

# National early warning system adherence: Is nurses' clinical competence involved associated with protocol in a hospital in Indonesia?

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## National early warning system adherence: Is nurses' clinical competence involved associated with protocol in a hospital in Indonesia?

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### Abstract

**Background:** The implementation of the Early Warning System (EWS) in developing countries still faces many obstacles. The National Early Warning Score (NEWS) is one of the most frequently used EWS. The factors affecting its compliance are still being studied.

**Purpose:** To analyze the involvement of nurse clinical competence in adherence to the National Early Warning Score (NEWS) protocol in a hospital in Indonesia.

**Method:** This study is an observational analytic study with a cross-sectional approach to nurses in the medical ward. Nurse characteristics consisting of age, gender, education level, work experience, and knowledge of NEWS were measured and recorded. Nurse clinical competence level is the main independent variable. The outcome measured was nurse adherence to the protocol which was assessed by looking at the records in the NEWS observation sheet. Data was analyzed using Chi-Square, Fisher Exact Test, and Spearman Rho.

**Results:** Thirty-five nurses were involved in the study. Respondent were 38.7 years old on average, had an average work experience of 7.1 years, and had an average knowledge of NEWS of 77.2+7.2 (good). The majority of respondent were females (20/57.1%), had diploma education (20/57.1), and were at clinical competency level I (26/74.3%). In the NEWS score < 5, most respondent adhered to the protocol (21/60.0%), but the majority did not adhere to the protocol at the NEWS score >.6 (28/80.0%). A p-value of > 0.05 was obtained in the analysis of the relationship between age, education level, and work experience with protocol adherence on NEWS score of >.6

**Conclusion:** The majority of respondent have not adhered to the NEWS >.6 protocol. There is a significant relationship between age, education level, work experience, and NEWS >.6 protocol adherence. There was no relationship between nurses' clinical competence and adherence to the NEWS protocol at either a score of < 5 or >.6. Further studies are needed to confirm the results of this study.

**Keywords:** Adherence; Clinical Competence; National Early Warning Score; Nurse; Protocol.

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## INTRODUCTION

One in ten hospitalized patients is at risk of adverse events<sup>1,4</sup>. Fifty percent of them are preventable (Schwendimann, Blatter, Dhaini, Simon, & Ausserhofer, 2018). Effective observation of patients is key in identifying deteriorating patients (Albutt, O'Hara, Conner, & Lawton, 2021). Lack of knowledge, failure to identify red flags, limited equipment, organizational failure, and poor communication are some of the causes of suboptimal patient care (Dall'Ora, Saville, Rubbo, Turner, Jones, & Griffiths, 2022; Schwendimann et al., 2018). The Early Warning System (EWS) was created to fill this gap. Early detection of the appearance of worsening of the patient's condition is important to prevent further worsening in patients who are generally irreversible (Lee & Hong, 2019).

A wide variety of EWS has been developed. One of the EWS that is widely used in adult patients is the National Early Warning Score (NEWS) (Lee & Hong, 2019). Compared to other types of EWS, NEWS has a good performance (Haegdorens, Monsieurs, De Meester, & Van Bogaert, 2019; Loisa, Kallonen, Hoppu, & Tirkkonen, 2022; Price, Prytherch, Kostakis, & Briggs, 2023; Thorén, Joelsson-Alm, Spångfors, Rawshani, Kahan, Engdahl, & Djär, 2022). NEWS is also easy and cheap because it can use standard medical equipment that is generally available and does not require additional laboratory test in its parameters (Williams, 2022). However, studies report low compliance in its implementation (Eddahchouri, Koeneman, Plokker, Brouwer, van de Belt, van Goor, & Bredie, 2021). One factor that is still being debated is the nurse's clinical competence in adherence to implementing protocols (Azimirad, Magnusson, Wiseman, Selander, Parviainen, & Turunen, 2022; Oliveira, Nogueira, & Cruz, 2022). Some studies show a relationship between nurse clinical competence and protocol adherence, but others show the opposite (Azimirad et al., 2022; Spångfors, Molt, & Samuelson, 2020).

This study aims to confirm nurse clinical competence in adherence to the NEWS protocol in our hospitals. We also explored other influencing factors. The identified factors are expected to be modified to improve the quality of NEWS implementation in the future.

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## RESEARCH METHOD

This study is an analytical observational study with a cross-sectional approach. The population in this study was nurses in the medical wards totaling 35 people. Samples are taken by total sampling technique. Nurses who had not received training on EWS/NEWS were excluded from the study.

Nurse characteristics consisting of age, gender, education level, work experience, and knowledge of NEWS were measured and recorded. Nurses' knowledge was measured using a validated NEWS knowledge questionnaire and categorized into poor (< score 56%), moderate (56-75%), and good (76-100%).

The nurse's level of clinical competence is the main independent variable. This data is taken from the personnel register book in the hospital. The outcome measured was the suitability of protocol implementation which was assessed by looking at the NEWS observation sheet in the patient's medical record retrospectively (in the period of the study). Each nurse was randomly assigned two samples of NEWS observation sheets to assess their adherence to the NEWS < 5 protocol, and the NEWS > 6 protocol. These two observation sheets were then assessed for adherence to the hospital's NEWS protocol (Table 1). The adherence to the protocol is categorized as "adhere" and non-adhere. Implementations are categorized as "not adhere".

The collected data were analyzed univariately and bivariately. Univariate analysis is presented in the form of tables and descriptive narratives. The data was also analyzed bivariate to determine the relationship between the independent variable and

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the dependent variable using Spearman Rho for numerical scale data, and Chi-square or Fisher Exact Test for categorical scale data.

All respondent were adequately informed about the study and had signed informed consent before

data collection. This research has received permission and approval from the Independent Review Board No. 800/ Tim Kordik. 149/ V/ 2023.

## RESEARCH RESULTS

Table 1. Characteristics of Respondent (N=35)

Variable	Result
<b>Age (Mean±SD)(Range) Year</b>	(38.7± 8.5)(26-53)
26-45 years old	23/65.7
>46 years old	12/34.3
<b>Gender(n%)</b>	
Male	15 /42.9
Female	20/57.1
<b>Education Level(n%)</b>	
Diploma	20/57.1
Bachelor	15/42.9
<b>Work Experience (Mean±SD)(Range) Year</b>	(7.1±6.1)(1-23)
0-5 years	18/51.4
>6 years	17/48.6
<b>Clinical Competence Level (n%)</b>	
Clinical Nurse I	26/74.3
Clinical Nurse II	9/25.7
<b>NEWS Knowledge Skor (Mean±SD)(Range)</b>	(77.2±7.2)(66.7-93.3)
<b>NEWS Knowledge (n%)</b>	
Moderate	17 / 48.6
Good	18 / 51.4
<b>NEWS &lt;5 Adherence (n%)</b>	
Adhere	21/60.0
Unadhere	14/40.0
<b>NEWS &gt;6 Adherence (n%)</b>	
Adhere	7/20.0
Unadhere	28/80.0

NEWS: National Early Warning Score

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The respondent show that the age of the respondent is in the range 26-53 years with a mean of 38.7 and a standard deviation of 8.5, where for men it is 42.9% and for women it is 57.1%. Meanwhile, for those with a Diploma education it was 57.1% and for those with a Bachelor's education it was 22.9%.

Furthermore, for respondents' work experience, it was in the range of 1-23 years with a mean of 7.1 and a standard deviation of 6.1, where for Clinical competence level CN I it was 74.3% and Clinical competence level CN II was 25.7%.

Furthermore, for NEWS knowledge, respondents' scores were in the range of 66.7-93.3 points with a mean of 77.2 and a standard deviation of 7.2, where for moderate NEWS knowledge it was 48.6% and good NEWS knowledge was 51.4%. Meanwhile, for NEWS <5 adherent adherence was 60.0% and non-adherent was 40.0%. Meanwhile, for NEWS >6 adherent adherence was 20.0% and non-adherent was 80.0%.

Table 2. Respondents' Characteristic Analysis on NEWS Adherence (N=35)

Variables	NEWS < 5		p-value	NEWS > 6		p-value
	Adhere (n=21)	Unadhered (n=14)		Adhere (n=7)	Unadhered (n=28)	
<b>Age (n/%)</b>						
26-45 years old	15/71.4	8/57.1	0.390	1/14.3	22/78.6	*0.003
>46 years old	6/28.6	6/42.9		6/85.7	6/21.4	
<b>Gender (n/%)</b>						
Male	9/42.9	6/42.9	1.000	5/71.4	10/35.7	0.112
Female	12/57.1	8/57.1		2/28.6	18/64.3	
<b>Education Level (n/%)</b>						
Diploma	12/57.1	8/57.1	1.000	1/14.3	19/67.9	*0.027
Bachelor	9/42.9	6/42.9		6/85.7	9/32.1	
<b>Work Experience (n/%)</b>						
0-5 years	12/57.1	6/42.9	0.414	1/14.3	17/60.7	*0.041
>6 years	9/42.9	8/57.1		6/85.7	11/39.3	
<b>Clinical Competence level (n/%)</b>						
Clinical Nurse level I	16/76.2	10/71.4	1.000	3/42.9	23/82.1	0.055
Clinical Nurse level II	5/23.8	4/28.6		4/57.1	5/17.9	
<b>NEWS Knowledge (n/%)</b>						
Moderate	11/52.4	6/42.9	0.586	3/42.9	14/50.0	1.000
Good	10/47.6	8/57.1		4/57.1	14/50.0	

\*significant (p-value < α 0.05)

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On table 2 shows that for the age factor in NEWS < 5 with a p-value of 0.390 those who adhere at the age of 26-45 are 71.4% and those who are not adherent are 57.1%, while those who are adherent at the age of 46 are 28.6% and those who are not adhere is 42.9%. Furthermore, for the gender factor in NEWS < 5 with a p-value of 1.000, those who adhere to males are 42.9% and those who are not adherent are 42.9%, while those who adhere to females are 57.1% and those who are not adherent are 57.1%. Then for the Education level factor in NEWS < 5 with a p-value of 1.000 those who adhere to the Diploma are 57.1% and those who are not adherent are 57.1%, while those who adhere to the Bachelor are 42.9% and those who are not adherent are 42.9%. Furthermore, for the Work experience factor in NEWS < 5 with a p-value of 0.414, those who adhere to 0-5 years are 57.1% and those who are not adherent are 57.1%, while those who adhere to >6 years are 42.9% and those who are not adherent are 42.9%. Then for the Clinical competence level factor in NEWS < 5 with a p-value of 1.000 those who adhere to Clinical Nurse level I are 76.2% and those who do not adhere are 71.4%, while those who adhere to Clinical Nurse level II are 23.8% and those who do not adhere is 28.6%. Furthermore, for the NEWS knowledge factor in NEWS < 5 with a p-value of 0.586, the Moderate adhere is 52.4% and the Not Moderate adhere is 42.9%, while the Good adhere is 47.6% and the Not Good adhere is 57.1%.

Then for the age factor in NEWS > 6 with a p-value of 0.003 those who adhere at the age of 26-45 years old are 14.3% and those who are not adherent are 78.6%, while those who are adherent at the age of 46 years old are 85.7% and those who are not adhere is 21.4%. Furthermore, for the gender factor in NEWS > 6 with a p-value of 0.112, those who adhere to males are 71.4% and those who are not adherent are 35.7%, while those who adhere to females are 28.6% and those who are not adherent are 64.3%. Then for the Education level factor in

NEWS > 6 with a p-value of 0.027 those who adhere to the Diploma are 14.3% and those who are not adherent are 67.9%, while those who adhere to the Bachelor are 85.7% and those who are not adherent are 32.1%. Furthermore, for the Work experience factor in NEWS > 6 with a p-value of 0.041, those who adhere to 0-5 years are 14.3% and those who are not adherent are 60.7%, while those who adhere to >6 years are 85.7% and those who are not adherent are 39.3%. Then for the Clinical competence level factor in NEWS > 6 with a p-value of 0.055 those who adhere to Clinical Nurse level I are 42.9% and those who do not adhere are 82.1%, while those who adhere to Clinical Nurse level II are 57.1% and those who do not adhere is 17.9%. Furthermore, for the NEWS knowledge factor in NEWS > 6 with a p-value of 1.000, the Moderate adhere is 42.9% and the Not Moderate adhere is 50.0%, while the Good adhere is 57.1% and the Not Good adhere is 50.0%.

## DISCUSSION

### NEWS and Nurse Clinical Competency Levels

Nurse clinical competence is a combination of knowledge, skills, attitudes, thinking abilities, and values in a nurse. This competence also shows his ability and independence in making clinical decisions and actions. In the case of emergencies, clinical competence describes how a nurse deals with and manages patients with worsening conditions (Benner, 1982; Fukada, 2018).

The law stipulated that the clinical competence of nurses is divided into four levels. The basic clinical competence is Clinical Nurse (CN) I and the highest competence is CN IV (Ministry of Health of the Republic of Indonesia, 2017). In this study, only find the competency levels of CN I and II. Clinical nurse I is a level of clinical nurse with the ability to perform basic nursing care with an emphasis on technical nursing skills under guidance. CN II is a clinical nurse level with the ability to perform holistic nursing care for clients independently, manage

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clients or groups of clients in teams, and obtain guidance for handling advanced clinical problems. In assessing the competence of a nurse, the law emphasizes the ability a nurse can achieve in solving clinical problems she faces (Ministry of Health of the Republic of Indonesia, 2017). But in practice, this is not easy. hospitals generally assess the competence of a nurse based on her level of education and work experience. However in reality these two bases do not always describe nurses' actual competence (Spångfors et al., 2020).

The results of this study showed that the nurse's level of clinical competence was not related to nurse adherence to the protocol. A lack of confidence in nurses in activating protocols in Finland and the United Kingdom (UK). Almost half of respondent are likely to wait for a doctor's decision before activating the protocol (Azimirad et al., 2022)

Social culture and demographics also have an impact on the work culture in the hospital. There is a gap between doctors and nurses in certain cultures such as the United Kingdom (UK) and Korea. This causes hesitancy in independent decision-making (Azimirad et al., 2022; Lee & Hong, 2019). Similarly with Indonesian nurse culture in general. In contrast to Finnish culture where nurses have the same bargaining position as doctors, so they tend to be more confident in making clinical decisions independently (Azimirad et al., 2022). This hesitation causes nurses at the CN I and CN II levels to feel inferior and not confident in making clinical decisions. In the end, it tends to take safe action by not escalating NEWS. As reported by an audit research on cardiac arrest patients. It was found that less than 50% of patients received complete observation. Only 24-33% of the total EWS score was accurate, and about 50% did not get the right protocol (Brooke, & Carroll, 2017). In these cases, it was found that increased monitoring escalation was only carried out before cardiac arrest. NEWS aims to detect worsening at least 24 hours before adverse

events occur. In this condition, the purpose of implementing NEWS is not achieved.

The clinical competence of nurses should not only describe the career path of a nurse, but in the future should better describe the competencies that nurses have. This stratification is important in planning strategies to reduce morbidity and mortality in hospitals by good nurse staffing.

### Age, Level of Education, and Work Experience in the Implementation of NEWS

In this study, a significant relationship was found between age, education level, and work experience with compliance with the NEWS protocol > 6. Higher education seems to shape the mindset and higher responsibility of nurses. Higher education makes nurses more aware of conditions that endanger patients. Higher education also indicates better knowledge of NEWS.

A study shows a significant relationship between age and work experience in influencing nurses' attitudes in facing protocol barriers. The study also showed that work experience was the most influential factor compared to other variables. The more experienced nurse (more than 10 years) show their strong disagreement with the obstacles to implementing the protocol (Azimirad et al., 2022). The more experienced a nurse is, the more exposed to a wide variety of clinical conditions. This has sharpened their intuition in dealing with various kinds of circumstances than inexperienced nurses. Experienced nurses are more confident in making clinical decisions in managing patient

A study reports the opposite. The shorter the work experience, the higher the proportion of nurses who respond positively to NEWS compared to experienced nurses. The study also reported that senior physicians and nurses had low adherence to the protocol (Spångfors et al., 2020). In a large hospital setting with varying age groups, this is very likely. At the age of over 45 years old, a person tends to stick to their comfort zone. Perhaps this is

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one of the reasons why the over-45 age group is apathetic to the changes around them. In a small hospital setting with not many nurses working, the age variation is not too high. Experienced nurses (generally over the age of 45) will be directed into managerial roles rather than staying in clinical services.

#### NEWS Adherence

This study found that nurses' adherence to the NEWS < 5 protocol was higher than to the NEWS > 6 protocol. NEWS < 5 has a less frequent monitoring protocol than NEWS > 6. Low compliance with the NEWS protocol has been widely discussed by researchers (Eddahchouri et al., 2021; Kopiczka, Unwin, Pugh, Sharif, Chandy, Davies, & Welsh Digital Data Collection Platform Collaborators, 2021). A study has reported a decrease in adherence along with the increasing frequency of patient monitoring (Oliveira, Nogueira, & Cruz, 2022). This does not only happen to NEWS, some types of EWS that still use manual systems also report the same thing (Eddahchouri et al., 2021).

Several studies explore nurses' perspectives in the implementation of NEWS. Researchers reported the pressures and dilemmas felt by nurses when implementing NEWS. On one hand, nurses realize that NEWS has a good impact on patients, but on the other hand, it increases their workload and anxiety (Jensen, Skår, & Tveit, 2019). Generally, in hospitals with a limited number of nurses, there is an increase in nurse workload along with an increase in NEWS scores (Eddahchouri et al., 2021). Low nurse staffing is suspected to be one of the causes of poor outcomes including hospital deaths (Dall'Ora et al., 2022).

Several studies developed various strategies to improve protocol compliance. The use of technology is said to lower nurses' workload and improve adherence to protocols (Han, Sohn, Hwangbo, Park, Kim, Choi, & Kim, 2022; Watson & Carberry, 2021).

Organizing the number of nurses based on their level of experience in nurse staffing and regulating the proportion of nurses and patients reported can reduce adverse events in hospitals (Dall'Ora et al., 2022). Another study suggests that efforts to simplify protocols can improve protocol adherence (Sanghera, Patel, & Arora, 2020). Developing nurse competence and conducting ward rounds are also other strategies (Azimirad et al., 2022; Roberts, McCallum, Hughes, Meland, Higgins, & Kirkpatrick, 2020).

#### LIMITATION

The results of this study can provide an initial picture of the factors that can affect nurses' adherence to protocols but cannot show how much each factor plays a role in influencing protocol adherence due to the limited number of samples. Further research is needed involving more respondent and multicenters so that they can be generalized to a wider population.

#### CONCLUSION

The majority of nurses still have not adhered to the protocol on a NEWS > 6. There was no relationship between nurses' clinical competence with NEWS adherence protocols in both the NEWS < 5 group and the NEWS > 6 group. There was a significant relationship between age, education level, work experience, and NEWS > 6 adherence. Further research is needed to confirm the results of this study.

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