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Research Article

Early Warning Score System (EWSS) Impelmentation Factors by Nurses as Early Detection Efforts Worsening of Covid-19 Patients in the Treatment Room

Sulastri Sulastri^{1*} | Hafidz Ma'ruf² | Hendra Maulana³

^{1,2}Lecturer at Akper
Yaspen Jakarta,
Indonesia

³Nurse at RSUD Pasar
Rebo East Jakarta,
Indonesia

***contact**

sulas71@gmail.com

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Abstract

Aims: One way to overcome the Covid-19 outbreak is by intra-hospital management. Fast and accurate management is needed to prevent complications and death in Covid-19. Early detection efforts to detect worsening of Covid-19 patients greatly help prevent more severe complications and death. This study aims to determine the factors of implementing the patient's EWSS in an effort to detect the worsening of Covid-19 in the treatment room at one of the hospitals in East Jakarta.

Methods: The research uses descriptive analytic method with a cross sectional approach. Respondents are nurses who are experienced in treating Covid-19 patients in the treatment room with a total of 121 respondents. Bivariate data analysis used the Somers'd test, multiple ordinal regression multivariate test and partial Wald test.

Result: Two factors were found that were significantly related to the implementation of EWSS in Covid-19 patients in the treatment room at the hospital, namely the level of knowledge and nurse compliance.

Conclusion: This study recommends efforts to increase nurses' knowledge and compliance regarding the implementation of EWSS for Covid-19 patients through regular training, workshops and good supervision.

Keywords:

Covid-19; EWSS; Implementation Factors

INTRODUCTION

The implementation of patient safety is an indicator of service quality in hospitals. This implementation can be seen from the mortality rate which is one indicator of the health service process (1). The mortality rate can be classified into two categories, namely deaths under 48 hours and deaths above 48 hours which are assessed through indicators of gross death rate (GDR) and net death rate (NDR). The standard of patient mortality in hospitalized > 48 hours according to the minimum standard of hospital service is 0.24%. No definite data has been found regarding the mortality rate in all hospitals in Indonesia, but data in one hospital that the GDR in 2016 shows the

number 14.73 while the NDR value is 7.73 which means it is still high beyond the minimum standard of hospital services(1). In order to reduce mortality in hospitals, monitoring the patient's deteriorating condition is important to be carried out according to the algorithm. This requires the medical team and nurses to have competence in monitoring, measuring and evaluating the patient's condition (2).

The Early Warning Score system (EWSS) is a system for requesting assistance to address patient safety issues early (3). The National Early Warning Score (NEWS) explains that EWS is a physiological scoring system (vital signs) that is generally used in medical surgery units before a patient

experiences an emergency condition. Early warning score (EWS) is a parameter used to assess the deterioration of the patient's physiological condition, namely identifying and responding to patients who come with or are in acute disease conditions(3).

The early warning score (EWS) assesses the patient's 6 physiological components, namely awareness, systolic blood pressure, pulse, oxygen saturation, respiratory rate and temperature(4). The EWS can be used to predict the short-term and long-term probability of death. This is associated with abnormalities in the vital signs of patients who are at high risk of death, regardless of the intervention or timeliness of medical personnel (4). EWS can be used as a predictor of patient clinical outcomes including length of hospital stay, mortality within 28 days, and rate of hospitalization to the intensive care unit (4). EWS in Covid-19 patients has 7 physiological components with an additional age component (5).

EWS assessment is very helpful for Emergency Medical Services (health services in the Emergency unit), in correctly understanding the patient's medical condition and can help identify patient needs accurately according to existing algorithms (6). Research conducted at Mulago Hospital, Uganda to determine the prevalence of critical illness using the Modify Early Warning Score (MEWS) showed that after using MEWS the mortality rate for critical illness at Mugalo Uganda Hospital at 7 days was only 5.5%. and 41.4% of patients could be discharged (7).

The results showed that the implementation of nurse monitoring based on EWS was not implemented 100% in accordance with the algorithm so it was necessary to evaluate its effectiveness and impact on patient clinical outcomes(8). The results of the article review found that the factors that hindered the implementation of EWS by nurses were poor knowledge and skills. Non-compliance in implementing the EWS protocol in hospitals can also hinder

the successful implementation of the EWS. On the other hand, good knowledge, skills and experience in the EWS can increase the success of the EWS. So that this can also make nurses confident in making decisions when the patient's EWS score is bad and a referral needs to be made to the medical team. Collaboration between professions can also have a good impact so that they can give trust to each other in providing the best service to patients who experience a worsening (8).

Covid-19 is caused by a coronavirus that belongs to the betacoronavirus genus. The results of phylogenetic analysis show that this virus can cause an outbreak of Severe Acute Respiratory Illness (SARS) in 2002-2004 ago, namely Sarbecovirus. On this basis, the International Committee on Taxonomy of Viruses proposed the name SARS-CoV-2 (9). The clinical manifestations of COVID-19 patients have a broad spectrum, ranging from asymptomatic, mild symptoms, pneumonia, severe pneumonia, ARDS, sepsis, to septic shock and death. About 80% of cases were classified as mild or moderate, 13.8% had severe illness, and as many as 6.1% of patients fell into a critical condition. Covid-19 patients with severe pneumonia are characterized by fever, plus one of the following symptoms respiratory rate >30 breaths/minute, severe respiratory distress, or oxygen saturation of 93% without oxygen assistance. In geriatric patients, atypical symptoms may appear. Most patients infected with SARS-CoV-2 show symptoms of the respiratory system such as fever, cough, sneezing, and shortness of breath(10).

Data in the world according to the World Health Organization (WHO, 2020) as many as 153,252 thousand people died from the corona virus (COVID 19) with 2,231,990 million people infected with Covid-19. The death rate from the coronavirus is 6.87%. In Indonesia, there are 5,030,002 confirmed cases of COVID-19 with a death rate of 145,828 people or (2.9%) (11). The highest number of areas infected with COVID 19 is

DKI Jakarta with 1,103 infected cases. 889 people and 14,256 people died (1.3%) (12).

One way to deal with the coronavirus (COVID 19) outbreak is through intra-hospital nursing management when patients are hospitalized. Early detection efforts (early warning system) to detect worsening of Covid 19 patients greatly help prevent more severe complications and death. The role of nurses in conducting rapid and accurate monitoring can help detect changes to the worse that can threaten Covid-19 patients (5).

One of the regional public hospitals in East Jakarta, which is a referral hospital for Covid-19 patients, has one mission to provide modern, safe and integrated service facilities, effectively and efficiently. The number of nurses at this hospital is 439 people and as many as 129 have experience treating Covid-19 patients. This hospital has implemented EWSS in an effort to detect patient deterioration in the treatment room, including the implementation of EWSS for Covid 19 patients. Evaluation of the effectiveness of EWSS implementation has not been carried out. Analysis of factors related to the implementation of EWSS has also not been carried out. Thus, it is important to conduct research on "Analysis of the Factors of EWSS Implementation by Nurses as an Effort for Early Detection of Deterioration of Covid-19 Patients in the Treatment Room" in order to provide an overview of the factors for implementing EWSS in Covid-19 patients.

The general objective of this study is to identify the factors for implementing EWSS in an effort to detect the worsening of Covid-19 patients in the hospital treatment room. The specific purpose of this study was to analyze the relationship between education level, knowledge, experience caring for Covid-19 patients, level of anxiety, compliance, with the implementation of EWSS in Covid 19 patients in the treatment room at one of the hospitals in East Jakarta.

METHODS

This research is a quantitative research with analytical descriptive method using a cross sectional approach. This study measures the relationship between education level, knowledge level, experience, anxiety level and nurse compliance in implementing the protocol with the implementation of EWSS in Covid-19 patients as an early detection effort for patient deterioration in the treatment room. Measurement of correlation variables that occur in the object of research is carried out simultaneously or at the same time. The population in this study were all nurses who served in the treatment room and had treated Covid 19 patients at one of the hospitals in East Jakarta.

Sampling was done by non-probability sampling method through saturated sampling, namely the technique of determining the sample by taking all members of the population as respondents or samples. The reason for using saturated sampling was because the number of nurses who served in the treatment room and had treated patients with Covid 19 at the study site were not many so that the entire population was sampled. The sample inclusion criteria were 1. Nurses who served in the treatment room and had treated Covid 19 patients. 2. Willing to be a respondent, 3. Able to fill out questionnaires using google forms. Exclusion criteria that caused subjects who met the inclusion criteria could not be included in this study included nurses who were unable to complete the research questionnaire.

The instruments used are 1) a questionnaire on respondent characteristics containing demographic data of nurses including gender, age, education level, length of experience caring for Covid-19 patients, which was developed by researchers based on needs. 2) the knowledge level questionnaire about EWSS and Covid-19 was adopted from the nurse

knowledge questionnaire about EWSS referring to the national early warning system, NHS-Royal College Physician, London (2017) which consists of 20 questions, with a good category if the answers are correct 76-100 %, enough if the answer is 56-75% correct, and the category is less if the answer is correct. 3) The anxiety level questionnaire was adopted from the Hamilton Rating Scale for Anxiety (HRS-A) questionnaire adapted to Covid-19 patients consisting of 14 questions with a score category < 14 no anxiety 14-28 mild anxiety 29-42 anxiety moderate 43-56 severe anxiety. 4) The nurse's adherence questionnaire to the Covid-19 protocol was developed by researchers consisting of 6 questions. 5) EWSS implementation questionnaire in Covid-19 patients modified from the RAPIDS Instrument (Liaw, Chan, Chen, Hooi, & Siau, 2014) which was used to measure the clinical performance of nurses in early detection of changes in vital signs, assessment and nursing interventions through the Airway, Breathing, Circulation, Disability, and clinical impairment reported using ISBAR communication (13). The test results show that the instrument is valid with a value range of 0.82 and reliable with a Cronbach's Alpha value of 0.91.

This study applies the principles of research ethics which include a) Self-determination; respondents (nurses) who met the inclusion criteria were given a written explanation about the objectives, benefits, research procedures and the role of the respondent in the study, then the researcher gave the opportunity to determine whether or not they were willing to become respondents. If they are willing to become respondents, they are asked to state their willingness in writing in the prepared format. b) Anonymity and confidentiality; The researcher did not include the respondent's name in the questionnaire, and the principle of confidentiality was carried out by the researcher by not publishing the information attached to the respondent's identity, so that in the analysis and

presentation of the data, the researcher only described the characteristics of the respondent. c) Privacy; the researcher guarantees the respondent's privacy and upholds the respondent's self-esteem. The questions in the questionnaire do not ask about things that are considered privacy for the respondent, except those related to research, but still prioritize respect and through the respondent's consent. d) Protection from discomfort and harm; The researcher gave the respondent the opportunity to express their discomfort and discontinue filling out the questionnaire if they experienced discomfort or decreased health. This study also received an ethical test approval from the ethics committee of one of the East Jakarta Hospitals.

Data analysis used univariate, bivariate and multivariate analysis. Univariate analysis was carried out on demographic data consisting of gender, age, education level, length of experience treating Covid-19 patients in the form of categorical data presented in frequency and percentage. Bivariate analysis using the Somers'd test was carried out to see the relationship between education level and implementation of EWSS in Covid-19 patients, relationship level of knowledge with implementation of EWSS in Covid-19 patients, relationship between experience and implementation of EWSS in Covid-19 patients, relationship between anxiety level and implementation of EWSS in Covid-19 patients and the relationship of compliance with the implementation of EWSS in Covid-19 patients. The initial multivariate analysis was tested simultaneously using the Multiple Ordinal Regression test. Variables that were tested simultaneously were predictor variables with p-value results in bivariate analysis less than 0.25, namely knowledge, compliance and education level variables. Subsequently, a partial test was conducted using the Wald test to detect variables that affect the model.

RESULTS

1. Characteristics of Respondents

Univariate analysis showed that the gender characteristics of the respondents were 74% female and 26% male, with an age range of 20-30 years as much as 41% and 31-40 years as much as 36% and 41-50 years as much as 23%. The education level of nurses in Diploma III Nursing is 77%, Nurses 23%, and there are no nurses with Masters or Specialist Nurses education levels. The experience in treating Covid 19 patients for more than 6 months was 54%, 26% for 3-6 months and 20% for less than 3 months.

Table 1. Characteristics of Research Respondents in One of The Regional General Hospital in East Jakarta (n=121)

Variable	n	%
Gender		
Male	32	26
Female	89	74
Age (years)		
20-30	49	41
31-40	44	36
41-50	28	23
Level Education		
Diploma III of Nursing	93	77
Ners	28	23
Magister	0	0
Experience Caring for Covid-19 Patient		
< 3 months	24	20
3-6 months	31	26
>6 months	66	54
Total	121	100

2. The relationship between education level, knowledge level, experience, anxiety level and nurse compliance with the implementation of EWSS in Covid-19 patients.

The results of the bivariate test on factors related to the implementation of EWSS in Covid-19 patients can be seen in the table below.

Table 2. The relationship between education level, knowledge level, experience, compliance, nurse anxiety level with the implementation of EWSS in Covid-19 patients in one of the Regional General Hospital in east Jakarta (n=121)

		Implementasi EWS						<i>r</i>	<i>p</i>
		No		Partial		Full			
		n	%	n	%	n	%		
Education Level	Diploma III of Nursing	8	6,6	11	9,1	74	61,2	-0,1	0,213
	Ners	5	4,1	4	3,3	19	15,7		

Total		13	10,7	15	12,4	93	76,9		
Knowledge Level	Less	5	4,1	0	0	0	0		
	Enough	3	2,5	4	3,3	0	0		
	Good	4	3,3	15	12,4	90	74,4	0,93	0,001
Total		12	9,9	19	15,7	90	74,4		
Experience	<3 months	1	0,8	3	2,5	19	15,7		
	3-6 months	5	4,1	4	3,3	23	19	-0,13	0,835
	>6 months	7	5,8	8	6,6	51	42,1		
Total		13	10,7	15	12,4	93	76,9		
Anxietas Level	No	2	1,7	1	0,8	20	16,5		
	Light	11	9,1	14	11,6	70	57,9	-0,074	0,345
	Currently	0	0	0	0	3	2,5		
Total		13	10,7	15	12,4	93	76,9		
Compliance	No	6	5	0	0	0	0		
	Sometime	3	2,5	3	2,5	0	0	0,91	0,001
	Obey	4	3,3	12	9,9	93	76,9		
Total		13	10,7	15	12,4	93	76,9		

Based on the results of the Somers'd test in the table above, it was found that the level of knowledge and adherence to the Covid-19 protocol had a significant relationship with the implementation of the EWSS. The knowledge correlation coefficient value obtained is 0.93 which shows the direction of a positive relationship, namely the higher the level of knowledge of nurses, the better the implementation of EWSS in Covid 19 patients. Likewise, the correlation coefficient value obtained is 0.91 which indicates a positive direction, namely the higher the level of nurses, the better the implementation of EWSS in Covid-19 patients

3. Multivariate Test

The initial stage is a simultaneous test. Variables that were tested simultaneously were predictor variables with *p-value* results in bivariate analysis less than 0.25, namely knowledge, compliance and education level variables.

Table 3. Simultaneous Significant Test Results

Log Likelihood	Chi-Square	df	p-value
24,785	50,176	3	0,001

Simultaneous test results shows *p-value* of 0.001, so it can be concluded that simultaneously there are predictor variables that significantly affect the implementation of EWSS. Subsequently, a partial test was conducted to detect variables that had an effect on the model. From the partial test, it was found that the 2 best factors for nurses to be able to fully implement EWSS because they have maximum probability. Knowledge level factor has a probability of 97% and compliance factor has a 99% probability to fully implement EWSS. Nurses who have low knowledge and do not comply with the protocol are considered the worst conditions for nurses to implement EWSS.

DISCUSSION

The implementation of EWSS in one of the regional general hospitals in East Jakarta has been going on for several years. The application of EWS is also carried out on Covid-19 patients during the pandemic. A total of 129 nurses are spread in general treatment rooms, emergency departments and intensive care in charge of treating Covid 19 patients. The number of nurses who are respondents is 121 people. As many as 77% of nurses are aged 20-40 years, this shows that the nurses in charge of treating Covid-19 patients at this hospital are of productive age. This is important in order to prevent transmission and support the implementation of EWSS in Covid 19 patients. At the productive age the immune system is still good compared to those aged >40 years. At the productive age, work motivation is still high. This condition is needed in order to be able to carry out optimal monitoring and care for Covid 19 patients so that EWSS can be carried out optimally. There is a modification of the parameters used, namely the addition of the age parameter to assess EWS in Covid 19 patients as an effort to detect worsening of the patient's condition. This is in line with the theory from Liao, Wang & Kang, 2020 which states that the age factor is one of the

important parameters to see the impact of Covid 19 on the worsening of patients (5).

Nurses at this hospital who have experience treating Covid 19 patients since the beginning of 2020. Of the 121 nurses who were respondents, 54.5% who had experience treating Covid-19 patients > 6 months, the rest only had experience < 6 months. The data shows that the experience of nurses caring for Covid-19 patients is still limited because this Covid-19 case is a pandemic that has not happened before. The results of this study indicate that experience does not have a significant relationship with the implementation of EWSS in the treatment room. The results showed that most of the nurses in charge of treating Covid-19 patients at this hospital had a Diploma III Nursing education level, which was 76.9%, the rest 23.1% with a Nurses education level. The results of the bivariate test and the partial test showed that the level of education did not have a significant relationship with the implementation of the EWSS in Covid-19 patients. Thus, there is no significant difference between nurses with Diploma III Nursing education and nurses in the implementation of EWSS on Covid-19 patients in the treatment room at the hospital. The results showed that the nurse in charge of caring for Covid-19 patients at this hospital only experienced mild anxiety, which was 78.6%, the rest did not experience anxiety. The results of the biivariate test showed that there was no significant relationship between the level of anxiety and the implementation of the EWSS in Covid 19 patients in the treatment room.

Based on the results of the bivariate test, there are two factors that have a significant relationship with the implementation of EWSS in Covid-19 patients in the treatment room, namely the knowledge factor and nurse compliance. The results of the study were 74.4% of nurses who had good knowledge also carried out the full implementation of EWSS (good). Somers'd

test on the knowledge aspect obtained $p = 0.001$ and $r = 0.93$, so it can be concluded that the level of knowledge of nurses is significantly related to the implementation of EWSS. The correlation coefficient value is 0.93 which shows the direction of a positive relationship, namely the higher the knowledge of nurses, the higher the implementation of EWSS. These results are in accordance with previous research conducted by Qolbi Nur, et al. (2020) regarding the relationship of knowledge and skills with accuracy and speed of nurses when conducting EWSS assessments, the results showed that there was a stronger relationship of knowledge and skills with accuracy when assessing using EWSS when compared to nurses' speed (14). Likewise, the research conducted by Situmorang (2019) that the lack of knowledge of nurses about EWSS is the cause of the failure to implement EWSS in the treatment room (15). This result is also supported by the research of Suwaryo, Sutopo & Utoyo (2019) which shows that there is a relationship between the level of knowledge of nurses and the application of EWSS in the treatment room at the regional general hospital in the city of Kebumen (16). Other research shows that there is a relationship between nurses' knowledge and the implementation of EWSS because nurses who have good knowledge show good EWSS documentation (Passa, 2021)(17). According to Odell (2015) the factors that influence the implementation of EWSS include the work culture of the inpatient room, the division of nurses' work, skills, and knowledge of nurses.

Based on research obtained from Ekawati, Saleh & Astuti (2020) there are 63.6% of respondents who have good knowledge of EWSS also apply EWSS well too (18). This is in line with the theory of Notoadmojo, (2010) which states that knowledge is directly proportional to the application or application (19). Thus, according to the author, nurses must increase knowledge so that performance gets better. There are many ways to

increase nurses' knowledge about EWSS, especially for Covid-19 patients, including through ongoing training, workshop activities. In the application of EWSS to Covid-19 patients, critical thinking skills are also needed so that nurses are able to accurately and quickly conduct EWSS assessments and make decisions on how to handle them. Thus, according to the results of the study and the support of previous studies, according to the authors, the level of knowledge is a factor that is significantly related to the implementation of EWSS in Covid-19 patients.

The results of the bivariate test showed that 76.9% of nurses who had a good level of adherence to the Covid-19 protocol (obedient) also showed full implementation of EWSS in Covid 19 patients in the treatment room. Based on the results of the Somers'd test, it was found that the level of nurse compliance was significantly related to the implementation of EWSS in Covid-19 patients in the treatment room. The correlation coefficient value is 0.91 which indicates the direction of a positive relationship, namely the higher the nurse's compliance, the better the implementation of EWSS for Covid 19 patients in the treatment room. The simultaneous multivariate test also showed p -value of 0.001, so it can be concluded that simultaneously there are predictor variables that significantly affect the implementation of EWSS in Covid 19 patients. Likewise, the results of the partial test to detect variables that affect the model, obtained the best 2 factors for nurses. to be able to fully implement EWSS in Covid 19 patients because it has the maximum probability. The knowledge level factor has a 97% probability and the adherence factor has a 99% probability to fully implement the EWSS. Nurses who have low knowledge and do not comply with the protocol are considered the worst conditions for nurses to implement EWSS.

In line with the research results, Rusmawati (2022) explains that most nurses are obedient and responsive to patient

development and there is a significant relationship between compliance with the implementation of the pediatric early warning score (PEWS) with nurse response time and patient safety (20). In the study, Eddahchouri et al (2021) explained that the level of compliance of nurses in implementing the EWSS was still low, especially when the assessment was required to be more intensive and this had a significant effect on the overall implementation of the EWSS which was also not optimal (21). This shows that there is a significant relationship between the level of nurse compliance with the implementation of EWSS. According to another study that the function and supervision of services, in this case starting from the head of the room, the leadership style of the head of the room, appreciation, motivation, and attitude have a significant relationship with the level of nurse compliance in implementing indicators of patient safety goals (IPSG). Meanwhile, according to Sagita (2019) the factors that can affect nurse compliance in applying standard precautions in hospitals are motivation, work experience and risks that can occur (22). Based on data and theory from previous studies, it can be concluded that treatment compliance is a factor that is related to the implementation of EWSS in an effort to detect the deterioration of Covid-19 patients in the treatment room.

CONCLUSION

The factors that are significantly related to the implementation of EWSS in Covid-19 patients in an effort to detect patient deterioration in one of the hospitals in East Jakarta are the level of knowledge and compliance of nurses. Thus, efforts are needed to increase nurses' knowledge about EWSS in Covid 19 patients and efforts to increase factors that can improve nurse compliance with the Covid-19 protocol so that the implementation of EWSS in Covid 19 patients is better.

Conflict of Interest Disclosure

we certify that there is no actual or potential conflict of interest in relation to this article.

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