



Accessibility of e-EWSS versus Manual EWSS for Detecting the Emergency Condition among Patients with Coronavirus Disease 2019: A Survey Research on Register Nurse in Indonesia

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Abstract

BACKGROUND: The early warning scoring system (EWSS) during the coronavirus disease 2019 (COVID-19) pandemic is essential, because it will reduce the risk of organ damage and the death of patients with COVID-19. Health professionals argue that EWSS will be needed in electronic form, because it will be easier to use and quick to identify patient conditions in an emergency situation. There is no study that provides information on the comparison between the use of Electronic EWSS (e-EWSS) and manual EWSS in accessibility among health professionals in a clinical setting.

AIM: The purpose of this study was to analyze the difference of accessibility of e-EWSS versus manual EWSS through survey research on registered nurses in Indonesia.

METHODS: A survey research was designed in this study. A study was conducted from July to November 2021 on 38 nurses at the COVID-19 referral hospital in Mataram city. Data were collected by a questionnaire containing 12 questions related to the accessibility of e-EWSS and manual EWSS in 19 participants on intervention and 19 participants in the control group.

RESULTS: The response to the accessibility of e-EWSS was more positive, namely, 64.5%, while the negative accessibility response was 35.5%. On the other hand, for EWSS, the response to accessibility was more negative, namely, 51.6%, while the response to accessibility was positive as much as 48.4%. The accessibility of emergency examinations of patients with COVID-19 using the e-EWSS was easier than the EWSS with $p = 0.000$.

CONCLUSION: e-EWSS was easier in accessibility compared to EWSS by convenience, speed, and effectiveness indicators. The computerized system on the e-EWSS was capable of performing calculations automatically about patients' emergency situations.

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Introduction

The World Health Organization (WHO) has reported a case of pneumonia of unknown etiology in Wuhan, Hubei Province of China on December 31, 2019 [1], [2]. China identified pneumonia of unknown etiology as a new type of coronavirus disease (COVID-19) On January 7, 2020 [3]. Furthermore, the WHO declared that COVID-19 was a concern on International Public Health Emergency On January 30, 2020 [2]. Increasing the number of COVID-19 cases has happened and spread between countries quickly. Globally, confirmed 90,870 cases were reported in 72 countries with 3,112 deaths (CFR 3.4%), in Indonesia, which were 257,388 cases while West Nusa Tenggara 3,197 people [4].

Common signs and symptoms of COVID-19 were acute respiratory distress, fever, cough, and shortness of breath with 5–6 days for a short average incubation period and 14 days for longest [5], [6], [7]. Pneumonia, acute respiratory syndrome, kidney failure, and death

were severe condition of COVID-19 [8]. The clinical signs and symptoms reported in the majority of cases were fever, with some cases having difficulty breathing, and X-rays showing extensive pneumonia infiltrates in both lungs [3], [8]. The implementation of infection prevention and control efforts through early detection of worsening COVID-19 patients is necessary to reduce the risk of death [9], [10].

The early warning scoring system (EWSS) is early detection that uses a marker in the score form to assess the worsening of the patient's condition before the problem occurs [11]. The EWSS uses routine physiological measurements of vital signs through five simple physiological parameters, namely, mental response, pulse, systolic blood pressure, respiratory rate, temperature, and urine output [12]. There are several variations of the existing EWSS, including National Early Warning Scores, Modified Early Obstetric Warning Scores, and Pediatric Warning Scores [13], [14], [15]. All functions of the EWSS types still work with the same pattern and goal, which were to make treatment management more

comprehensive, prevent further organ damage, and reduce the risk of death [11], [12], [14].

The use of EWSS during the COVID-19 pandemic is essential because it will reduce the risk of organ damage that results in the death of patients with COVID-19 [16]. The high number of COVID-19 cases in Indonesia has made health facilities, including hospitals and primary health care facilities, move to provide the best emergency services [17], [18], [19]. However, EWSS at primary health care facilities is often not available; therefore, many health professionals argue that EWSS will be needed in electronic form as Electronic EWSS (e-EWSS), because it will be easy to download and access anytime and anywhere. Moreover, EWSS in the electronic form might easily to use and quickly to identify patient conditions in emergency situation, because the score of emergencies can be calculate automatically. That was the reason why researchers initiated to create of an e-EWSS so that health professionals in health facilities can easy to use and identify patient conditions in emergency situation. The e-EWSS has been compiled and tested for validity and reliability; therefore, the next step is to compare between the e-EWSS and manual EWSS with accessibility indicators (convenience, speed, and effectiveness) among health professionals in a referral hospital for COVID-19. There is no study that provides information on the comparison between the use of e-EWSS and manual EWSS among health professionals. Thus, the purpose of this study was to analyze the difference of accessibility of e-EWSS versus manual EWSS through survey research on register nurse in Indonesia.

Methods

Design

The study design was survey research about the difference in the effectiveness e-EWSS and manual EWSS through accessibility indicators on register nurse in Indonesia.

Population, sample, place, and time

The population in this study were nurses at the COVID-19 referral hospital, while the sample was 38 nurses at the COVID-19 referral hospital in Mataram city. We divided that participants become two groups (intervention and control group) which were 19 participants for each group. A study was conducted from July to November 2021.

Randomization

Randomization is a technique that reduces participant selection bias between intervention and

control groups [20], [21]. There are several technics of randomization such as tossing coins, random bock, stratified random sampling, and covariate adaptive randomization [20], [21]. From the choices, the simple randomization is easier to use than others. Using simple random, sampling can be problematic in small sample size, but authors were used computerize generated random number to address the problem.

Inclusion and exclusion criteria's

Nurses who can operate computers and smart mobile devices, attended the emergency examination training for e-WSS, and manual EWSS with 100% attendance were included as inclusion criteria in this study. Meanwhile, nurses who refused to participate were excluded and were not included in the study.

Data collection

The researcher submits a letter of permit and proposal for obtaining the Institutional Review Board (IRB) from Mataram University. Further, the researcher submitted an application for approval/research permit to the COVID-19 Referral Hospital of West Nusa Tenggara Province.

Data were collected by a questionnaire containing 12 questions related to the accessibility of e-EWSS and manual EWSS on registered nurses in a COVID-19 referral hospital. Notebooks, stationery, e-EWSS, and manual EWSS Form were equipment's in this study.

Ethical approval

Participants provided written informed consent procedures to participate in this study. Moreover, this study was successfully accepted by the hospital with IRB number: LB.01.03/6/4967/2021.

Results

The distribution in age on the intervention group was mostly 25–35 years old, 12 respondents (63.1%) then <25 years old were four respondents (21.0%), and the lowest was >35 years old three respondents (15.8%). Meanwhile, the proportion of age in the control group was mostly 25–35 years old 11 respondents (57.9%) then age >35 years five respondents (26.3%) and the lowest age <25 years three respondents (15.8%).

The distribution of gender in the intervention group consisted of seven respondents male (36.8%) and 21 respondents female (63.2%), while the control group consisted of eight male (42.1%) and 11 female (57.9%).

Table 1 : Distribution of respondents in age, gender, and education in the intervention and control groups at the COVID-19 referral hospital, October 2021

Characteristics	Group				Total	
	Intervention		Control			
	N	%	n	%	n	%
Age						
<25 years old	4	21.0	3	15.8	7	18.4
25–35 years old	12	63.1	11	57.9	23	60.5
>35 years old	3	15.8	5	26.3	8	21.0
Total	19	100.0	19	100.0	38	100.0
Gender						
Male	7	36.8	8	42.1	15	39.5
Female	12	63.2	11	57.9	23	60.5
Total	19	100.0	19	100.0	38	100
Education						
Diploma III	16	84.2	17	89.5	33	86.8
Bachelor degree	2	10.5	2	10.5	4	10.6
Master degree	1	5.3	0	00.0	1	2.6
Total	19	100.0	19	100.0	38	100.0

The distribution of the proportion of education in the intervention group was Diploma III 16 respondents (84.2%), then Bachelor's degree two respondents (10.5%), and then master degree was one respondent (5.3%). The most control group was Diploma III 17 respondents (89.5%) then Bachelor's degree two respondents (10.5%). The distribution of respondents presented in Table 1.

Table 2: Comparison of accessibility between e-EWSS and EWSS among intervention and control groups

Intervention group n = 19	Control group n = 19		Accessibility indicators	Agree n (%)	Disagree n (%)
	Agree n (%)	Disagree n (%)			
The use of e-EWSS for patients with COVID-19 in emergencies situation is essential	19 (100%)	0 (0%)	The use of EWSS for patients with COVID-19 in emergencies situation is essential	19 (100%)	0 (0%)
Time used of e-EWSS is efficient and fast	14 (73%)	5 (27%)	Time used of EWSS is efficient and fast	10 (52.6%)	9 (47.4%)
e-EWSS is difficult to use	6 (28.95%)	13 (71.05%)	EWSS is difficult to use	9 (47.4%)	10 (52.6%)
The cost used for e-EWSS is cheap relatively	14 (73%)	5 (27%)	The cost used for EWSS is cheap relatively	9 (47.4%)	10 (52.6%)
e-EWSS is easy to used and understand	17 (89.47%)	2 (10.53%)	e-EWSS is easy to used and understand	7 (39.5%)	12 (60.5%)

Respondents agree that the use of e-EWSS or EWSS was important to identify the emergency condition among patients with COVID-19. Through accessibility indicators, it can be concluded that e-EWSS was easier to use compared to EWSS. It can be read in Table 2. The computerized system in the e-EWSS was capable of performing calculations automatically, making it easier for health workers to identify emergencies in COVID-19 patients. A comparison of the accessibility of e-EWSS and EWSS in statistics is shown in Table 3.

Table 3: Comparison the summary of accessibility e-EWSS and EWSS

Intervention group			Control group			Sig
Accessibility (+)	Accessibility (-)	Mean	Accessibility (+)	Accessibility (-)	Mean	
13 (64.5%)	6 (35.5%)	47.00	9 (48.4%)	10 (51.6%)	16.00	0.000

On statistical analysis, the response to the accessibility of e-EWSS was more positive, namely 64.5%,

while the negative accessibility response was 35.5% that was mean that emergency detection by e-EWSS has easier and faster. In addition, at the end and completion of the emergency detection examination, the respondent obtains that they can provide direct intervention to the patient according to the results of the examination by e-EWSS. On the other hand, for EWSS, the response to accessibility was more negative, namely 51.6%, while the response to accessibility was positive as much as 48.4%. Therefore, we conclude that the accessibility of emergency examinations of patients with COVID-19 using the e-EWSS was easier than the EWSS with $p = 0.000$.

Discussion

Through this study, researchers have developed the e-EWSS with an android-based application system for early detection of life-threatening conditions in patients, as a result, the health professional can handle patients with COVID-19 more quickly. So far, several health professionals mention EWSS have not been efficient in detecting emergency condition among patients with COVID-19.

Although the difference in the percentage of accessibility between e-EWSS and EWSS in this study is not too far, several respondents admitted that the examination using manual EWSS still requires a lot of writing and summing up the scores of the examination results. From several opinions of respondents, this study was proven that the use of the Android-based e-EWSS application by nurses showed a positive response and high accessibility compared to manual EWSS. Considering that one of the advantages of an Android-based application was easy to access by a mobile device, it was more practical in its use [22], [23]. Thus, e-EWSS is effective and efficient.

This study was in line with other study which mentions that instrument that was developed based on a website based will provide greater convenience, speed, and efficiency when compared to manual measuring instruments [24], [25], [26]. Moreover, measuring tools that use an android-based approach will be very practical, easily accessible anytime and anywhere because the use of paper can be reduced so that it will increase efficiency and have an impact on reducing the costs [26], [27], [28].

Conclusion

Respondents in the intervention who used e-EWSS gave a positive accessibility response (+) of 64.5% and a negative accessibility response (-) of

35.5%, while the control group accessibility response (+) as much as 48.4% and a negative accessibility response (-) as much as 51.6%. There was a significant difference between accessibility in the intervention group and the control group with $p = 0.000$. Therefore, e-EWSS was easier in accessibility compared to EWSS. The computerized system on the e-EWSS was capable of performing calculations automatically about patient's emergency situations.

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