ELECTRONIC MEDICAL RECORD ACCEPTANCE:
A Literature Review

Ananda Dhea Soraya [1*], Iwan Dewanto[2], Winny Setyonugroho [3]
[1,2,3] Master of Hospital Administration, Post-Graduate Program
University of Muhammadiyah Yogyakarta

*Corresponding Author: wsetyonugroho@umy.ac.id

ABSTRACT

The implementation of hospital information systems and electronic medical records can improve health care services in hospitals, but there are still many things that inhibits its user acceptance. The purpose of this study is to find out things that can support the acceptance of hospital information systems and medical records by electronic users and their obstacles. **Methods:** *This is a literature review research and uses the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) methods. Relevant articles were obtained from PubMed in 1982 to June 2021. Articles were selected if they met the criteria in the form of discussing the acceptance of hospital information systems in the form of electronic medical records in hospitals.* **Results** *: A total of 1535 articles were obtained from PubMed. The same article was deleted with Zotero's delete duplicate feature and manually with the results of 215 relevant articles, 89 articles were selected through abstract reading and 22 articles were obtained for full text reading. A total of 21 journals were analyzed in this review. Factors that affect the acceptance of hospital information systems and electronic medical records are perceived usefulness, perceived ease of use, human-related factors, demographics and the human environment, technological factors, organizational and organizational environmental factors, effort expectancy and performance expectancy.* **Conclusion:** *Implementation of information systems and electronic medical records can be maximized by increasing user acceptance of the system so that health services can be provided optimally.*

Keywords: *Hospital information system, Behaviour, Acceptance.*

INTRODUCTION

One of the hospital's strategy in carrying out its duties as a service provider for the community is using an information system, so that patient's data can be properly recorded and documented. Some of the information systems that have been widely used in various hospitals are electronic office systems (e-office), electronic medical records (ERM) and others. There are several important roles of information systems namely: supporting the health care service in hospitals, supporting hospital management in decision making and supporting various strategies for competitive advantage (Kisdianata et al., 2016). The role of the Hospital Management Information System (SIMRS) in managing hospital data is actually quite large and complex, both for patient medical data and administrative data owned by hospitals. So that if it is managed conventionally, it has the potential to cause duplication of data, resulting in the increasing of data storage capacity. Data that is not integrated can cause 'out of sync' in each part and cause the presentation of information that is late and less reliable. This finally will lead to human error. Out of sync data entry for the same patient or item will complicate data processing and often result in significant material losses for hospitals. (Handiwidjojo, 2009).

Regulation of the Minister of Health of the Republic of Indonesia Number 269 of 2008 article 2 states that a medical record is required to be made in writing, complete and clear or can be made in written form or in electronic form. Electronic medical records are files that contain all patient history. Records that must be written by a doctor or dentist and made electronically or digitally. A good medical record file can describe a good and valid health report. The role of medical records are important as a collector, processor, and a presentation of health information, which can be done manually or electronically (Nuryati&Widayanti, 2015). The electronic medical record computerized system is expected to assist hospital management in documenting several things such as doctor's visits and the accuracy of providing care, so that it is expected to save time, cost, avoid duplication, shorten processing time, and provide effective and efficient services. There are several factors that influence the success of the electronic medical record implementation process such as thorough planning, dedicated team members and support from facility management, funders and computer system developers (Mashoka et al., 2019).
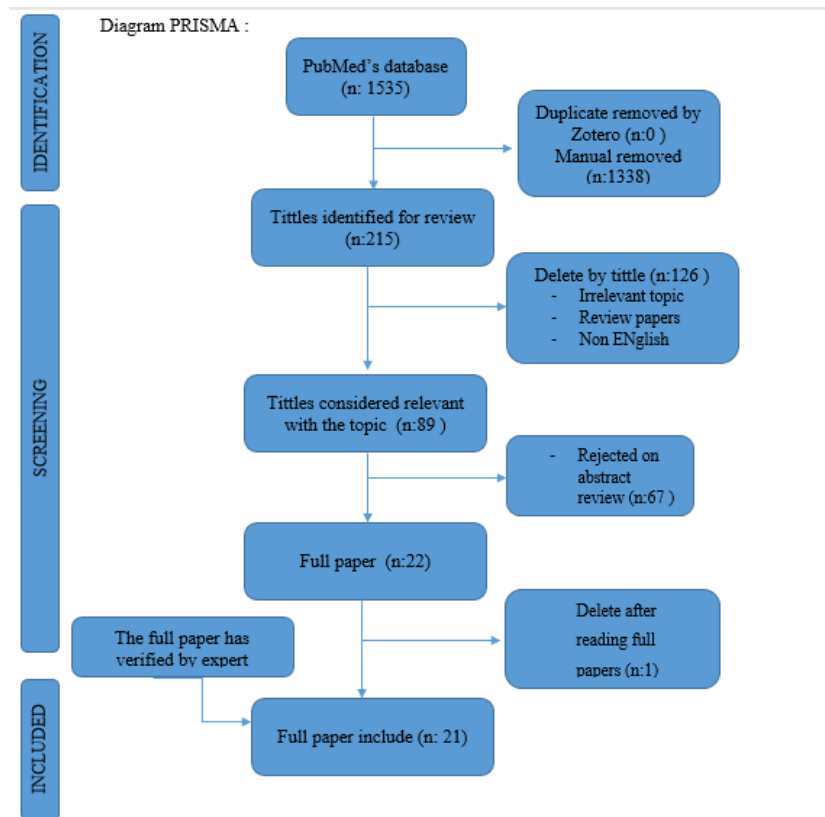
The successful application of electronic medical records in several developing countries has several obstacles, including those caused by limited resources, lack of necessary information technology support and stakeholder awareness to move in the implementation of the new system. In conducting an electronic medical records (ERM) readiness assessment, 3 basic requirements are needed, including: architectural readiness, infrastructure readiness and process

readiness. The four main things in conducting an electronic medical record readiness assessment are: organizational culture, management and leadership, operational readiness and technical readiness (Ajami et al., 2011).

Evaluation of information systems is an effort to find out the conditions that occur in the field from the implementation of information systems. With this valuation, it is hoped that there will be a target in the implementation of information system activities so that later it can be known and also corrected in its application (Purwandi, 2018). There are many models that can be used to evaluate an information system. One of the usual and frequently used models in the evaluation of information systems is the Unified Theory Of Acceptance And Use Of The Technology (UTAUT) which is based on previous technology acceptance models such as Theory of Reason Action (TRA), Theory of Planned Behavior, Task Technology Fit Theory, and especially the Technology Acceptance Model (TAM). TAM, which was first introduced by Fred D. Davis in 1986, is an adaptation of TRA which was made specifically for modeling user acceptance of information systems. (Dillon, 2006). The purpose of this article review is to describe things that can support the acceptance of electronic medical records by users and the obstacles in using electronic medical records.

RESEARCH METHODOLOGY

This study uses a literature review method and the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) method, this method is carried out systematically by following the correct stages or research protocols.The literature obtained in this study was sourced from an electronic database, namely PubMed (https://www.ncbi.nlm.nih.gov/pubmed/). The article search method uses advanced search so that the search is more focused with search keywords in the form of: "hospital information system" and "behavior". After deleting the same journal, the title and abstract were identified. Research journals deemed eligible for full-text screening were taken for full review. The inclusion criteria of this study were: English-language articles, published in 1982 to June 2021 and articles. published internationally, articles that discuss the hospital information system in the form of electronic medical records and conducted at the hospital. An ethical review was not required for this study. The following is a list of searches on PUBMED along with the PRISMA diagram:

Table 1. Data-Based Search System

Diagram PRISMA :

PubMed's database (n: 1535) → Duplicate removed by Zotero (n:0) Manual removed (n:1338)

Tittles identified for review (n:215) → Delete by tittle (n:126) - Irrelevant topic - Review papers - Non ENglish

Tittles considered relevant with the topic (n:89) → - Rejected on abstract review (n:67)

Full paper (n:22) → Delete after reading full papers (n:1)

The full paper has verified by expert

Full paper include (n: 21)

IDENTIFICATION / SCREENING / INCLUDED

RESULTS AND DISCUSSION

At the start of the search we found 1553 articles from PubMed. Checking the same article was carried out using Zotero's delete duplicate feature and manually with the result did not find the same article. There are 215 articles left after reading the relevant titles, 89 articles were selected through abstract reading and 22 articles were obtained for full text reading of the article. A total of 21 research articles were taken for analysis regarding user acceptance of the implementation of technology, especially electronic medical records in hospitals. All research journals described in table 1. User acceptance of electronic medical records and hospital information systems was measured using different questionnaires so that the factors that influenced acceptance were also found to be different. In this study, the factors that affect acceptance are grouped into several groups, namely: perceived usefulness, perceived ease of use, human-related factors, demographics and the human environment, technological factors, organizational and organizational environmental factors, effort expectancy and performance expectancy.

Perceived usefulness was found to be the factor influencing the acceptance of hospital information systems by its users. It was found in research conducted (Nadri et al., 2018), (Barzekar et al., 2019), (Alipour et al., 2019), (Abdekhoda et al., ., 2019), (Hwang et al., 2019), (Thit et al., 2020), (Omar et al., 2017), (Elahi et al., 2020), (Jauk et al., 2021) and (Litwin et al., 2018). Perceived ease of use were found to be a factor influencing the acceptance of hospital information systems by users, found in research conducted (Nadri et al., 2018), (Barzekar et al., 2019), (Alipour et al., 2019), (Thit et al., 2019). al., 2020), (Abdekhoda et al., 2019), (Omar et al., 2017), (Elahi et al., 2020) and (Jauk et al., 2021).

Perceived usefulness is the user's belief that technology can improve his work performance in health facilities, while the perception of user's convenience is defined as the system used by the user can be used easily. Research conducted at the Zahedan University Hospital of Medical Sciences on hospital information system users using a new validated questionnaire obtained the results of perceived usefulness and perceived ease of use affecting the acceptance of hospital information systems (Alipour et al., 2019). The same thing was also found where the acceptance of the Electronic Prescribing Decision Support Systems (EPDSS) which is an application or digital drug prescribing system was carried out on paediatricians at Karolinska University Hospital using semi structured interview questions based on the Extended Technology Acceptance Model 2, namely perceptions of usefulness and perception of user's convenience (Omar et al., 2017). The results above are in line with a review of articles discussing the acceptance of electronic medical records. We found that factors in the form of perception of user's convenience, perceived usefulness, behavioural intentions to use and actual use are interconnected and affect the acceptance of medical records (Putri &Sevtiyani, 2020).

Factors related to humans, demographics and the human environment were found in the research conducted (Abdekhoda et al., 2019),(Nadri et al., 2018), (Alipour et al., 2019),(Ahmadian et al., 2017),(Ahmed et al., 2020), (Hwang et al., 2019), (Darby et al., 2019), (Singh et al., 2020) and (Bourla et al., 2020). A study was found to explore the acceptance of smartphone-based ecological momentary assessment (EMA) applications, computerized adaptive testing (CAT) and connected wristband based digital phenotyping (CW) in France. As much as 24.6% of respondents in the 26–30 year age group were the most reluctant to use the system (p = 0.032), regarding the reliability of the system 25.4% of the 31-35 year old group believed that the device was reliable (p < 0.001) and regarding the impact on the therapeutic relationship, the 18-25 year old group believed that this device could inhibit the therapeutic relationship, while the 31-35 year old and over 40 year old group believed otherwise (p = 0.007). Factors that affect the CW device are gender and age. Around 51.9% of women and 33.3% of men believed that the device could be a barrier to the therapeutic relationship, while 38.1% of

men thought that it could be useful ($p < 0.001$), regarding usability, 18.5% of the group over 40 years of age stated that they would use the device ($p < 0.05$) and 30.9% of participants in the 31-35 year age group considered that the potential use for psychiatrists was high ($p = 0.022$) (Bourla et al., 2020). Gender was also found to be a factor influencing both perceived usefulness and perception of user's convenience, which is an indirect factor that influences doctors in using electronic medical records (Hwang et al., 2019).

Technological factors were found in research conducted by (Alipour et al., 2019), (Sheikhtaheri et al., 2020), (Ahmadian et al., 2017), (Abdekhoda et al., 2019), (Ahmed et al., 2020),(Darby et al., 2019),(Singh et al., 2020) and (Wang et al., 2020). Research on the different challenges and barriers to the use of hospital information systems in hospitals in Kerman, Iran, states that the hardware factor is an obstacle to the use of hospital information systems. Nurses who have experience using hospital information systems will be more interested and motivated to use hospital information systems (Ahmadian et al., 2017). Information quality, service quality and system quality significantly increase nurse satisfaction with hospital information systems. Nurse satisfaction with hospital information systems and the use of hospital information systems can directly improve individual performance when using hospital information systems (Sheikhtaheri et al., 2020).

Organizational factors and organizational environment were found in research conducted by (Ahmadian et al., 2017), (Alipour et al., 2019), (Barzekar et al., 2019), (Abdekhoda et al., 2019), (Ahmed et al., al., 2020), (Jahanbakhsh et al., 2017) and (Wang et al., 2020). Organizational factors and organizational environment were found to play an important role in influencing the acceptance of hospital information systems. In a study in Iran using a combination of TOE (technology, organization and environment)–TAM (technology acceptance model) on 237 health workers, the results of adaptation of the use of electronic medical records were influenced by perceived ease of use which were directly influenced by organizational factors such as: organizational competence, management support, training and education and technological factors such as relative advantage, compatibility and complexity while the perceived usefulness is influenced by organizational factors in the form of management support and technological factors such as relative advantage, compatibility and complexity (Abdekhoda et al., 2019). In another study, there is a relationship between the attitude of the manager who is the decision maker in the hospital organization to the implementation of electronic medical records on commitment. The positive attitude and high commitment of hospital managers to the implementation of the system can improve the quality of health services, patient safety, speed of service delivery and reduction of patient costs (Jahanbakhsh et al., 2017).

Effort expectancy and performance expectancy were found in research conducted by (Sheikhtaheri et al., 2020) and (Ahmed et al., 2020). Research conducted on 173 nurses regarding the implementation and effects of hospital information systems on nurse performance using a questionnaire compiled from a combination of the unified theory of acceptance and use technology (UTAUT) model and the Delone& McLean model. The results stated that effort expectancy and expectancy performance affect nurses' willingness in using hospital information systems (Sheikhtaheri et al., 2020). Similar to the results above, a study that explored the capabilities and factors that influence the use of electronic medical records in referral hospitals in Ethiopia for 420 health workers using the unified theory of acceptance and use technology 2 (UTAUT2) method obtained the results of expectancy performance and effort expectancy are factors that influence the desire of health workers to use electronic medical records (Ahmed et al., 2020). Effort expectancy and performance expectancy that affect acceptance are in accordance with UTAUT theory where these variables affect user acceptance of technology (Williams et al., 2015).

Several obstacles in the acceptance of the system were also found in the review of this article in the form of anxiety about computers, transition costs, the fear of not feeling useful, increasing the workload and lacking facilities and training. Anxiety about computers (computer anxiety) has a negative effect on perceptions of usefulness and perceived ease of use so that it can reduce users' motivation to accept existing technology (Barzekar et al., 2019). A literature review states that computer anxiety can be corrected depending on the cause. When anxiety is caused by psychological factors, it is necessary to change individual technological attitudes and beliefs. In the case where the cause is lack of knowledge about computers, training can be given about computers and if the cause of anxiety is due to operational factors then extra time can be given to add experience and to get used to the system (Chien, 2008). The negative perception that arose at the beginning of the use of Computerized Provider Order Entry (CPOE) in pediatric tertiary hospitals in Australia was due to ignorance of the system. In this study, it was found that over time users became more proficient and efficient in using the CPOE system so that the additional perceived security benefits became clear (Baysari et al., 2018). Transition costs are also known to have a significant relationship with refusal to use electronic medical records, in this study the transition costs can be reduced by minimizing the number of updates and changes to electronic medical records and testing updates properly to solve problems before updating electronic medical records is implemented. (Darby et al., 2019).

A system that is deemed useless was found in research on electronic medical record users where employees who work as office workers tend to have low interest in implementing electronic medical records when compared to clinical workers because the use of the system is not felt to be beneficial for office workers directly (Thit et al. al., 2020). The use of The Public Private Interface– Electronic Patient Record (PPI-ePR) encountered problems due to feasibility issues and unclear benefits, complicated registration procedures, worried about the additional workload of transferring data from paper records to computers, considered electronic medical records a waste of time, perceived use of the system does not help clinical work and does not provide significant benefits (Wang et al., 2020). Another study that discussed electronic medical records found that some health workers felt uncomfortable using electronic medical records in front of patients and made double work when filling out electronic medical records and paper medical records, only wanting to use electronic medical records if previously training and the availability of supporting infrastructure was available. Other obstacles include lack of incentives, electricity problems, internet connection problems and limited computer capabilities for users. Financial support and training are known to support the use of electronic medical records. Participants have expectations that electronic medical records can improve performance, are easy to use and have enough electronic devices. Participants also recommended increasing awareness about electronic medical records for health workers who have a negative response to electronic medical records (Ahmed et al., 2020). Effort expectancy and expectancy performance that affect acceptance are in accordance with UTAUT theory where these variables affect user acceptance of technology (Williams et al., 2015).

LIMITATION OF THE STUDY

In this study, only one journal search source was used, namely Pubmed.

CONCLUSION

Things that can be an obstacle in receiving electronic medical records and hospital information systems are workers who experience computer anxiety, the feeling of lacking in benefit in office workers, low education and work experience, problems in the initial model of the system, slow systems, and the lack of understanding about the legality of the information system used. Several things support the acceptance of hospital information systems are the benefits felt by user, perceived ease of use, human-related factors, technological factors and organizational factors, monetary incentives and attitudes in using EMR. Gender is an indirect factor in perceived ease of use. Training and support from the information technology department as well as involving users in the system formation process.

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