BARRIERS AND OPPORTUNITIES OF USING ELECTRONIC NURSING RECORD IN INDONESIA: NURSES' PERSPECTIVE

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ABSTRACT. *The implementation of Information Technology (IT) improves patient safety and efficiency. Electronic health record is one of IT's innovation in health care delivery. This research aimed to assess nurses' nursing informatics skill and nurses' acceptance toward mobile electronic nursing record application, known as PANI/the Prototype Application of Nursing Implementation. This research was conducted at a public hospital in Pekanbaru, Indonesia, with 237 participants. Data were taken by using questionnaire which was divided into three parts: general information of the participants, self-assessed nursing informatics skill and the acceptance of PANI. Prior to handing over the questionnaire, the participants were informed about PANI through leaflet and video. The study shows that the nursing informatics skill of nurses is varied, and only 11 (4.6%) participants are classified expert. The participants' skill is related to the education level (p = 0.036) and length of work (p = 0.014). The acceptance rate of PANI is nearly 50 : 50, the total of nurses with low acceptance toward PANI are 117 (49.4%) participants and 120 (50.6%) participants with high acceptance. Mostly, participants worry about the data safety; the data could be erased when the server is in trouble. They also thought that the application can be error that will lead to problem in documenting. However, they believed that PANI will increase the quality of health care delivery and they agreed that the electronic system should be applied sooner. In addition, 218 (92%) participants had mobile phone and agreed with using their personal gadget to do pilot project in implementing PANI.*
Keywords: Nursing informatics, Electronic nursing record, Health care delivery

1. **Introduction.** The problem in nursing practice in Indonesia is documenting the nursing process which still applies manual system or hand writing [1]. The documentation of nurse intervention is a legal aspect for the nurse and as the process of giving the guarantee of the sustainability of patients' treatment [2-4]. However, the nurse states that the documentation process needs many things that must be written and takes a very long time during the treatment [5].

In some countries, the system of electronic documentation becomes the solution, as the change of the manual system or the handwriting [6,7]. The implementation of information technology in the health service can improve the patients' safety and the efficiency [8-11]. Studies showed that Electronic Health Record (EHR) promoted nurses' workflow, helped decision making by early warning system and increased the quality of patient care [8,12].

Due to recognition of electronic health record's benefits, nurses around the world are moving to the electronic health record [8]. Advanced countries have started e-health since

various decades ago, but developing countries have just started this [6,13,14]. Nowadays, all states in the United States of America have used the electronic system to document their society health with the adoption level reaching 93%; even in some states, this system has been compulsory based on the law [7]. In Australia, the level of adoption of electronic documentation is 60% [8]. Nevertheless, in Indonesia, there is still no data on the adoption level of this system because it is still rarely used. Mostly, the hospitals still use manual writing system in Indonesia.

Researchers in Indonesia try to keep up with the development of IT in healthcare service. Studies have proved that the integration of information technology in the Indonesia nursing care can improve the patients' treatment quality [9]. The particular electronic nursing process system which has been introduced in Indonesia is Intan's Screening Diagnosis Assessment (ISDA). This system helps nurses in clinical decision to decide nursing diagnosis [15]. However, the mobile application for electronic nursing record is still uncommon so that it needs to be initiated.

The biggest challenge in the innovation of health information technology such as EHR is the acceptance and satisfaction of the medics including nurses [9]. A study showed that nurses believed in the importance of information technology application in the health service [16]. In the contrary with this, another research showed that the nurses had negative experience towards electronic recording system because they considered that the system is not suitable for the nurse tasks [17]. In certain case, nurses' attitude towards EHR becomes negative after the implementation of the system. Increase of cognitive workload during the transition from paper based documentation to EHR was the reason of negative reactions from nurses [18]. The nurse less acceptance in certain electronic recording system relates to the nurse capacity to adapt with the new information system [16].

The stereotype about younger individuals can adapt faster to the new technology is not proved. A study showed that even older staff could mediate the age effect through the computer attitude score. The computer attitude and computer skills score were related to the adaption of EHR implementation [18]. A study in Iran related to the computer literacy showed that more than half of nurses had moderate computer literacy and did not know how to operate EHR [19]. Another study also showed that senior female nurses lack computer literacy even in some developed countries such as England [10]. Lack of computer skills and adaptation to the new system are the main issues in EHR implementation. Poor EHR usage may cause negative results and consequences to the nursing care and nurses' responses [2].

Overall, the electronic recording system is applied as the solution towards the problem of nurse treatment documentation. The innovation of information technology in the field of health can improve the efficiency and the patient's safety. In Indonesia, there is no data about the level of system adoption of electronic recording system yet, because it is still rarely used. This study introduced a system called PANI which stands for the Prototype Application of Nursing Implementation. To start the establishment of an information system in the health field such as electronic recording system, it needs the acceptance and the satisfaction of the medics including nurses. This research aimed to study the level of nurses' informatics skill and acceptance of electronic nursing record (PANI) in a public hospital in Indonesia.

2. **The Prototype Application of Nursing Implementation (PANI).** PANI is an android based application which is developed in 2017 for documenting the nurse treatment. This application was designed by the researcher with the IT team. The content of this application is designed based on NANDA-NOC-NIC and uses Indonesian language. PANI helps nurses to record their nursing care in an easy to use, mobile application.
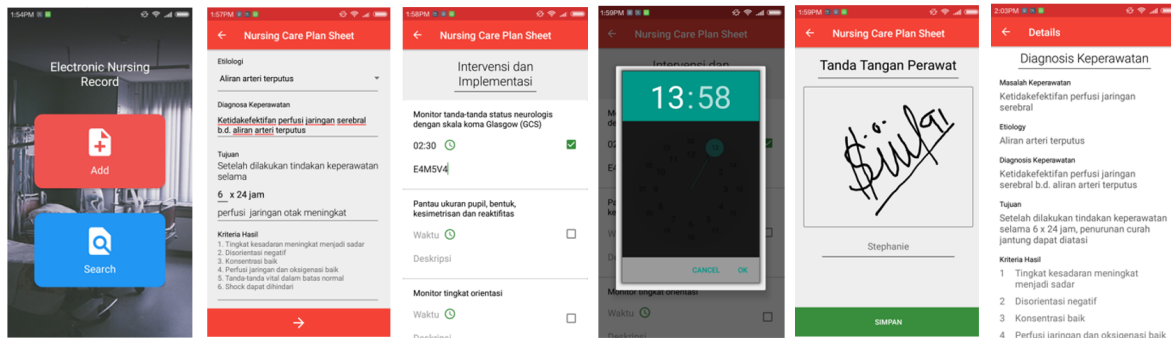
FIGURE 1. Application display on smartphone

When opening the application, users may choose either to make new record or to read recorded documentation. In creating new documentation, users need to complete general data of patient (name, medical record number, medical diagnoses) and user's name. In the next step, users choose the nursing problem, etiology, and nursing outcomes. Then users check the implementations or nursing treatments that had been done. Users also need to record the time in doing the implementations. Users can write down additional comment regarding the patients' responses and conditions. The final step is signing to legalize the documentation.

3. **Research Methodology.** This research was a descriptive analysis with cross sectional approach and has passed the ethical clearance from Faculty of Medical Science, Riau University. It took place at RSUD Arifin Achmad (Regional Public Hospital) in Pekanbaru, Indonesia. The hospital is an educational hospital and the Management Information System (SIMRS) has been implemented here. However, there is no a particular electronic nursing record system especially the mobile one.

The samples were taken through purposive sampling method. Total of 237 nurses were participated in this research. They were given explanation about PANI through leaflet and video before completing the questionnaire. The questionnaire used in this research was divided into three parts.

The first part of the instrument was general information such as gender, age, education level, length of work and computer training history. The second part is used to measure the nursing informatics skill. Researcher used the standardize instrument which consists of 30 items and assesses computer ability, information system knowledge, and informatics management [20]. This instrument is in English. The researcher needed to translate the language into Bahasa. The last part of the questionnaire was developed by researcher with Likert scale to measure the nurses' acceptance toward PANI which consisted of attitude, behavioral intention, and behavior.

The validity and reliability tests of the instrument were conducted at Santa Maria Hospital Pekanbaru. The validity test was conducted twice. At the first validity test, it only showed that the instrument of nursing informatics skill was valid and reliable with Cronbach's Alpha 0.977. The instrument to measure the nurses' acceptance needs improvement from the first instrument tested. The second test obtained the value of Cronbach's Alpha 0.933, so that the questionnaire is already valid and reliable.

4. **Main Results.** After conducting the research, the main results can be shown in Table 1.

The results indicated that 74.3% were female, 55.7% were 26-35 years old, 63.3% had 1-10 years work experience, 71.3% were diploma, 80.2% had computer training and 92% were using smartphone. The results also showed that the skill level of nursing informatics was varied from advance beginner to expert; nearly half of participants were competent

TABLE 1. Demographics data, skill of nursing informatics & nurses' acceptance

VARIABLE	RESULTS
GENDER	Female 176 (74.3%) Male 61 (25.7%)
AGE	$\leq$ 25 yrs 2 (0.8%) 26-35 yrs 132 (55.7%) 36-45 yrs 92 (38.9%) 46-55 yrs 10 (4.2%) 56-65 yrs 1 (0.4%)
LENGTH OF WORK	1-10 yrs 150 (63.3%) 11-20 yrs 74 (31.3%) 21-30 yrs 11 (4.6%) > 30 yrs 2 (0.8%)
EDUCATION LEVEL	Diploma 169 (71.3%) Bachelor 68 (28.7%)
COMPUTER TRAINING	Yes 190 (80.2%) No 47 (19.8%)
USING SMARTPHONE	Yes 218 (92%) No 19 (8%)
SKILL LEVEL OF NURSING INFORMATICS	Advance beginner 30 (12.7%) Competent 117 (49.4%) Proficient 79 (33.3%) Expert 11 (4.6%)
NURSES' ACCEPTANCE	Low 117 (49.4%) High 120 (50.6%)

and only 4.6% were expert. The nurses' acceptance level is comparable, namely, 49.4% nurses have low acceptance level and 50.6% have high acceptance level.

The results of chi square test showed that the skill level of nursing informatics related to the level of education (p value 0.036) and their work experience (p value 0.014). The level of nurses' acceptance related to the level of education (p value 0.015).

Additional results from this research based on items of questionnaire in the third part (nurses' acceptance), indicated that nurses worried about the patients' data security; the nurses contend that the data can be deleted if the server has trouble. Beside that, the nurses are also concerned that the application can be error or in trouble which causes difficulty to document the nursing care. However, the nurses believed that the electronic recording system can improve the quality of patient care and they agreed that this system must be applied immediately. They even agreed to use their smartphone for pilot project of PANI.

5. **Discussion.** This study assessed nurses' skill level of nursing informatics and acceptance toward an electronic documentation system (PANI) as the main factors of implementation of EHR. Even though most of nurses had computer training and were already using smartphone, but only 4.6% were experts on nursing informatics. The results supported previous research that showed the low computer literacy among female senior nurses even in advanced countries [10]. In addition, even though nurses believed that the electronic recording system can improve the quality of patient care, but nearly half of the respondent (49.4%) had low acceptance toward PANI.

The nurses' tendency to use mobile technology, social media, and the Internet is for professional purposes as the impact of work demands (PR Newswire 10th of September 2014). One of reasons which underlie the high interest of the smartphone is on giving the

health service such as the mobility and the multifunction of this device until it is suitable for the team work in the field to ensure the treatment sustainability [21].

In the contrary with the data above, even though the IT development is very fast, the conversion process that paper based documentation becomes electronics is still low globally. From the result of international study, paper based conventional record is still the general system being used [1]. The main obstacle of the application of the information system in the field of health is the acceptance and work satisfaction of the medics [9]. The nurses as the human resource with big quantity at one health service center have different perspectives of IT innovation in the field of health in the form of electronic medical records. The results of this research showed that nurses' acceptance toward PANI related to level of education. Further education and information related to the new system may help the nurses to adapt with EHR [19,22]. In addition, nurse managers need to be involved directly in the development of the system to create a system based on what nurses need rather than accept poorly designed technology from IT developer [19,23].

Besides that, the results which are not expected from this system can be caused by the low skill of the human resources covering the managerial supports, the training, and education [1,14,17]. Some researches also have showed that the bad usage of electronic medical records can cause the mistake or unexpected occurrence [14,17]. The results of this research showed that the skill level of nursing informatics related to the level of education and nurses' work experience. Training prior to the implementation of the new system should be provided [3].

The development of a new information system in the health service such as hospital is a very complex thing. This will take changes not only technical but also social in order to adapt with the new technology [16]. The establishment of this new information system is even given label "Frankeinstein IT System" because of the complicated effort and needs multidiscipline of science [24]. This long process involves much money even political power. The main focus must be on the human resources in a team and how the team can work well together.

6. **Conclusions.** This research showed that despite limitation in nursing informatics skills as well as the low acceptance due to data safety concern and usability of the application, nurses believed in the importance of electronic record system. Further education, information and training related to the new system may help the nurses to adapt because education is related to the nursing informatics skill as well as nurses' acceptance toward electronic record system. We believe that the electronic record system should be applied in Indonesian healthcare system.

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