

Nurse Perception Towards “Nursbox” Application Use In Bandung District And City

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Abstract: *The use of technology is believed to be a solution in overcoming the existing issues, including health issues. In health sector, an electronic documentation system referred to as the Electronic Health Record (EHR) has been introduced and started to be used widely in various countries, including Indonesia. In Indonesia, an innovation of EHR was introduced in 2018 under the name of nursBOX application. This study aimed to describe the perception of nurses towards the use of this application. This was a descriptive quantitative study using electronic survey data collection technique. A google form containing a questionnaire adapted from Galimany-Masclan et al. was sent via email to 322 respondents who were nursBOX users in Bandung District and City, who were obtained through the accidental sampling technique. This questionnaire consisted of 23 statements with a Likert scale. Data collected were then analyzed using the media value with 1 as the minimum value and 5 as the maximum value for each item. Interpretation was then made to classify the answers as positive or negative. Of the 322 respondents, 52 filled out the questionnaire with 53.8% of them expressed a positive perception towards the use of nurseBOX. This positive perception was found in continuity of care (53.8%), usability (50.0%), and record of information (53.8%) domains. Hence, the general perception of nurses towards the use of nursBOX application is positive. However, a review on this innovation should be done because the difference between the positive and negative perceptions is only 7.6%, which is quite insignificant. acting as the point-of-entry for any given scientific paper or patent application.*

Keywords: *EHR, NnursBox, Perception*

1. INTRODUCTION:

Telecommunication technology continues to develop rapidly, especially in the smartphone sector. Data show that the number of smartphone users in developing countries has increased from an average of 21% (2013) to 37% (2015) [1]. In Indonesia, the penetration of smartphone into the life of the people is apparent from the record that shows 44.7 million people in this country used smartphones in 2014, which equals to 32.6%, and this number is predicted to increase to 47.6% or 92 million in 2019 [2]. Internet is an inseparable part of the smartphone use as these phones need to have an internet connection to function. Therefore, it is not surprising that the internet use in Indonesia is growing rapidly in line with increased

number of smartphone use that 143.26 million people, or 54.68% of the Indonesian population, is recorded to use internet in 2017 used the internet with 44.16% of these users are smartphone users [3].

The rapid development of smartphone also leads to rapid development of various applications to be used with the smartphones. These technological advances are believed to be able support various solutions for the existing issues in the health sector [4]. One of these technology solutions in Indonesia is the nursBOX application, which is the only smartphone application that supports the electronic nursing documentation process in community nursing centers as a frontline community health effort [5,6].

The electronic health documentation, or better known as the Electronic Health Record (EHR), is an electronic health system that records patients' health profile, behavior, and environmental information including the time domain that allows the inclusion of information on several episodes/periods, making it possible to record a patient's lifetime data. The difference between this electronic documentation and the manual documentation is the use of electronic technology using computers, cellphones, and other electronic media in the electronic documentation. [7]. In Indonesia, the electronic record is an important part of the work of a nursing center, which is an approach that combines integrated health services, nursing education, and research in a health care model [5].

NursBOX is developed by combining communication media (smartphone), nursing care documentation system, and Geographic Information System (GIS). It is an Android-based application that can be downloaded in Google Play Store [5,6]. This application's features include: announcement to provide one-way information from coordinators or members; timeline to post status which can include photos of activities or photos of cases that are difficult to handle; chat for discussion and consultation; documentation for individual, family, and emergency care recording and reporting; homepage to manage the account profile, log out, organization and community settings, and transaction [6].

Based on the theory of the innovation process from Desouza et. al. the nursBOX can be categorized as a new innovation in the experimentation stage because the nursBOX has gone through the two previous processes: idea generation & mobilization and screening & advocacy that the current application is a prototype that can be used but not tested yet. After testing is performed, the next stage will be commercialization and, eventually, diffusion & implementation [8].

A previous trial or study was performed in Tanjungsari Public Health Center (Puskesmas Tanjungsari), Sumedang, to compare the completeness of the nursBOX documentation with the traditional documentation. Results of this study suggested that the nursBOX has a higher degree of completeness with $p = 0.014$ ($p < 0.05$) [9]. However, the study is not adequate to advance the nursBOX to the next stage of the innovation process because the first key to the success at the experimentation stage is positive acceptance from the users [8]. Good acceptance of EHR technology, according to a study conducted by Galimany-Masclans et al. in the primary care in Catalonia, Spain, can be measured through the user's perception of the EHR utilization [10]. The perception measurement of the EHR use, which is the nursBOX in the context of this study, includes the measurement of continuity of care, usability, and record of information [10].

Demographic variables also need to be considered due to their influence on the perception of nurses who use EHR [10]. The demographic variables included in the measurement are age, period of using the EHR, gender, EHR training, and education [10,11,12].

This study aimed to gain the overview on the perception of nurses regarding the use of nursBOX application, consisting of the nurses' perception on continuity of care, usability, and record of information subvariables. This study also explored the demographic profiles of the nurses who used nursBOX and their trend in perception variables.

2. METHODS

This study was a descriptive quantitative study to describe a situation or event with the aim of gaining a systematical, factual, and accurate description of the facts observed from data collected from the respondents that were then analyzed using a statistical method to be further interpreted [39, 40]. Two areas were selected for this study, i.e. Bandung District and Bandung City, based on the consideration that based on the information on the database, these two areas have the most active nursBOX users compared to other areas, meaning that the users in these area do not only open the nursBOX application but also use the features in the application.

Population and Sample

The population in this study included 322 nurses working in various public health centers in Bandung District and Bandung City who actively used the nursBOX. Sampling was performed using the accidental sampling approach, resulting in 52 of 322 nurses completed the questionnaire.

Data Collection and Analysis

The questionnaire used in the study was adapted from Galimany-Masclans et al. (2011). This questionnaire measured the nurses' perception towards using nursBOX from the perspective of three sub-variables: continuity of care, usability, and record of information. The questionnaire contained 23 statements with a Likert scale answer (1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree) with a Cronbach's 0.875, meaning that it had a quite strong reliability. The questionnaire used has undergone the process of translation, content validity assessment, and face validity assessment. Data collection were collected by distributing the questionnaire via email to the respondents in the form of an electronic survey link. Data collected were then analyzed using the median value to describe the respondents' perceptions that were categorized into positive and negative perceptions. The perception was considered positive when the score of the respondent was higher or equal to the median value while the perception was deemed to be negative when the score was less than the median value. This applied to the general perception and the perception for each sub-variable.

3. RESULTS AND DISCUSSION

Demographic Characteristics

The total sample size based on the number of respondents who completed the questionnaire was 52 nurses, with 26.9% males and 73.1% females. Table 1 presents characteristic of respondents based on their age, received dissemination of NursBox, length of employment and education background.

Table 1 Trend of Demographic Variables and Perception Variables

Demographic Data	Result			
	Positive		Negative	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)

Age				
<31 Years	18	64.3%	20	83.3%
31-45 Years	9	32.1%	4	16.7%
>45 Years	1	3.6%	0	0.0%
Gender				
Male	8	28.6%	6	25.0%
Female	20	71.4%	18	75.0%
Receive dissemination on nursBOX				
Yes	26	92.9%	23	95.8%
No	2	7.1%	1	4.2%
Length of Working in Current Job				
<5 Years	17	60.7%	19	79.2%
5-15 Years	6	21.4%	4	16.6%
>15 Years	5	17.9%	1	4.2%
Educational Background				
Diploma (D3)	4	14.3%	3	12.5%
Bachelor	22	78.6%	21	87.5%
Post-graduate	2	7.1%	0	0.0%

The majority of the respondents had received information regarding how to use nursBOX (94.2%). Most of the respondents were <31 years (73.1%), followed by 31-45 years (25%) and > 45 years (1.9%). In terms of length of work period, most had been working in their current job for <5 years (69.2%), followed by 5-15 years (19.2%), and > 15 years (11.5%). The majority of the respondents were graduated from the bachelor program, and 13.5% and 3.8% graduated from the diploma (D3) program and postgraduate program, respectively.

Nurse Perception

The nurses' perception towards NursBox is presented in Table 2 as follow.

Table 2 Nurse Perception towards nursBOX Use (n=52)

Variable	Result			
	Positive		Negative	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Nurse Perception towards nursBOX Application Use	28	53.8%	24	46.2%
Continuity of Care	28	53.8%	24	46.2%
Usability	26	50.0%	26	50.0%
Record of Information	28	53.8%	24	46.2%

Perception is the process of organizing and giving meaning to information obtained from the sensory and then processed in the brain [29]. Perception of new technology, in this case EHR, is defined as a process that is influenced by the environment to create willingness to adopt EHR, either with good (positive) or poor (negative) acceptance [30]. Of the 52 nurses,

28 nurses had positive perceptions (53.8%). This shows that more than half perceived the application as positive, albeit insignificant. This is similar to the results of an EHR study in the US that stated primary care health workers have a positive perception towards EHR because it improves quality of care, minimizes medication errors, improves communication among health workers, and more time efficient for documentation [13].

In addition, the EHR implemented in the Emergency Room (ER) of the Community Hospitals in the US, the majority of nurses consider the benefits of EHR is greater than the paper based one, and only 2 respondents (out of 46 respondents) prefer to use paper [31]. Nurses acknowledge that there is an increased access to patient care information and increased efficiency. It is also stated that the use of EHR supports patient safety and that patients' documentation becomes more organized [31]. A similar study was conducted on ICU nurses in the US using the mix-method approach by combining a questionnaire and interviews with 113 respondents. Findings of this study suggested that nurses who worked less than 10 years felt that the EHR makes them more productive when compared to nurses who have more than 10 years of experience [22].

EHR has also begun to be tested for Nursing Home. According to a study in Australia regarding the perception of care givers towards the use of EHR, EHR is perceived positively because it is considered to be able to improve the quality of information based on the accuracy and completeness of documents with measurement statements, meaning that the use of EHR eliminates repeated data entry, documents become more legible, and there are better managerial benefits compared to paper-based documentation [32].

Continuity of Care

The nurses' statement about the Continuity of Care when using NursBox is presented in the following Table 3.

Table 3 Frequency of Each Statement in Continuity of Care Sub-Variable

No.	Statement (Subvariabel <i>continuity of care</i>)	1	2	3	4	5
		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
		f	f	f	f	f
1.	nursBOX facilitates coordination between health care levels	8	16	19	8	1
2.	nursBOX enables you to trace the progress (traceability) of the patient's nursing care	9	25	11	6	1
3.	nursBOX enables the nurse to know all team members who treat the patient	10	15	24	3	0
4.	nursBOX enables the availability of health baseline data	10	21	17	4	0
5.	nursBOX facilitates knowledge on patient's health issues	8	18	17	8	1
6.	nursBOX facilitates information exchanges with	11	18	18	5	0

	the main care team					
7.	nursBOX enables better nursing care services	11	19	17	4	1
8.	nursBOX can help showing patient's satisfaction towards the care team	9	15	21	6	1

Continuity of care is a series of continuous care from time to time with consistent quality of service supported by the role of collaborating health care workers [25]. For this sub-variable, 53.8% of the respondents had a positive perception with most prominently admitted that with the nursBOX, it is possible to trace the patient's nursing care progress (traceability) and the application also allows the availability of basic health data. EHR has been shown to increase clinical workflow capabilities, improve patient care, and improve communication among health care workers [14].

Other studies have described the benefits of continuity of care in terms that data are presented more accurately and completely to the health care workers, including data on medical history, medications, and supporting diagnostic test results fs to ensure that patients receive the best care. This information can be shared with other health workers in a collaboration and can be shared with the family as a coordination effort to facilitate informed consent. If the EHR has been integrated, the management system will be more organized because the system facilitates an integrated scheduling system, both for health service provision practices and administrative needs. When a patient is in an emergency, the referral system will benefit from the use of the EHR because data access between the health facilities enable them to send-trace-receive data from one another. The public health system will also gain benefits from this system as it can be used to create the disease database in the community [33, 34, 35].

Usability

Distribution frequency of the nurses' statement about the usability of NursBox is presented in the following Table 4.

Table 4 Frequency of Each Statement in Usability of NursBox

No.	Statement (Usability Sub-Variable)	1	2	3	4	5
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
		f	f	f	f	f
1.	In my opinion, the nursBOX is totally not important	5	2	12	11	22
2.	In my opinion, to use this nursBOX, I will need help	3	12	18	15	4
3.	In my opinion, there are many inconsistencies in this nursBOX	1	11	24	14	2
4.	In my opinion, the nursBOX is very complicated	3	4	19	21	5
5.	In my opinion, I need to learn more to get the maximum performance of	16	11	19	5	1

	this application (nursBOX)					
6.	In my opinion, the use of nursBOX is interesting	14	18	14	5	1
7.	In my opinion, the nursBOX is easy to use	7	19	22	4	0
8.	In my opinion, some features are integrated well in this nursBOX	4	16	24	7	1
9.	In my opinion, most people learn to use this nursBOX fast	3	13	26	8	2
10.	I feel very confident when using this nursBOX	6	10	28	7	1

A system that is easy to learn, easy to use, and encourages users to use the system positively to help them with their work is said to be a system with usability [26]. Nurses' perceptions on the usability sub- variable in this study were 50% positive and 50% negative. On the issue of application consistency, the majority of nurses gave a neutral answer. Meanwhile, the inconsistency of EHR application has caused confusion among users [11]. However, the majority of nurses admit that nursBOX is important and interesting. Perception will be higher or more positive when the object is more desirable because it is attractive and considered important. When an object is highly desirable, the use will be more regular and consistent, and the perception will be positive [28].

Not only important and desirable, EHR is also expected to be easy to use. This has been proven through a study on the use of EHR in the primary health care in Singapore for prostate cancer screening that shows EHR makes the screening process easier as evidenced by the increase in screening in all age categories, including in the 40-49 year group (from 26.7% to 47.1%), 50-69 year group from (60.7% to 73%), and 70-75 year group (from 56.6% to 67.6%). This increase is seen after the integration between EHR and screening algorithm. The screening algorithms used are from the United States Preventive Services Task Force (USPSTF), Duke Cancer Institute (DCI), and the American Urological Association (AUA). The study also presented that 79.2% of the Primary Care Providers (PCPs) felt very confident about their ability to communicate about prostate cancer screening topics [37].

Record of Information

Distribution frequency of the nurses' statement about the record information of NursBox is presented in Table 5.

Table 5 Frequency of Each Statement in Record of Information of NursBox

No.	Statement (Record of Information sub variable)	1	2	3	4	5
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree
		f	f	f	f	f
1.	nursBOX maintains the confidentiality of nursing care record	7	19	19	6	1
2.	nursBOX collects all information needed by nurses	8	19	24	1	0
3.	This application (nursBOX) is suitable for nursing documentation	11	21	17	3	0

4.	Documentation of nursing care services use nursBOX if possible	5	17	20	9	1
5.	This application (nursBOX) covers all nursing care provided	0	8	23	17	4

Record of information is a well-planned recording in a coordinated unit in terms of procedures, policies, and activities needed to manage existing information [27]. In this study, 53.8% of nurses had a positive perception and the majority of them agreed and strongly agreed that the nursBOX is suitable for nursing documentation. The use of the EHR for nursing documentation has indeed been recommended directly by the American Nurses Association (ANA) [15].

Based on a systematic literature review of 23 journals (12 from the US, 5 from Germany, 5 from Australia, and the remaining from the UK, Canada, Denmark, Greece, and France), it is revealed that the use of EHR for record of information can increase the effectiveness of the time used in documentation by decreasing the time spent for documentation although at the beginning of implementation most journal described the presence of an adaptation process that results in discomfort. The increased effectiveness in documentation is seen in different groups of health professionals, i.e. from 16% to 28% among doctors, from 9% to 23% among nurses, and from 20% to 26% among apprentices [36].

Demographic variable trends

Age

Nurses <31 years old showed a trend towards negative perceptions. Whereas the majority of the age group is > 12 years, which means that according to cognitive development theory, they are able to think logically and abstractly [16]. However, according to psychosocial theory, the age of 18-30 years old is referred to as the early adulthood phase, which is a transitional period that tends to have many problems that might cause of the negative perception trend [17,18].

Gender

Women tend to have a positive perception, when actually they tend to be slow in new technology adoption and have low self-confidence, making them less likely to have a career in information technology. However, this perception can be debunked because, over time, the gender gap in the adoption of new technologies has decreased or disappeared [19].

NursBOX Dissemination

Of all respondents who completed the questionnaire, 94.2% had received information through the dissemination of the nursBOX, showing that there is a trend towards positive perception in the group that received the nursBOX dissemination. This is consistent with the study in the UK which shows users who use EHR and receive training tend to be more confident in using the system [20]. Training is also a determining factor for the successful implementation of EHR [21].

Length of Working in Current Job

Nurses with a work experience of <5 years tend to have negative perception. However, nurses with less than 10 years of working experience felt more productive when they used the EHR [22]. A study in India suggested that the slow adoption of EHR technology is partly due to the lack of time or lack of learning/experience obtained for the skills required to use these new technologies [23].

Education

In terms of the educational background, nurses with diploma (D3), bachelor, and post-graduate education showed a trend towards positive perception. A study in Singapore that applied the EHR in 7 universities also shows positive perception towards this system [24]. This is different from the results of a survey in the UK on nursing and midwifery students who practiced using EHR with 60% (n = 128) received training and 40% (n = 87) did not receive any training. The training was received during the pre-practice placement (33%), during placement (24%), and through informal training (59%). This Singaporean study showed that 64% of the respondents feel that the documentation is more adequate using paper-based, and 96% are more likely to be ready to engage using paper-based. In addition, some mentors also have concerns that the legitimacy of students to access EHR and verification of EHR entries is a challenging issue in several areas [38]. Education, by including the formal EHR curriculum in nursing documentation practice, is important because it can improve students' habits and consistency in becoming familiar with EHR and to be more prepared when they are in a clinical setting [34].

4. CONCLUSIONS

The nursBOX application is an EHR on smartphones devices that is more integrated and uses a GIS system, making it possible to map the spread of diseases in the community. A previous study has proven that with nursBOX the completeness of nursing documentation data increases. Nurses' perceptions in this study is predominantly positive although insignificant (53.8%). This is directly proportional to the perception of nurses in each sub variable, with the percentage of positive perception in the continuity of care sub-variable of 53.8%, 50% in the usability sub-variable, and 53.8% in the record of information variable.

The trend also shows that women are more likely to have a positive perception when compared to men. NursBOX dissemination activity can support a more positive perception among nurses. Finally, all educational backgrounds (diploma, bachelor, and post-graduate) present a trend towards positive perception, while the age group of <31 years and the length of working in the current job of <5 years show a trend towards negative perceptions.

Recommendation

The results showed that the difference between nurses who had positive and negative perceptions is only 7.6%, that a review on the previous stage of the innovation process is necessary. Furthermore, this results of this study can also be used as an input for the scale-up of users to the national level because EHR, or nursBOX in this study, can support the improvement of health services, especially in the community. In its development, experts in information technology are needed to make the nursBOX application stronger. The private sector also can help in the efforts for funding the application development and the government should create policies to make the nursBOX a milestone in EHR progress in Indonesia. In the future, it is possible that the nursBOX training can be included in the educational curriculum in community nursing courses at the Bachelor of Nursing level.

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