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ORIGINAL ARTICLE

Factor Analysis in the Implementation of Early Warning System Documentation in Psychiatric Hospitals

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ABSTRACT

Introduction: An early warning system (EWS) is a tool used to rapidly identify patient deterioration and prevent adverse events. However, implementation and documentation have not been optimally performed. This study aimed to analyze factors related to the implementation of EWS documentation in a psychiatric hospital in Malang. **Methods:** This was an analytical, observational study with a cross-sectional design. The study population consisted of nurses in the intensive care unit of the hospital, with a total sample of 60 respondents selected using a proportional random sampling technique. Data were collected using demographic questionnaires, workload questionnaires, and observation sheets for the implementation of EWS documentation of patients through the hospital management information system. Data analysis was performed using the chi-squared test. **Results:** The Implementation of EWS documentation was significantly related to workload and EWS training ($p<0.05$). Implementation of EWS documentation was not related to age, gender, education level, years of service, employment status, or work shift ($p>0.05$). **Conclusion:** Nurses with light workloads who had attended EWS training successfully created good documentation (100%). Hospitals must review their management in planning, developing, and fostering nursing resources, especially the provision of continuous training accompanied by equitable EWS monitoring for nurses in psychiatric hospitals.

Keywords: early warning system, factors, management, nurses, psychiatric hospital

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INTRODUCTION

Nurses worked to serve patients for 24 hours. Based on the Regulation of the Minister of Health of the Republic of Indonesia (2019) concerning the implementation of Article 36 of Law Number 38 of 2014 concerning nursing, nurses have an obligation to document the care provided in accordance with the standards. Failure to recognize and respond to acute deterioration can increase the risk of adverse events (Khair, La Ubo and Mustari, 2019). Early identification and a quick response can reduce the patient's worsening condition. Therefore, many hospitals use the early warning system (EWS) to detect abnormalities and trigger the right response from the staff (Dewi, Susila and Darmawan, 2020).

According to Megawati *et al*. (2021), all the EWS documentation sheets, adult inpatient rooms are incomplete. The results of the study Widegdo, Marti and Ratnawati (2022) found that most nurses did not comply with EWS protocols. In addition, the results of a hospital audit show documentation inconsistencies in EWS implementation, which has an impact on the quality of the hospitals and can pose a risk to patient safety (Ratag and Kartika, 2021).

Early warning scores have been shown to increase code blue activation and decrease high care unit (HCU) admissions, but no significant difference was found in the net death rate (NDR) and length of stay (LOS) in studies with good EWS use (22.81%) (Hidayat, Agushybana and Nugraheni, 2020). Knowledge, attitudes, and nurses' compliance are required to competently apply EWS documentation skills. The application of the EWS concept starts by scoring the physiological parameters, reporting

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the scoring results, and implementing the activation of the escalation plan for the documentation of the EWS score.

A preliminary study was conducted by the researchers on January 12, 2020, at Dr. Radjiman Wediodiningrat Psychiatric Hospital in Lawang by randomly observing three different treatment rooms. The results showed that the implementation of EWS documentation was 60% of the documentation was partially completed, 30% was completely filled, and 10% was not complete. The researchers also conducted interviews with the nurses on duty. Most of them said that the reason they did not carry out EWS documentation was that they felt that the workload was too heavy. They were burdened by the establishment of correct EWS documentation. The average number of patients at this psychiatric hospital was 35-36 patients in each room with two nursing shifts: four nurses in the morning and two nurses in the afternoon or evening. This also contributed to the heavy burden of completing the EWS documentation.

Several methods can be used to tackle the problem of completing EWS documentation, including EWS simulation tutorial training (Hapsari *et al*., 2021), monitoring and evaluation (Megawati *et al*., 2021), streamlining workloads, and using electronic-based EWS documentation (Tobing, 2018).. The purpose of this study is to examine factors related to the implementation of early warning system (EWS) documentation in patients admitted to Dr. Radjiman Wediodiningrat Psychiatric Hospital in Lawang.

METHODS

This research was a quantitative study using an analytical observational research design and cross-sectional approach. The study population was 71 nurses from the Psychiatric Intensive Room of Dr. Radjiman Wediodiningrat Psychiatric Hospital in Lawang, Malang. The total study sample comprised 60 respondents selected using proportional random sampling techniques. The data collection used demographic data questionnaires, workload questionnaires, and observation sheets for the implementation of the early warning system documentation of patients through the hospital management information system. Data were analyzed using univariate and bivariate analyses. The univariate analysis in this study showed the frequency distribution of age, sex, education level, years of service, employment status, experience in early warning system training, work shift, workload, and implementation of EWS documentation. Bivariate analysis was used to determine the relationship between independent variables (age, gender, education level, years of service, employment status, experience in participating in early warning system training, work shift, and workload) and dependent variables (the implementation of early warning system documentation). Data were analyzed using the chi-square test because they met the test requirements.

Ethics approval was obtained from Dr. Radjiman Wediodining Rat Psychiatric Hospital in Lawang, Malang (project no. LB.02.03/ XXVII.5.7/2301/2020). All participating nurses were informed of the purpose of the study and provided written approval. All the respondents were encouraged to provide genuine answers.

RESULTS

Univariate Analysis

Table 1 shows the characteristics of the respondents based on their age, gender, education, years of service, employment status, experience in EWS training, work shifts, and workload. This shows that 37% of the respondents were early adults (26-35 years), and most of them (70%) were male. Their educational background was mostly diplomas in nursing (53%). Most had a working period of >10 years (65%) and were civil servants (83%). Fifty-five percent of the respondents had attended EWS training and over 50% of the respondents had morning shifts. More than half of the respondents had a moderate workload.

Bivariate Analysis

Table 2 shows the results of the cross-tabulation and bivariate analysis using the chi-square test. The results showed that attending EWS training had a significant relationship with the implementation of EWS documentation. This suggests that nurses who received EWS training carried out EWS documentation either partially (51.5%) or fully (45.5%), compared to those who never had EWS training.

Workload is also related to how respondents carried out EWS documentation. The results of this study showed that the respondents who had a

Table 1. Demographic Profile of Respondents in Psychiatric Intensive Room of Dr. Radjiman Wediodiningrat Psychiatric Hospital in Lawang, Malang, 2020

Demographic Profile	Total (n)	Percentage (%)
Age		
26-35 (early adult)	22	37
36-45 (late adult)	18	30
46-55 (early elderly)	20	33
Gender		
Male	42	70
Female	18	30
Education Level		
Diploma in nursing	32	53
Bachelor's in nursing	28	47
Years of Service		
<6 years	10	17
6-10 years	11	18
>10 years	39	65
Employment Status		
Civil servants	50	83
Contract employees	10	17
EWS Training		
Yes	33	55
No	27	45
Work Shift		
Morning	31	51
Afternoon	16	27
Night	13	22
Workload		
Heavy	13	22
Keep	30	50
Light	17	28
Implementation of EWS documentation		
Implemented 100%	16	27
Partially Implemented	31	52
Not doing EWS	13	21

light workload mostly (70.6%) fully completed the EWS documentation, compared to those who had moderate or heavy workloads.

The results of this study also showed that factors such as age, level of education, gender, years of service, employment status, and work shifts were not significantly related to the implementation of EWS documentation.

DISCUSSION

Relationship between Age and the Implementation of Early Warning System (EWS) Documentation

The results of this study showed no significant relationship between nurses' age and the implementation of EWS documentation. However, we found that adult nurses carried out more EWS documentation, partially or fully (100%), than older nurses. This is probably because in adulthood or younger age, people are generally more receptive to changes, more manageable, and more energetic at work. Meanwhile, in the elderly, changes in the physiological functions of the body can affect their motivation to work, causing the quality of performance to decrease. Based on Erikson's theory of development, young adulthood is a phase of an active individual's career; therefore, they are productive at work(Potter and Perry, 2015). This finding is also in accordance with the results of the study, De Groot *et al*. (2022) which found that older people receive more information so that they can improve their ability to document nursing care.

The Relationship between Educational Level and the Implementation of Early Warning System Documentation

This study found no relationship between nurses' level of education and the implementation of EWS documentation. More than half of the respondents (53%) had a diploma in nursing, which suggests that they had sufficient knowledge in providing care and services for patients, including EWS documentation (Mayenti, Arif and Priscilla, 2020). In addition, most respondents with a diploma in nursing had > 10 years of employment; therefore, years of service can hone their ability to become professionals despite only having a diploma in nursing (Wu *et al*., 2015). However, the results of this study showed that nurses with a diploma in nursing had a greater percentage of not carrying out EWS documentation than nurses with a bachelor's degree in nursing.

A possible explanation for this might be that nurses with a bachelor's degree in nursing are required to work with professionals following new scientific developments and policies, and do not work routinely. This may help them to evaluate

Table 2. Bivariate Analysis of Respondents' Characteristics

Variable	Implementation of EWS Documentation						Total		P value
	Implemented 100%		Implemented partially		Not doing EWS				
	n	%	n	%	n	%	n	%	
Age									
26-35 (early adult)	5	22.7	9	40.9	8	36.4	22	100	
36-45 (late adult)	8	44.4	8	44.4	2	11.1	18	100	0.067
46-55 (early elderly)	3	15.0	14	70.0	3	15.0	20	100	
Gender									
Male	11	26.2	25	59.5	6	14.3	42	100	0.074
Female	5	27.8	6	33.3	7	38.9	18	100	
Education Level									
Diploma in nursing	10	31.3	13	40.6	9	28.1	32	100	0.176
Bachelor's in nursing	6	21.4	18	64.3	4	14.3	28	100	
Years of Service									
<6 years	3	30.0	2	20.0	5	50.0	10	100	
6-10 years	4	36.4	5	45.5	2	18.2	11	100	0.097
>10 years	9	23.1	24	61.5	6	15.4	39	100	
Employment Status									
Civil servants	12	24.0	29	58.0	9	18.0	50	100	0.082
Contract employees	4	40.0	2	20.0	4	40.0	10	100	
EWS Training									
Yes	15	45.5	17	51.5	1	03.3	33	100	0.000
No	1	03.7	14	51.9	12	44.4	27	100	
Work Shift									
Morning	4	12.9	17	54.8	10	32.3	31	100	
Afternoon	7	43.8	8	50.0	1	06.3	16	100	0.079
Night	5	38.5	6	46.2	2	15.4	13	100	
Workload									
Heavy	1	07.7	2	15.4	10	76.9	13	100	
Keep	3	10.0	26	86.7	1	03.3	30	100	0.000
Light	12	70.6	3	17.6	2	11.8	17	100	

and improve their work. An undergraduate degree in nursing is a professional education level that prepares students to become nurse managers. Therefore, they should be able to implement early warning and risk control systems in clinics and build an appropriate nursing management system (Wu *et al*., 2015). The results of this study Mayenti, Arif and Priscilla (2020) showed that nurses' higher levels of education may contribute to complete nursing documentation. Low educational levels are a determining factor for low health literacy because of their limited ability to access and understand health information (De Groot *et al*., 2022).

Relationship between Gender and the Implementation of Early Warning Cocumentation

The results of this study showed that there was no relationship between sex and the implementation of EWS documentation. However, Table 2 shows a higher proportion of women who did not carry out EWS documentation than men.

This might be due to the larger number of male respondents in the inpatient rooms of Dr. Radjiman Wediodiningrat Psychiatric Hospital. Male and female nurses have equal educational and employment opportunities; therefore, gender

dominance and social inequality should not occur in the nursing workforce. Gender relations in nursing tasks place male and female nurses on equal footing. Male and female nurses are given the same rights and obligations, engage in the same profession, and perform the same duties, including documenting the implementation of EWS. Larjow and Lingner (2022) showed that female nurses are more obedient in documenting complete nursing duties. Meanwhile, the results of the study Langkjaer *et al*. (2021) showed that female nurses have more experience in implementing EWS.

The Relationship between Years of Service and the Implementation of Early Warning System Documentation

Nursing tenure showed no significant association in this study. However, this study showed that nurses who did not carry out EWS documentation were dominated by those with < 6 years of service compared to those with a service period of > 6 years. Service period describes the experience of mastering an area of duty. Sujalmo *et al*. (2022) in their study found that most nurses expressed that EWS implementation was difficult. During the focused group discussion (FGD), the participants expressed that the implementation was complicated and they were confused about how to complete the EWS. Several factors may affect the implementation of EWS, such as nurses' experience. Meanwhile, junior nurses may not have the ability to recognize a patient's aggravation and may not document it. This may be due to the nurses' lack of knowledge and experience. Nurses who have experience recognizing a patient's aggravation can immediately respond to it. Staff experience is an important factor for conducting effective assessments and referrals.

The length of service or the time required to obtain information about EWS documentation and carrying it out in the room is an important element in carrying out documentation. According to the results of the study byAng (2019), nurses in the intensive care unit implemented the electronic documentation system better after twelve (12) months after implementation compared to three (3) months after implementation.

The Relationship between Employment Status and the Implementation of Early Warning System Documentation

TThe results of this study found no significant relationship between employment status and the implementation of EWS documentation. However, the results of this study showed that most contracted nurses did not conduct EWS documentation. This is probably because nurses considered civil servants were permanent employees of psychiatric hospitals. These nurses had been given training and activities to increase their knowledge; therefore, there was a motivation to carry out duties that were part of their responsibilities. Permanent employees can be more responsible and more focused on carrying out their duties than contracted employees because they are less worried about losing their job or employment status, which can affect their work performance.

The Relationship between Participation in Early Warning System Training and the Implementation of Early Warning System Documentation

The results of this study showed a significant relationship between the experience of attending EWS training and implementation of EWS documentation. Based on the results of a study by Nantschev and Ammenwerth (2022), attending training can increase knowledge and improve the ability of nurses to assess correct clinical situations; thus, they can document complete and standardized nursing documentation.

This study is in line with previous research Reyaan *et al*. (2022) that included 30 nurses and midwives across various inpatient wards in a private hospital in Yogyakarta. The results showed that there was a relationship between training ($p = 0.049$) and the level of knowledge of nurses and midwives about EWS. The training aims to prepare employees who will soon be assigned the task of working as expected by the institution. Training is an effort to transfer knowledge or skills to trainees so that after the participants have completed the training, they will be able to apply it at work.

The Relationship between Work Shift and the Implementation of Early Warning System Documentation

This study found no significant relationship between work shift and the implementation of EWS documentation, as all nurses knew the importance of documenting a patient's EWS while on duty. The EWS is used to assess a patient's clinical condition and improve the response in a timely manner. The main objective of the EWS is to help nurses quickly recognize and respond to patient deterioration (Sujalmo *et al*., 2022).

According to Hwang and Kim (2022), EWS documentation is used during patient handovers to improve patient safety. The use of NEWS2 can enhance handover quality, teamwork, and the safety climate. Using NEWS2 to assess patient conditions may foster clear communication and understanding of the importance of patient information as a mutual agenda and provide an opportunity for cross-checking, thereby improving the quality of patient handovers and teamwork.

However, Table 2 shows that nurses with morning shifts had a higher percentage of not carrying out EWS documentation than those who were in the afternoon or evening shifts. This was probably because morning services in psychiatric hospitals were the nurses' peak hours for nursing performance. In addition, this can also be caused by the limited number of nurses in the room. The results of this study are in accordance with those of a study O'Neill *et al*. (2021) that found that the perceived busyness of ICU nurses discouraged participants from activating rapid response team (RRT). Participants noted that the responding RRT members occasionally talked about how busy they were.

Relationship between workload and early warning system documentation

Workloads are significantly related to the implementation of EWS documentation. The results showed that almost all respondents with heavy workloads did not carry out EWS documentation (76.9%). The results of this study are in line with those of a study Widegdo, Marti and Ratnawati (2022) that found that workload has a relationship with nurse compliance in documenting an early warning system (EWS), with a p-value of 0.001.

Workload is the basis for determining nurses' capacity to create a balance between nurses and workloads. The results of this study showed that nurses with a heavy workload mostly did not document EWS. In addition, nurses with moderate workloads mostly did not complete or partially complete the EWS documentation. According to the results of a previous study Widegdo, Marti and Ratnawati (2022), a heavy or moderate workload may stem from nurse shortages compared to the number of patients treated, thus causing a heavy workload for some nurses. In addition, certain conditions require nurses to make efforts to rescue patients due to unexpected deteriorating conditions. Therefore, additional nurses are required to provide optimal services.

Several external factors affect the workload of nurses. One example of external factors is physical workload, for example, an imbalance between the number of nurses and the number of patients and additional tasks (Megawati *et al*., 2021). This finding supports the findingTamaka, Mulyadi and Malara (2015) that factors associated with higher workloads present a higher number of diagnoses and worse functional status.

CONCLUSION

The implementation of early warning score (EWS) documentation had a significant relationship with nurses' workload and EWS training attendance. Nurses with a light workload mostly carried out complete EWS documentation (100%). Similarly, nurses who had attended EWS training mostly performed EWS documentation. Meanwhile, age, gender, level of education, years of service, employment status, and work shifts did not have a significant relationship. The results of this study can be used as input to deal with these factors to improve the quality of service of psychiatric hospitals. Psychiatric hospitals can conduct training for nurses in implementing EWS and documenting it regularly. In addition, supervision is needed to evaluate nurses' ability to carry out EWS documentation. Implementing professional nursing care management in a room may reduce the workload and improve optimum patient services. Subsequent research could identify other factors that may relate to or influence the implementation of EWS documentation. Therefore, barriers to implementation can be identified and addressed.

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