

Comparison of Triage Duration Using the Early Warning Score (EWS) and the Emergency Severity Index (ESI) by Nursing Student

Vita Maryah Ardiyani^{1*}, Wahyu Dini Metrikayanto ², Ani Sutriningsih³, Putu Sintya Arlinda⁴, Risna Yekti Mumpuni⁵, Yati Srihayati⁶, Indah Dwi Pratiwi⁷

^{1, 2,3, 4} Faculty of Health Sciences, Universitas Tribhuwana Tunggaladewi, Malang, Indonesia

⁵ Maharani College of Health Sciences, Malang, Indonesia

⁶ Faculty of Health Sciences, Universitas Brawijaya, Malang, Indonesia

⁷ Faculty of Health Sciences, Universitas Muhammadiyah Malang, Malang, Indonesia

*Corresponding Author: vitamaryah@gmail.com

ARTICLE INFO

Article History

Received : 26th September, 2025

Revised : 11th April, 2026

Accepted : 23rd April, 2026

Published : 30th April, 2026

DOI:

<https://doi.org/10.36858/jkds.v14i1.1051>

Corresponding author e-mail

vitamaryah@gmail.com

PUBLISHER:

LPPM Universitas dr. Soebandi

Jalan Dr. Soebandi No 99 Jember, Patrang Regency, Jember, East Java, Indonesia.

email : jkds@uds.ac.id



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ABSTRACT

Background: Triage is a crucial competency for nurses in the field of emergency nursing, as it determines the level of urgency for each patient. The concept of emergency care focuses on the triage system, which classifies patients based on the severity of their condition. Although triage methods vary across countries, the fundamental principle remains the same: prioritizing patients according to the severity of their condition and the resources available. Two triage methods that can be applied based on patients' clinical signs and are in line with nursing competencies are the Emergency Severity Index (ESI) and the Early Warning Score (EWS). Nursing students, as novice healthcare providers preparing for clinical practice, must be equipped with a strong understanding of triage. It is therefore essential to introduce various triage methods to students, particularly through the application of these methods in clinical case simulations, which they are likely to encounter during clinical practice. This underpins the urgency of research comparing triage time between the ESI and EWS methods. The objective of this study was to analyze nursing students' ability to apply triage using ESI and EWS, and to compare triage duration between these two methods in simulated clinical cases (vignette-based scenarios). **Methods:** The study employed an experimental design with a one-group pretest–posttest approach, where clinical case vignettes were presented to be assessed using both ESI and EWS methods. **Results:** The respondents consisted of 200 undergraduate nursing students drawn from five nursing education institutions in Malang City and Regency. Mann–Whitney test results indicated a significance value of 0.000, demonstrating a significant difference in triage duration between the ESI and EWS methods. **Conclusions:** The findings revealed that the ESI method was faster than the EWS method. All respondents were undergraduate nursing students with limited clinical experience. Future studies are recommended to examine the implementation of ESI and EWS methods in emergency departments or critical care units in hospital settings

Keyword: Early Warning Score; Emergency Severity Index; Nursing ; Students; Triage.

How to cite:

ardiyani, V. M., Metrikayanto, W. D., Sutriningsih, A., Arlinda, P. S., Mumpuni, R. Y., Srihayati, Y., & Pratiwi, I. D. (2026). Comparison of Triage Duration Using the Early Warning Score (EWS) and the Emergency Severity Index (ESI) by Nursing Student. *Jurnal Kesehatan Dr. Soebandi*, 14(1), 69–76. <https://doi.org/10.36858/jkds.v14i1.1051>

INTRODUCTION:

Triage is a crucial competency for nurses in the field of emergency care, as it determines the level of urgency for each patient (Sutriningsih A & Ardiyani VM, 2018). Triage involves a rapid assessment of the patient's condition, including vital signs, level of consciousness, and mechanism of injury, in order to categorize them into different priority groups (Wibowo D, 2019). Rapid and efficient decision-making in triage is essential to optimize the use of available resources and to reduce morbidity and mortality. The concept of emergency management emphasizes the triage system, which classifies patients based on the severity of their illness (Kusumaningrum WN & Kusnanto K., 2023). Triage plays a pivotal role for nurses, particularly in emergency departments and disaster situations, as it enables the efficient prioritization of patients according to the severity of their medical condition (El Hasanah N, 2024; Listiana S & Adnan N., 2025). Through triage, nurses are able to identify and provide immediate care to patients who require urgent intervention, optimize the allocation of limited resources, and reduce unnecessary waiting times for other patients (Kurniasari R., 2016; Kusumaningrum WN & Kusnanto K., 2023). A study conducted by Kayuzuki et al. (2017) concluded that nursing students generally made triage errors because they tended to focus more on the overall condition of the patient rather than adhering strictly to triage criteria (Akinaga K, Shibayama K, Takahashi K, Umesaki S, 2017).

Triage methods demonstrate variability across countries; however, the underlying principle remains consistent—prioritizing patients according to the severity of their condition and the availability of resources (Moll HA, 2010). Two triage approaches that may be applied based on patients' clinical indicators and align with nursing competencies are the Emergency Severity Index (ESI) and the Early Warning Score (EWS). In Indonesia, several hospitals have adopted the ESI framework as a reference for triage practice (Mulyono D, 2019).

The ESI, developed in the United States in the late 1990s, stratifies patients into five categories (ESI levels 1–5) according to clinical presentation and the hospital resources anticipated to be required (Singer RF, Infante AA, Oppenheimer CC, West CA, 2012). The primary advantage of the ESI within clinical practice is its capacity to rapidly classify patients' acuity based on their medical needs (Abedi A, Mirhaghi A, Ebrahimi M, 2020). Alongside the ESI, the Early Warning Score (EWS) represents another widely utilized triage approach. EWS is a physiological scoring system designed to detect early signs of patient deterioration, thereby facilitating the identification of individuals at high clinical risk. Its application is consistent with the principles of triage, namely the systematic assessment of patient urgency (NICE, 2020). Mastery of multiple triage methods is essential for nurses to ensure applicability across diverse care settings, both intra-hospital and extra-hospital (Ardiyani & Sutriningsih, 2023). Comparative investigations between ESI and EWS in clinical contexts remain limited, particularly to pediatric triage. For instance, a study by Solanki et al. (2023) concluded that ESI demonstrated greater effectiveness in triage compared with the Pediatric Early Warning System (PEWS) (Solanki A, Batra P, Bhaskar V, 2023).

Nursing students, as prospective professional nurses preparing for clinical practice, must be equipped with a comprehensive understanding of triage. Exposure to various triage methods is essential, particularly through the application of these methods in clinical case scenarios that students are likely to encounter in practice (Ardiyani VM, 2021). Nursing students should be familiar with instruments that can be applied independently to determine the level of emergency and the corresponding interventions required, as novice healthcare providers (Ardiyani et al., 2021). Previous studies conducted by the principal investigator in 2021 and 2022, which tested the application of the Emergency Severity Index (ESI) and the Early Warning Score System (EWSS)

among undergraduate and professional-level nursing students, demonstrated an improvement in triage accuracy for clinical cases following the introduction of these methods. These studies employed a cross-sectional pre- and post-test design (Ardiyani et al., 2021; Ardiyani VM, 2021). In 2024, further research was carried out involving 200 students from eight nursing education institutions in the Malang Raya region, applying the EWSS in respiratory emergency cases. The findings revealed a significant difference in triage accuracy before and after the application of the EWSS method. In general, nursing students at the study sites were primarily familiar with color-tag triage systems and had limited knowledge of other triage methods. However, across the three studies conducted, no direct comparison had been made regarding the accuracy and duration of triage in clinical cases. This gap prompted the present study, which aims to analyze differences in both the accuracy and duration of triage by comparing the ESI and EWS methods among nursing students, as prospective healthcare professionals who must be introduced to various triage approaches during their education to ensure their ability to apply them effectively in clinical practice in accordance with the cases encountered.

METHODS:

This study employed an experimental design using a one-group pretest–posttest approach, in which the intervention was administered to a single treatment group without a control group. Data collection was conducted at two points—prior to and following the intervention—within the same treatment group. The study participants were undergraduate nursing students (minimum sixth semester) enrolled in five nursing education institutions located in Malang City and Malang Regency. Sampling was carried out using quota sampling, with a total of 200 respondents, allocating a minimum of 30 and a maximum of 60 participants per institution. The percentage for each institution ranges from 25% to 70% of

the total students at each institution. The data collection procedure involved providing participants with education on both the EWS and ESI methods, followed by clinical case simulations and scoring. Each method was allotted 30 minutes for simulation activities. Subsequently, participants were asked to complete vignette-based clinical case questions: eight cases for EWS triage and ten cases for ESI triage. The duration of triage was measured using a timer to determine the average triage time for each method. The difference in the number of cases was intended to align with the categories defined within each triage method. Simulation and vignette assessments were conducted as a single intervention. Each clinical case was reviewed by faculty members serving as reviewers from the Indonesian Nursing Education Institution Association (AIPNI), East Java region. Final measurements assessed students' understanding of EWS and ESI, as well as the time required to complete each case, using a vignette-based clinical case questionnaire administered over 30–45 minutes. Triage time was tabulated by calculating the average duration (in minutes) required to complete each vignette for both the ESI and EWS methods. The algorithms applied for the ESI and EWS triage methods are presented as follows:

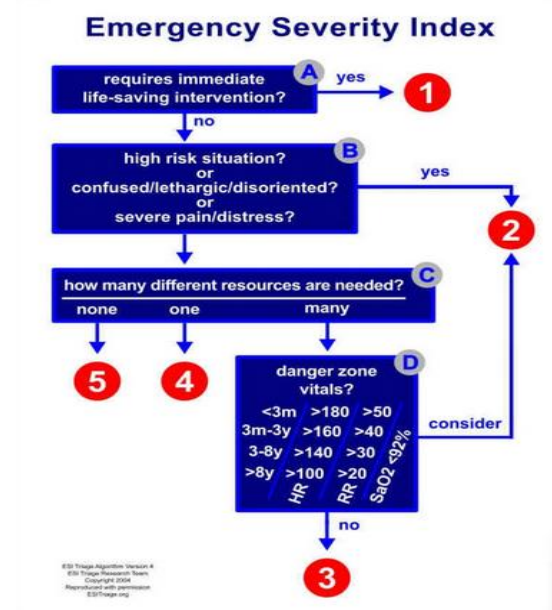


Figure 1. ESI algorithm

PHYSIOLOGICAL PARAMETER	SCORE						
	<u>3</u>	<u>2</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>
Respiration rate per minute	≤8		9–11	12–20		21–24	≥25
SpO2 Scale 1 %	≤91	92–93	94–95	≥96			
SpO2 Scale 2 %	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or Oxygen		Oxygen		Air			
Blood pressure Systolic / mmHg	≤90	91–100	101–110	111–219			≥220
Pulse rate per minute	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature °C	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Figure 2. EWS algorithm

Ethical consideration approval from Health Research Ethics Committee. Faculty of Nursing Universitas Airlangga number 3788-KEPK. All participants were thoroughly briefed on the objectives of the study, the methodological procedures to be undertaken, the potential limitations, associated risks and anticipated benefits, the assurance of data confidentiality, and their right to participate on a voluntary basis. Informed consent was obtained from all participants prior to their inclusion in the study. The data collected will be treated with strict confidentiality and disseminated in an anonymized format. Ethical clearance and participant consent were formally secured in accordance with established research standards.

RESULTS:

Table 1. General Data of Respondents (n=200)

Charateristic	N	%
Age		
20	27	13,5
21	60	30
22	96	48
23	17	8,5
Gender		
male	14	7
female	186	93
Emergency subject value		
A	103	51,5
B	77	38,5
C	20	10
Clinical Experience in emergency unit		
yes	62	31
no	138	69
Knowing ESI before		
yes	23	11,5
no	177	88,5
Knowing EWS before		
yes	28	14
no	172	86
Emergency training		
yes	43	21,5
no	157	78,5

Based on Table 1, the majority of respondents were between 21 and 22 years of age, with all participants enrolled at the undergraduate level in nursing. Nearly all respondents were female, accounting for 93%. Most respondents had achieved an “A” grade in the Emergency Nursing course. Only a small proportion of respondents reported having clinical experience, particularly in emergency department settings. Furthermore, the majority of respondents were unfamiliar with the ESI and EWS triage methods.

Tabel 2. Data Normality Test

		Tests of Normality					
Grup		Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
triage time	ESI method	,136	200	,000	,927	200	,000
	EWS method	,180	200	,000	,954	200	,000

Table 2 presents the results of the normality test for triage time using the ESI and EWS methods. The significance value obtained was 0.000, indicating that the data were not normally distributed. Based on the results of the normality test, the comparison of triage time between the ESI and EWS groups was analyzed using the Mann–Whitney test.

Table 3. Mann Whitney test results

		Ranks		
Grup		N	Mean Rank	Sum of Ranks
triage time	ESI method	200	174,24	34848,00
	EWS method	200	226,76	45352,00
	Total	400		

Test Statistics^a

	triage time
Mann-Whitney U	14748,000
Wilcoxon W	34848,000
Z	-4,558
Asymp. Sig. (2-tailed)	,000

Test Statistics^a

	triage time
Mann-Whitney U	14748,000
Wilcoxon W	34848,000
Z	-4,558
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: Grup

Based on the results of the Mann–Whitney test presented in Table 3, the significance value was 0.00, which is less than 0.05. These findings indicate a significant difference in triage duration between the ESI and EWS methods. Referring to the mean triage times, the EWS method showed an average of 226.76, whereas the ESI method showed an average of 154.24. It can therefore be concluded that triage using the EWS method required more time compared to triage using the ESI method.

DISCUSSION:

The findings of this study indicate that nearly all respondents had minimal clinical experience, as all participants were undergraduate nursing students. Despite this limited exposure to clinical practice, respondents' competence in performing triage was not hindered, as evidenced by the fact that nearly all obtained an “A” grade in the Emergency Nursing course. Nursing students must be able to perform triage both theoretically and practically to detect patients' levels of urgency. Mastery of triage is essential to ensure that patients receive care appropriate to the severity of their condition, while also preventing the spread of communicable diseases (Ardiyani VM, 2021). As novice healthcare providers, nursing students are required to understand various triage methods, since they are future

frontline professionals who will directly face crisis situations and patients' urgent needs (Ardiyani et al., 2021; Zahroh R & Mariyani LM., 2020). In-depth knowledge of triage equips them with essential skills to prioritize patients efficiently, allocate limited resources, and deliver timely interventions to those in greatest need. The ability to conduct triage accurately and rapidly not only saves lives but also reduces morbidity and mortality, alleviates the burden on healthcare systems, and enhances operational efficiency in emergency situations. By mastering different triage methods, nursing students become better prepared and more competent to make meaningful contributions in delivering high-quality care across various clinical settings, particularly in emergency departments, disaster events, and resource-limited situations (Kurniasari R., 2016; Mulyati DS & Safitri A., 2024). Both the EWS and ESI methods can be applied practically and straightforwardly by undergraduate nursing students, whether at the academic or professional level, to detect patient acuity prior to confirmation through clinical and laboratory assessments. These methods may also serve to meet the standard requirement of triage implementation, which stipulates completion within five minutes (Hinson JS, 2018). Specifically, the comparative analysis of the effectiveness of EWS and ESI can provide nursing students with a strong foundation for determining appropriate triage decisions in clinical practice (Mulyono D, 2019).

The results of the Mann–Whitney test indicated a significance value of 0.000, confirming a significant difference in triage duration between the ESI and EWS methods. Further analysis demonstrated that the time required to complete each case using the EWS method was longer compared to the ESI method. The longer duration of triage determination with EWS can be attributed to the assessment of eight indicators, which must be evaluated prior to establishing the four EWS categories. In contrast, the ESI method required a shorter duration despite having more categories (five levels), as

its triage algorithm allows for quicker decision-making compared with EWS. Analyzing the accuracy and duration of triage using both ESI and EWS provides valuable insights not only for nursing students but also for healthcare professionals in general. Most previous studies have examined only a single triage method without comparison to alternatives. Directly comparing two triage methods offers significant benefits in enhancing the understanding and overall effectiveness of triage systems (El Hasanah N, 2024; Mistry B, 2018). By examining the strengths and limitations of each approach, healthcare providers can identify the most appropriate method for specific contexts, such as patient characteristics, resource availability, and clinical environments. Such comparisons also create opportunities to adapt or integrate the best elements of both methods, leading to more comprehensive and flexible triage systems (Fu LH, 2020; Kyriacos U, Jelsma J, 2011). In addition, this process stimulates critical discussion and raises awareness among practitioners, encouraging them to re-evaluate underlying assumptions and refine decision-making skills. Ultimately, a deeper understanding of diverse triage methods contributes to improved patient care quality and more efficient resource allocation in crisis situations (Mirhaghi A, Heydari A, Mazlom R, 2015). In practice, ESI tends to be faster for initial triage in emergency departments, as it directly assesses clinical condition and urgency. EWS, on the other hand, provides more detailed monitoring of changes in patient condition, making it particularly useful for continuous monitoring and early detection of clinical deterioration.

CONCLUSIONS:

There was a significant difference in triage duration between the ESI and EWS methods. The ESI triage method required less time compared to the EWS method. All respondents in this study were undergraduate nursing students with limited clinical experience. Future studies are recommended to test the implementation of ESI

and EWS methods in emergency departments or critical care units in hospital settings. The development of an integrated triage model combining Early Warning Score (EWS) and Emergency Severity Index (ESI) can be systematically designed and subsequently validated through clinical trials as a standardized triage instrument for nursing practice.

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 Tungadewi 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. Faculty of Health Sciences, Muhammadiyah University of Malang, Malang, Indonesia

REFERENCES:

- Abedi A, Mirhaghi A, Ebrahimi M, M. S. (2020). Comparison between stroke triage scale and emergency severity Index to triage patients with neurological Complaints: A randomized clinical trial. *International Emergency Nursing*, 53(100871).
- Akinaga K, Shibayama K, Takahashi K, Umesaki S, S. K. (2017). Study on Triage Education for Nursing Students Analysis of Their Errors in Triage. *Asian Journal of Human Services*, 13, 10–22.
- Ardiyani, V. M., & Sutriningsih, A. (2023). Lama Pengalaman Klinik Perawat dengan Ketepatan Skoring Virulensi Covid-19 meggunakan Aplikasi EWSS (Early Warning System Score). *Care: Jurnal Ilmiah Ilmu Kesehatan*, 11(2), 372–379.
- Ardiyani, V. M., Sutriningsih, A., & Andinawati, M. (2021). Pengaruh Aplikasi Early Warning Score System (EWSS) Terhadap Ketepatan Skoring Virulensi Covid-Oleh Mahasiswa Program S1 Keperawatan Program Studi Ilmu Keperawatan Universitas Tribhuwana Tungadewi Malang. *Journal of Nursing Care and Biomolecular*, 6(2), 138–145.
- Ardiyani VM, A. M. (2021). Aplikasi Metode Triage” Emergency Severity Index (ESI)” Terhadap Ketepatan Penentuan Tingkat Kegawatdaruratan Oleh Mahasiswa Program S1 Keperawatan. *Jurnal Kesehatan Mesencephalon*, 7(1).
- El Hasanah N. (2024). Education About Early Detection Of Emergencies In Patients With Catastrophic Diseases Through Early Warning Score. *JURNAL PENGMAS KESTRA (JPK)*, 4(1), 160–163.
- Fu LH, et al. (2020). Development and validation of early warning score system: A systematic literature review. *Journal of Biomedical Informatics*, 105(103410).
- Hinson JS, et al. (2018). Accuracy of emergency department triage using the Emergency Severity Index and independent predictors of under-triage and over-triage in Brazil: a retrospective cohort analysis. *International Journal of Emergency Medicine*, 11(1).
- Kurniasari R. (2016). Hubungan Antar Level Emergency Severity Index Dengan Kepuasan Pasien Instalasi Gawat Darurat Rumah Sakit Sido Waras. *Jurnal Administrasi Kesehatan Indonesia*, 4(2), 97–106.
- Kusumaningrum WN & Kusnanto K. (2023). Hubungan Pengetahuan Dan Pengalaman Perawat Dalam Penilaian Triage Di Instalasi Gawat Darurat RSUD Kabupaten Bekasi Tahun 2023. *Innovative: Journal Of Social Science Research*, 3(3), 2201–2217.
- Kyriacos U, Jelsma J, J. S. (2011). Monitoring vital signs using early warning scoring systems: a review of the literature. *Journal of Nursing Management*, 19(3), 311–330.
- Listiana S & Adnan N. (2025). Hubungan Early Warning Scoring System dengan Mortalitas Pasien COVID-19 di Rumah Sakit Universitas

- Indonesia. *Jurnal Epidemiologi Kesehatan Komunitas*, 10(1), 88–96.
- Mirhaghi A, Heydari A, Mazlom R, H. F. (2015). Reliability of the emergency severity index: meta-analysis. *Sultan Qaboos University Medical Journal*, 15(1).
- Mistry B, et al. (2018). Accuracy and reliability of emergency department triage using the emergency severity index: an international multicenter assessment. *Annals of Emergency Medicine*, 71(5), 581–587.
- Moll HA. (2010). Challenges in the validation of triage systems at emergency departments. *Journal of Clinical Epidemiology*, 64(3), 384–388.
- Mulyati DS & Safitri A. (2024). Hubungan Beban Kerja Mental dengan Tingkat Kepatuhan Perawat dalam Penerapan Early Warning Score System (EWSS) di Ruang Rawat Inap. *Journal of Management Nursing*, 3(3), 349–359.
- Mulyono D. (2019). *Perbedaan Modified Early Warning Score (Mews), Rapid Emergency Medicine Score (Rems), National Early Warning Score (News) Dan Glasgow Coma Scale (Gcs) Terhadap Outcome Pasien Trauma Kepala Di Igd Rsud Dr. Soedono Madiun*. Universitas Brawijaya.
- NICE. (2020). National early warning score systems that alert to deteriorating adult patients in hospital. *Medtech Innov Brief*, 4731, 1–8.
- Singer RF, Infante AA, Oppenheimer CC, West CA, S. B. (2012). The use of and satisfaction with the Emergency Severity Index. *Journal of Emergency Nursing*, 38(2), 120–126.
- Solanki A, Batra P, Bhaskar V, H. D. (2023). Comparison of Emergency Severity Index Version 4 and Modified Pediatric Early Warning Score as Triage Models in the Pediatric Emergency of a Tertiary Care Public Sector Hospital. *Indian Pediatrics*, 60(11), 917–921.
- Sutriningsih A & Ardiyani VM. (2018). Pengaruh Aplikasi Paediatric Triage Metode Jumpstart Terhadap Kesiapan Penanganan Awal Kegawatdaruratan Pada Anak Di Sdn Purwosari I Kabupaten Pasuruan. *Care: Jurnal Ilmiah Ilmu Kesehatan*, 6(3), 286–293.
- Wibowo D. (2019). Gambaran ketepatan penulisan dokumentasi triage emergency severity index (ESI) Oleh Mahasiswa Ners Stikes Cahaya Bangsa Di IGD RSUD Ulin Banjarmasin. *Jurnal Kesehatan STIKES Darul Azhar Batulicin*, 7(1).
- Zahroh R & Mariyani LM. (2020). Penerapan Early Warning Score (Ews) System Dengan Respon Time Pada Kondisi Kegawatan di Rawat Inap RS Grha Husada. *Jurnal Ners LENTERA*, 8(2), 138–146.