

Differences in Triage Accuracy in Low and High Category Respiratory Emergency Cases Using the Early Warning System Score (EWSS) by Nursing Students

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Submitted : 29 October 2024 ; Accepted : 26 April 2025

Doi : <https://doi.org/10.36858/jkds.v13i1.803>

ABSTRACT

EWSS is a cumulative scoring system that standardizes the evaluation of the severity of acute illness based on the patient's vital signs. This study aims to compare the accuracy of determining triage in cases of respiratory emergencies in cases with low and high categories to find out the extent of understanding of triage by nursing students in these two categories of cases using the EWSS method. The research was carried out at 8 institutions providing undergraduate nursing education in the city and district of Malang. The sample for this research was 200 nursing students at undergraduate and professional levels. Of the 200 students, they were divided into 2 treatment groups, namely a student group of 100 respondents who were given respiratory emergency vignette cases in the low triage category (low risk) and a student group of 100 respondents who were given cases in the high triage category (emergency). The research results show the results of the Man Whitney test with a significance result of 0.91 so it can be concluded that there are no differences in the 2 treatment groups. Almost all respondents determined triage in the 2 triage groups correctly using the EWSS triage method. EWSS can be used independently by novice nurses in carrying out triage in various cases of respiratory emergencies

Keyword: Triage; Respiratory Emergencies; Early Warning Score System; Nursing Students

ABSTRAK

EWSS adalah sistem penilaian kumulatif yang menstandarkan evaluasi tingkat keparahan penyakit akut berdasarkan tanda vital pasien. Penelitian ini bertujuan untuk membandingkan ketepatan penentuan triase pada kasus kegawatan respirasi pada kasus dengan kategori rendah dan tinggi untuk mengetahui sejauh mana pemahaman triase oleh mahasiswa keperawatan pada dua kategori kasus tersebut dengan metode EWSS. Penelitian dilaksanakan pada 8 institusi penyelenggara pendidikan sarjana keperawatan di kota dan kabupaten Malang. Sampel penelitian ini adalah 200 mahasiswa keperawatan dalam jenjang sarjana dan profesi. Dari 200 mahasiswa dibagi menjadi 2 kelompok perlakuan yaitu kelompok mahasiswa sejumlah 100 responden yang diberikan kasus vignette kegawatan respirasi dengan kategori triase rendah (resiko rendah) dan kelompok mahasiswa sejumlah 100 responden yang diberikan kasus dengan kategori triase tinggi (gawat darurat). Hasil penelitian menunjukkan hasil uji man whitney dengan hasil signifikansi 0,91 sehingga dapat disimpulkan tidak terdapat perbedaan pada 2 kelompok perlakuan. Hampir seluruh responden menentukan triase pada 2 kelompok triase dengan tepat menggunakan metode triase EWSS. EWSS dapat digunakan secara mandiri oleh perawat pemula dalam melaksanakan triase pada berbagai kasus kegawatdaruratan respirasi

Kata Kunci: Kegawatan respirasi; Early Warning Score System; Mahasiswa keperawatan

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How to Cite : vita maryah ardiyani, Metrikayanto, W. D., Sutringngsih, A., Arlinda, P. S., Mumpuni, R. Y., Srihayati, Y., ... Hardiyanto, H. The Differences in Triage Accuracy in Low and High Category Respiratory Emergency Cases Using the Early Warning System Score (EWSS) by Nursing Students. *Jurnal Kesehatan Dr. Soebandi*, 13(1). <https://doi.org/10.36858/jkds.v13i1.803>

Introduction:

In diagnosing emergencies in the respiratory system, several examination indices are used to classify the severity and prognostic factors. However, these indicators are not suitable for screening, and no specific scoring system has been developed for patients with signs of respiratory distress (Hu et al., 2022). One of the best approaches for screening is to apply an existing assessment tool, namely the Early Warning Score System (EWSS) method which can be used to determine the level of respiratory emergency. EWSS can be utilized on its own to assess the severity of an emergency and guide students, as beginner healthcare practitioners, in deciding the necessary steps to take (Hu et al., 2022; Soltan et al., 2021). EWSS is a cumulative scoring system that standardizes the evaluation of the severity of acute illness and has been widely applied in emergency departments (ER). This system is useful for predicting the risk of damage, monitoring the patient's clinical condition, and supporting clinical decision making, especially in improving the safety of critical patients. EWSS uses a simple scoring system called Track & Trigger, based on the patient's vital signs that indicate a worsening clinical condition (Song et al., 2020).

Handling patients with respiratory emergencies is a skill that is needed by a nurse, where cases of respiratory emergencies are very often encountered in the clinical environment. In this situation, nurses are faced with new challenges that have a psychological impact, especially in handling cases of infection involving the respiratory system (Purba et al., 2020). Nursing students, as novice health workers, have an important role in handling the increasing number of cases of respiratory emergencies, especially in terms of socialization and implementation of health protocols (Sari et al., 2020). As prospective health workers who will enter clinical practice, nursing students need to be equipped with triage skills in dealing with various emergency cases, especially respiratory system emergencies that are encountered at the clinical practice level (Siregar & Simamora, 2020).

A preliminary study conducted on nursing students in Malang, out of 10 students, 7 people said they were not familiar with the Early Warning System Score (EWSS) method as a triage method for respiratory emergencies. Professional students stated that they needed knowledge regarding how to detect respiratory system emergencies, where cases of pneumonia have often been encountered in practice since the Covid-19 pandemic until now, where cases of respiratory disorders are often encountered. Previous research that had been carried out by researchers by trialling the EWSS to determine Covid-19 virulence scoring in nursing students showed that there was a relationship between the accuracy of virulence scoring before and after use and exposure to EWSS (Ardiyani et al., 2021). The categorization in the EWSS is divided into 3 emergency categories, namely low, medium and high. This study aims to compare the accuracy of determining triage in cases of respiratory emergencies in cases with low and high categories to find out the extent of understanding of triage by nursing students in these two categories of cases using the EWSS method (Ardiyani & Sutriningsih, 2023). The urgency of this study lies in piloting the EWSS instrument, which can be used independently to determine the level of emergency and appropriate interventions, as part of the core competencies for nursing students as entry-level healthcare providers. EWSS can be used by novice nurses as a triage method that can be used in both prehospital and intrahospital environments so that it can also be used at the level of independent nurse practice. The implications of this study in both educational and clinical settings are to provide nursing students with direct experience in using the EWSS triage system to determine the severity level of respiratory emergencies, which can be applied in clinical practice to triage patients with respiratory emergency cases.

Methods:

This research used a quasi-experimental approach with 2 treatment groups without a control group (Nursalam, 2013). The variable measured in this study was the accuracy of determining triage using the EWSS method in the

2 groups. Group 1 is the group given respiratory emergency cases in the low emergency category, group 2 is the group given cases in the high emergency category. The results of the triage determination were compared to determine the comparison of the accuracy of the triage determination in the 2 groups. The triage determination method uses the EWSS method where triage categorization is carried out based on 8 indicators of the patient's clinical symptoms based on National early warning score (news) 2 publish by Royal College of physicians (RCP). National early warning score (news) 2: standardising the assessment of acute-illness (RCP, 2017):

Parameter	Assesment	Score
Signs of pneumonia on lung CT scan	Yes	5
History of close contact with confirmed COVID-19 patients/patients with respiratory symptoms	Yes	5
fever	Yes	3
age	≥ 44 year	1
gender	male	1
Maximum temperature (measured from onset to hospital	≥ 37.8 C	1
symptoms of respiratory problems (cough, phlegm and shortness of breath)	≥ 1 symptomp	1
The ratio of neutrophils to lymphocytes	$\geq 5,8$	1

Based on the total score in the table above, categorization is carried out based on the table below based on National early warning score (news) 2 publish by Royal College of physicians (RCP). National early warning score (news) 2: standardising the assessment of acute-illness (RCP, 2017):

Score	Clinical risk level/emergency level	Response (handling)
0-4	low	Low response (observation)
5-6	Medium	Respond immediately
7 and more	High	Emergency Response

The research was conducted at 8 institutions providing undergraduate and professional nursing education in Malang in July-September 2024 using a sampling quota of 100 respondents for the light category case group and 100 respondents for the high category case group. A total of 200 respondents were selected through quota sampling, comprising 25 participants from each of four professional-level institutions and four undergraduate-level institutions. The inclusion criterion required participants to be students who had completed the emergency nursing Subject Each respondent was given 5 cases of respiratory emergencies in the form of vignette questions which were reviewed by the research team. The vignette questions were developed by an emergency nursing team who had undergone item development training and were reviewed by two lecturer reviewers from AIPNI (Asosiasi Institusi Pendidikan Ners Indonesia) regional East Java .Each question with the correct triage categorization was given a score of 10 and an incorrect categorization was given a score of 0. The comparative analysis of the scores of the two groups was carried out using the Mann Whitney test.

Ethical consideration approval from Health Research Ethics Committee. Faculty of Nursing Universitas Airlangga number 3320-KEPK. Each participant was informed about the study's purpose, the methods to be used, possible limitations, risks, benefits, the confidentiality of their data, and their choice to participate voluntarily. All participants gave their informed consent for the study. Collected data will remain confidential and be published anonymously. Approval from an ethics committee and participant consent were obtained.

Results:

Table 1. Age table of research respondents

	N	Mini mum	Maxim um	Mean	Std. Deviatio n
Age	200	18,00	30,00	22,1650	1,74442
Valid N (listwise)	200				

Based on table 1. Of the 200 respondents who took part in the research, the average age of the respondents was 22 years. The minimum age of respondents is 18 years and the maximum value of respondent age is 30 years.

Table 2. General Data of Respondents (n=200)

Characteristics	n	%
Gender		
Male	60	30
Female	140	70
Emergency MK Value		
A	69	35
B	116	58
C	13	6.5
D	2	1
Clinical Experience time		
No	118	59
1-12 month	80	40
≤1 years	2	1
Knowing EWSS Before		
Yes	22	11
No	178	89

Table 2 shows an overview of the characteristics of the 200 respondents involved in the research with a percentage of 70% of respondents being female and 30% of respondents being male. The grade for the emergency nursing course was in the B grade range. Most of the respondents had no clinical experience and only a small number of respondents were familiar with the EWSS triage system.

Tabel 3. Data Normality Test

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
low Triase	,278	100	,000	,767	10	,000
High Triase	,276	100	,000	,759	10	,000

Table 3 shows the results of the data normality test in the 2 low triage groups (low risk) and the high category triage group (high risk). The significance value of the 2 triage groups shows a result of 0.000 which is below

0.05, so it can be concluded that the 2 groups of data are not normally distributed. Based on the results of the normality test, the data were not normally distributed, the difference test between 2 groups was carried out using the Man Whitney test.

Table 4. Description of scores for the high category triage group and the low category triage group

VAR00002	N	Mean	Std. Deviation
Low Category	100	42,7000	8,74498
High Category	100	43,1000	8,00189

The table above shows the average triage accuracy score in the low category triage group is 42.7 out of a maximum score of 50 and the average triage accuracy score in the high category triage group is 43.1 out of a maximum score of 50. In each group there were 100 respondents.

Table 5. Man Whitney test results

	Skor
Mann-Whitney U	4958,000
Wilcoxon W	10008,000
Z	-,112
Asymp. Sig. (2-tailed)	,910

Based on the results of the Man Whitney test in table 5, the significance result is 0.910, where this value is more than 0.05. The conclusion that can be drawn from the results of the Man Whitney test is that there is no difference in triage accuracy in the 2 low triage groups (low risk) and the high triage group (high risk).

Discussion :

In the triage group with the low category, of the 5 cases assessed, the average determination of triage determination reached a score of 42, where the maximum score was 50. In the high category triage group, the average score reached 43 with a maximum score of 50. The assessment of the accuracy of triage in the two groups was carried out after respondents were given a case

simulation using the EWSS triage method. The EWSS method is very applicable in use as a triage method based on 8 clinical indicators experienced by patients including signs of pneumonia with lung CT scan, history of close contact with confirmed COVID-19 patients, fever, age, gender, maximum temperature, symptoms of respiratory disorders, ratio of neutrophils to lymphocytes. EWSS can be used independently to determine the level of emergency and the appropriate actions to be taken by students as novice healthcare providers. Compared to other methods such as ESI and color tagging, EWSS, with its 8 indicators, is more suitable for assessing triage in respiratory emergency situations (Song et al., 2020). The use of the EWSS application in case simulations to determine respiratory emergency triage is part of the application of case studies, which are used in research when case studies examine phenomena in real life contexts, especially when the boundaries between phenomenon and context cannot be clearly separated. Case study investigations focus on complex situations involving multiple important variables, relying on multiple sources of evidence or data, requiring triangulation as well as cross-checking with other results. The previous theoretical prepositions help guide the data collection and analysis process (Prihatsanti et al., 2018). The ability of health workers to assess a case influences the success of treatment when a patient experiences an emergency. Nurses' accuracy in determining a diagnosis is also influenced by various factors, such as nurses' knowledge of triage, work motivation, and the workload they face (Amri et al., 2019). Respondents were all in a bachelor's degree in nursing at least one semester and had mastered the basic skills of recognizing clinical symptoms on the EWSS indicators and were familiar with triage material in emergency nursing. Khairina (2018) in her research stated that education is not a determining factor in nurses' decision making, in fact the dominant factor influencing nurses' accuracy in making decisions to carry out case determination is the knowledge factor

EWSS is an instrument that nurses can use independently in triage actions. In the process of

determining a patient's diagnosis, health workers go through several stages. The first stage is profiling, which is the first step to narrow down possible diagnoses by collecting patient identity information. The second stage is anamnesis, namely collecting initial information through asking the patient questions about the complaints they are experiencing, such as when the symptoms appeared, how they developed, how the complaints were handled, and whether there were other complaints. There are two types of anamnesis: autoanamnesis, namely a direct interview with the patient, and anamnesis, an interview with the patient's family. The success of the diagnosis depends on identifying the main complaint that is the reason the patient seeks treatment or is admitted to hospital. The third stage is a physical examination, which includes inspection (direct observation of the patient's condition), palpation (touching), percussion (tapping), and auscultation (listening with an instrument) (Amri et al., 2019). Mastery of clinical signs related to respiratory emergencies and case simulation activities using the EWSS method provides respondents with direct experience in carrying out triage actions in various triage categories (Rizkika et al., 2014). Based on the facts found at the research location, theories, and previous research results, it can be concluded that knowledge is not always related to the application of procedures. It is possible that there are other influencing factors, namely that respondents used previous learning experiences obtained from the results of assessments in related courses, namely Emergency Nursing, where the majority of respondents received category B (good) grades.

The results of the bivariate test using the Man Whitney test in both triage groups showed that there was no difference in the accuracy of triage determination in both the low category (low risk) group and the high category (emergency) triage group. EWSS mastery of the 3 triage categories is related to the accuracy of determining triage in cases given to respondents. EWSS as a triage method in cases of respiratory emergencies greatly influences the accuracy of triage in cases of respiratory emergencies by nursing students. This is in line with research

which states that simulation or training through case studies can increase nurses' knowledge in determining EWSS scores (Alias & Ludin, 2021; Damayanti et al., 2019; Foley & Dowling, 2019; Indrawati & Yulianto, 2023; Millizia et al., 2023; Saab et al., 2017). Based on the facts found at the research location, theory and previous research results, it can be concluded that learning using case studies can improve understanding and skills. This is because the presentation of case studies in vignettes provides a better understanding because it attracts more attention. The EWSS application for health workers can confirm that health in a clinical environment is very useful where EWSS can identify the condition of patients who are at risk early and uses multiple parameters. One of the parameters assessed is changes in vital signs. Experts say that this system can produce more benefits for patients by identifying deterioration in the patient's condition (Angkasa, 2022; Mirawati & Deswita, 2022; Spencer et al., 2019; Suwaryo et al., 2019). EWSS is very useful in monitoring or early detection before patients experience worse conditions and are able to use appropriate referral or action pathways. Research shows that EWSS can be used as an early detection tool to determine next actions. Clinical signs of worsening conditions are usually similar, which can be seen in respiratory, cardiovascular and neurological functions. Effective observation of the patient is the first key in identifying the patient's condition. It is very important to have better nursing practices so that it can reduce morbidity and mortality rates (Dewi et al., 2020; Fauziah & Adiutama, 2023; Jayasundera et al., 2018; Lindayani et al., 2024; Mirawati & Deswita, 2022). Based on the facts found at the research location, theory and previous research results, it can be concluded that accurate triage using EWSS can be a measuring tool for early detection of worsening patient conditions, so that morbidity and mortality rates can decrease. Based on the results of this study, it is hoped that EWSS training can be conducted as one of the competencies for nurses, both in clinical and educational settings, so that nurses are proficient in various triage methods.

Conclusions:

The EWSS method can be applied to various triage categories as evidenced by the fact that there is no difference in triage accuracy in the low category group and the high category group. Almost all respondents determined triage in the 2 triage groups correctly using the EWSS triage method. EWSS can be used independently by novice nurses in carrying out triage in various cases of respiratory emergencies. Future research is expected to compare the accuracy and duration of EWSS triage with other triage methods in order to analyze the level of accuracy and the comparison of triage duration.

Acknowledgement:

We are grateful for the support of:

1. Ministry of Education, Culture, Research and Technology as Funding Source
2. Faculty of Health Sciences, Tribhuwana Tunggal University, Malang, Indonesia
3. Kendedes College of Health Sciences, Malang, Indonesia
4. Maharani College of Health Sciences, Malang, Indonesia
5. Faculty of Health Sciences, Brawijaya University, Malang, Indonesia
6. Widyagama Husada College of Health Sciences, Malang, Indonesia
7. Faculty of Health Sciences, Muhammadiyah University of Malang, Malang, Indonesia
8. Widyacipta Husada College of Science, Malang, Indonesia
9. Kepanjen University, Malang, Indonesia

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