	2.765	1.311 - 5.832	0.008
Compliance with EMR ethics and regulations (ref: Understood) Less understanding	3.370	1.636 - 6.942	0.001
Ability to develop soft skills in a practice environment (ref: Capable) Incapable	2.397	1.165 - 4.929	0.018
Ability to analyze and make decisions based on EMR data (ref: Capable) Incapable	2.294	1.111 - 4.737	0.025

Note: Binary regression logistic test was used to compare participants; AOR has been used to measure the depth of association between variables.
Abbreviations: AOR, adjusted odds ratio; 95%CI, 95% confidence interval; p, p-value.

Discussion

FSP allows students to apply classroom theories to real-life situations, providing hands-on experience with EMR systems in HCF [20, 21]. This helps them understand not only how EMR works, but also the importance of the system in improving efficiency and accuracy in patient data management. EMR has several basic functions, including the collection, storage, and management of patient health information [22]. Previous studies conducted in Saudi Arabia have revealed that by understanding these basic concepts and functions, students are better equipped to contribute to a modern healthcare system [23]. In the field practice, students can see first-hand how patient data is inputted, accessed, and managed, as well as the role of EMR in improving coordination between health professionals [24].

In addition to improving concept understanding, FSP also contributes to the development of students' practical skills [25]. In a real-world environment, students can learn to use EMR software and adapt to various situations that may be encountered in the field [26]. These skills are essential, especially when it comes to working with medical teams and communicating with patients about health information [27]. Another study conducted in Saudi Arabia revealed that FSP encourages students to develop interpersonal, communication, and problem-solving skills that are crucial in healthcare practice [12]. In practice, students who have participated in FSP show significant improvements in their technical skills compared to those who have only learned theory in the classroom [8]. Students understand various aspects of security, including data encryption, access control, and privacy policies. With this knowledge, they can contribute to creating more secure and effective systems [28]. A previous study conducted by Repsha et al. revealed that through FSP, students are able to observe how other healthcare professionals carefully manage patient data, and are aware of the protocols followed to protect that information [5]. The experience reinforces the theoretical understanding they have learned in class, so that they can better appreciate the importance of data security and privacy [29]. EMRs are equipped with various advanced features, such as automatic reminders for routine check-ups or integration with laboratory systems [30]. The experience builds their ability to work as part of a larger healthcare team [31]. Improved student understanding of EMR workflows and procedures through FSP also has a positive impact on the quality of health services [32]. Another study conducted in Australia revealed that students who have a good understanding of EMR can provide efficient and accurate services to patients [6]. Such understanding can reduce errors in patient data management and improve overall patient safety [5]. In addition, students trained in EMR use may become agents of change in the future, driving further technology adoption within healthcare organizations [20]. Through the FSP, students have the opportunity to be involved in projects related to the development and maintenance of EMR systems. This may include training in the use of software, data analysis, as well as the development of Standard Operational Procedures (SOPs) to ensure proper integration between systems [4]. This practical experience also assists students in understanding the complexities associated with system integration [26]. They learn how different systems function, the challenges that arise when they have to communicate with each other, and the importance of accurate and consistent data [1]. Students

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involved in FSP need to understand the basic principles of medical ethics, such as autonomy, justice, and beneficence, as well as the regulations governing the use of EMR [12]. Previous studies conducted in Saudi Arabia revealed that students who do well in FSP tend to have higher levels of compliance with EMR ethics and regulations [30]. Students involved in the FSP gained a better understanding of the consequences of ethical violations, especially in the context of patient data management [22]. Through first-hand experience, they can see how such violations can impact patients and healthcare professionals [9]. Compliance with electronic medical record ethics and regulations is a very important aspect of healthcare education. FSPs play a crucial role in shaping students' attitudes and behaviors towards EMR management [25]. Soft skills cover a wide range of interpersonal and intrapersonal abilities, such as communication, teamwork, leadership, empathy, and problem-solving skills. In healthcare, soft skills are particularly important because healthcare professions focus not only on the medical aspects but also on interactions with patients, their families, and coworkers [7]. Another study explains that FSPs give students the opportunity to learn about medical procedures and patient care, but also how to communicate with patients, handle stressful situations, and work with multidisciplinary teams [5]. The experience helps students to develop empathy and effective communication skills [21].

Conclusion

The role of FSP as a hands-on learning method has a positive impact on students' understanding and skills in EMR system management. Students who get quality practical experience have a better understanding than those who only receive theoretical learning. By maximizing the quality of FSP, educational institutions can better prepare graduates to face challenges in the era of healthcare digitalization. The study findings have significant implications for the future in that the FSP method is effective for improving students' understanding and skills. The findings encourage stronger integration between theory and practice in MRHI education curriculum development. Educational institutions can increase the focus on EMR training before and during FSP to ensure students are prepared for work demands. Studies on the development of FSP guidelines need to be conducted so that the competencies achieved are more comprehensive. Future research on the role of FSP in EMR mastery can make an important contribution to the development of higher education in healthcare. Understanding the factors that influence the success of FSP allows educational institutions to create more relevant and innovative learning strategies. This, in turn, equips students to tackle the challenges posed by digital transformation in the health sector.

Ethical considerations

The study was conducted following the ethics committee process and has received approval from the Ethics Committee for Health Research (ECHR) at the Institute for Research and Community Service, Politeknik Medica Farma Husada Mataram. The approval is documented under Number: 13/LPPM/ECHR/2024.

Artificial intelligence utilization for article writing

Using Grammarly for punctuation and grammar correction in manuscript.

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Conflict of interest statement

All authors declare that there is no conflict of interest.

Author contributions

Musparlin Halid, and Beny Binarto Budi Susilo: study design, data collection, data analysis, and interpretation. All authors of the study contributed throughout approved the final of the manuscript.

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Data availability statement

Study data available upon reader request.

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