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The Correlation Between CTAS Level and NEWS Score in Patients at the Emergency Department of RSUD Umar Wirahadikusumah

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Abstract: The Emergency Department (ED) requires rapid and accurate evaluation of patients' clinical conditions to support effective triage and timely intervention. The Canadian Triage Acuity Scale (CTAS) classifies patients based on clinical urgency, while the National Early Warning Score (NEWS) assesses physiological parameters to detect early deterioration. Evidence on the relationship between these tools remains limited, particularly in Indonesia, and discrepancies between them may result in undertriage or overtriage, affecting patient safety. This study aimed to determine the relationship between CTAS levels and NEWS scores among patients in the ED of RSUD Umar Wirahadikusumah. An analytical observational study with a cross-sectional design was conducted on 307 patients selected through simple random sampling across different shifts. Data were collected using CTAS and NEWS assessment sheets and analyzed using the Spearman rank correlation test. The results showed a statistically significant but very weak positive correlation between CTAS and NEWS ($r = 0.184$, $p < 0.001$), indicating that higher CTAS levels tend to be associated with higher NEWS scores, although not consistently. The presence of undertriage and overtriage reflects inconsistencies between clinical judgment and physiological assessment. These findings suggest that CTAS and NEWS assess complementary aspects of patient acuity, and their integration may improve triage accuracy, reduce misclassification, and enhance patient safety in emergency care.

Keywords: triage; canadian triage acuity scale; national early warning score, emergency department;

1. Introduction

Emergency health services are an important part of the hospital service system as they serve as the main entry point for patients in critical condition who require fast, accurate, and measurable treatment (Ramadhan et al., 2020). The principle of "Time Saving is Life Saving" is the main basis for emergency services, emphasizing that every second is precious in saving patients' lives. (Prahmawati et al., 2021). Delays in treating emergency patients can increase the risk of disability and even death, so a clinical assessment system is needed to help healthcare workers determine treatment priorities quickly and accurately.

The number of patient visits to emergency department in Indonesia is relatively high. Based on data from the Indonesian Ministry of Health, in 2017, there were 4,402,205 patient visits to emergency department, 12% of which were referrals from public hospitals (Lairin Djala et al., 2023). This phenomenon also occurred at Umar Wirahadikusumah Regional General Hospital, where this study was conducted. Based on emergency department medical records from January to June 2025, there were 16,872 patient visits. This figure indicates the high workload in the emergency department, requiring a triage system that can quickly and accurately determine service priorities based on the severity of each patient's condition.

Triage is the process of sorting patients based on the urgency of their medical condition to determine the priority of treatment (Williams, 2022). In international practice, several widely used triage systems include the Australian Triage Scale (ATS) and the Canadian Triage Acuity Scale (CTAS), both of which have also been adopted in Indonesia (Pivina et al., 2021). One of the most widely used triage systems is the Canadian Triage and Acuity Scale (CTAS), which categorizes patients into five categories: resuscitation, emergent, urgent, less urgent, and non-urgent. At Umar Wirahadikusumah Regional General Hospital, the triage system, which originally used the Australian Triage Scale (ATS), was changed to CTAS in February 2024 with the aim of improving the accuracy and effectiveness of services in the emergency department (Yoelia Nur Allif et al., 2024). However, in practice, CTAS still has limitations because the initial assessment focuses more on the symptoms and condition when the patient arrives, so it is not yet fully capable of detecting changes in clinical condition early on. This condition indicates the need for support from other instruments that can comprehensively monitor changes in the patient's physiology.

One instrument that can be used to complement CTAS is the National Early Warning Score (NEWS). NEWS is a physiological scoring system that aims to detect early changes in a patient's condition by measuring vital parameters such as blood pressure, body temperature, respiratory rate, pulse, oxygen saturation, and level of consciousness (Peng et al., 2021). The application of NEWS helps healthcare workers, especially nurses, to systematically monitor patients' conditions and determine intervention priorities according to patient clinical risk (Romero-Brufau et al., 2021). However, the implementation of NEWS in the ED often faces various obstacles, such as delays in recording vital signs, limited equipment, and differences in interpretation of results between CTAS categories and NEWS scores (Sridhar et al., 2022). Most previous studies have focused on nurses' knowledge or perceptions, rather than on direct evaluation of patients (Krisada Suamchaiyaphum, 2024).

Schinkel et al. (2022), reported discrepancies between the urgency level assessment on the complaint-based triage scale and the EWS score in some cases in the emergency department. These discrepancies can lead to undertriage or overtriage, which ultimately results in delayed intervention, inefficient use of resources, and increased risk of morbidity and mortality for patients (Jeppesen et al., 2020). These findings are in line with Nielsen et al. (2020), who emphasized that inaccuracies in initial assessments can have serious implications for patient safety. Based on the results of a preliminary study conducted at the Emergency Department of Umar Wirahadikusumah Regional General Hospital in June 2025, there was a discrepancy between the CTAS and NEWS assessment results in several patients, where two patients in the emergent category actually had a low risk based on their NEWS score, while one patient in the urgent category had a high risk. This discrepancy indicates a potential difference in the assessment of severity levels, which could affect treatment priorities in the emergency department. Based on these conditions, it is important to evaluate the correlation between the CTAS and the NEWS to ensure optimal integration in the triage system in the emergency department.

In addition, based on data from the Hospital Management Information System (SIMRS), there were 2,293 patient deaths in the emergency department of Umar Wirahadikusumah Regional General Hospital from 2024 to 2025. The high mortality rate indicates that accuracy in triage assessment and early detection of changes in patients' clinical conditions is essential. Therefore, research on the relationship between the CTAS and the NEWS is important to determine the extent to which these two instruments are interrelated in determining the severity of patients' conditions in the emergency department.

Based on the above description, this study aimed to determine the correlation between the Canadian Triage and Acuity Scale (CTAS) and the National Early Warning Score (NEWS) in patients in the Emergency Department of Umar Wirahadikusumah Regional General Hospital. The results of this study are expected to contribute to improving the quality of emergency nursing services, particularly in terms of improving the accuracy of triage assessments and patient safety, as well as providing evaluation material for hospitals in optimizing evidence-based emergency service systems.

2. Materials and Methods

2.1 Study Design

This study employed a quantitative research design using an analytical observational approach with a cross-sectional method. This design was selected to determine the relationship between the Canadian Triage and Acuity Scale (CTAS) and the National Early Warning Score (NEWS) among patients in the Emergency Department (ED) of RSUD Umar Wirahadikusumah. The cross-sectional approach allows data collection at a single point in time without introducing any intervention to the study variables.

2.2 Study Setting and Period

The study was conducted in the Emergency Department of RSUD Umar Wirahadikusumah, Sumedang Regency, West Java, from 30 September to 10 November 2025. Data collection was carried out across all emergency department service periods, including morning, afternoon, and night shifts, to ensure adequate representation of patients from all operational hours of emergency care.

2.3 Population and Sample

The study population consisted of all patients who visited and received services in the emergency department (ED) during the study period. A total of 307 patients were selected through a simple random sampling technique, based on predefined inclusion and exclusion criteria. The inclusion criteria consisted of patients aged ≥18 years who presented directly to the emergency department (ED). Exclusion criteria included referred patients who had received prior medical interventions before arrival and patients presenting with cardiac arrest, as these conditions prevented complete CTAS and NEWS assessments.

2.4 Research instruments

The instruments used in this study were CTAS observation sheets and NEWS observation sheets adapted from the official guidelines of each assessment system. The CTAS observation sheet was used to record triage categories based on the patient's clinical condition. In this study, CTAS classification was recorded using a color-based triage system applied in the hospital setting, where red, yellow, green, and white represent different levels of clinical urgency. Although CTAS is originally a five-level triage system, the use of color-based categorization was adopted to align with local clinical practice. The NEWS observation sheet was used to record physiological parameters and calculate the NEWS score. Both instruments underwent content validation by emergency nursing experts to ensure the suitability and clarity of the measurement indicators.

2.5 Data analysis techniques

The collected data was processed through several stages, namely editing, coding, entry, and tabulation. Data analysis was conducted using univariate and bivariate methods. Univariate analysis was used to describe the frequency distribution of respondent characteristics and CTAS and NEWS scores. Bivariate analysis was performed to determine the relationship between CTAS levels and NEWS scores using the Spearman's rank correlation test, as both variables were ordinal and not normally distributed.

3. Results and Discussion

The results of this study describe the characteristics of patients evaluated using the Canadian Triage Acuity Scale (CTAS) and the National Early Warning Score (NEWS), as well as the relationship between these two assessment tools. Further discussion interprets these findings in the context of existing literature and clinical practice in the emergency department. This section is presented in several subtopics covering the distribution of triage levels, physiological risk categories based on NEWS, and the correlation between the two tools.

3.1. Result

3.1.1. Characteristics of Respondents

Table 1. Frequency distribution of respondents based on age

Characteristic	Frequency (n)	Percentage (%)
Age		
18-29	48	15.6
30-41	48	15.6
42-53	65	21.2
54-65	88	28.7
66-77	53	17.3
78-89	5	1.6
Total	307	100

Based on Table 1, it shows that most respondents were in the 54–65 age range (28.7%), while a small number were in the 78–89 age group (1.6%).

Table 2. Frequency distribution of respondents based on gender

Gender	Frequency (n)	Percentage (%)
Male	131	42.7
Female	176	57.3
Total	307	100

Based on Table 2, it shows that the majority of respondents were female (57.3%), while the rest were male (42.7%).

Table 3. Frequency distribution of respondents based on time of arrival

Time of Arrival	Frequency (n)	Percentage (%)
Morning	103	33.6
Afternoon	102	33.2
Evening	102	33.2

Total	307	100

Based on Table 3, it can be seen that patient arrival times at the Emergency Department (ED) show a relatively even pattern across each service shift, namely morning (33.6%), afternoon (33.2%), and night (33.2%), illustrating that patients arrive at the ER evenly throughout the 24-hour service period.

Table 4. Frequency distribution of respondents based on outcome patient

Outcome Patients	Frequency (n)	Percentage (%)
Inpatient Care	202	65.8
Referral	8	2.6
Discharge	97	31.6
Total	307	100

Based on Table 4, it is known that most patients had an outcome of hospitalization (65.8%), followed by patients who went home (31.6%), and patients who were referred (2.6%). These results indicate that most patients who came to the emergency department required further treatment at the hospital.

3.1.2 CTAS Level Distribution

Table 5. Frequency distribution of CTAS (color-based triage categories)

Characteristic	Frequency (n)	Percentage (%)
CTAS Level		
Red	16	5.2
Yellow	184	59.9
Green	104	33.9
White	3	1.0
Total	307	100

Based on Table 5, it was found that most respondents were in the yellow triage category (59.9%), followed by the green category (33.9%), the red category (5.2%), and the white category (1.0%).

3.1.3. NEWS Score Distribution

Table 6. Frequency distribution of NEWS Score

Characteristic	Frequency (n)	Percentage (%)
NEWS Score		
Green	133	43.3
Orange	116	37.8
Yellow	32	10.4
Red	26	8.5
Total	307	100

Based on Table 6, it was found that almost half of the respondents were in the green NEWS category (43.3%), and most were in the orange category (37.8%), indicating that the patients'

physiological conditions were relatively stable. Meanwhile, a small number of respondents were in the red category (8.5%), indicating critical conditions that required immediate treatment.

3.1.4. Correlation Between CTAS Level and NEWS Score

Table 7. Hypothesis testing spearman's rho

Variable CTAS Level and NEWS Score	r	p-value
Spearman's rho	0.184	<0.001

Based onTable 7, a correlation value (r) of 0.184 with a significance value of $p < 0.001$ was obtained. These results indicate a significant relationship between the Canadian Triage Acuity Scale (CTAS) and the National Early Warning Score (NEWS)

3.2. Discussion

3.2.1. CTAS Level

Based on the results of this study, the majority of patients assessed at the Emergency Department (ED) were classified into the yellow triage category, which corresponds to CTAS level 3 (urgent), followed by the red category (level 2, emergent) and the green category (level 4, less urgent). This distribution indicates that most patients presented with conditions requiring prompt evaluation and intervention, although not in an immediate life-threatening state. These findings illustrate how the CTAS system functions in prioritizing patients according to clinical urgency, ensuring that care delivery is proportional to the severity of their condition.

This pattern is consistent with the findings of Yoelia Nur Allif et al. (2024), who reported that most ED patients were categorized into CTAS level 3, corresponding to the yellow triage category, with an average waiting time of less than 30 minutes, reflecting moderate emergency conditions that allow timely clinical intervention. Furthermore, a study by Wilastri et al. (2025) at RSU Siaga Medika Purbalingga found that most patients demonstrated low to moderate Early Warning Score (EWS) values. Although that study did not apply CTAS directly, the generally stable physiological profiles of patients upon arrival mirror the clinical characteristics typically associated with the yellow triage category (CTAS level 3) in the present study.

In addition, Yeni Devita (2023) emphasized that the accuracy of CTAS classification is significantly influenced by triage nurses' competence, including their knowledge, assessment skills, and workload conditions. These factors are crucial in ensuring precise categorization, particularly for patients in the yellow triage category (CTAS level 3), which requires rapid and accurate clinical judgment during the initial assessment.

From the researchers' perspective, the distribution of CTAS categories in this study suggests that the triage system implemented in the ED of RSUD Umar Wirahadikusumah is functioning effectively in identifying patient priority needs. However, the predominance of patients in the yellow triage category (CTAS level 3) requires heightened vigilance, as these patients may experience clinical fluctuations that could progress to instability if not monitored carefully. Effective triage requires the ability to rapidly distinguish ambiguous symptoms, integrate clinical observations, and incorporate objective physiological assessments such as the NEWS score to minimize the risk of delayed intervention.

These findings highlight the importance of continuous evaluation of triage accuracy. Misclassification may adversely affect patient flow, patient safety, and resource allocation within the ED. Therefore, strengthening nurses' clinical competence, conducting routine internal audits,

and integrating evidence-based assessment tools represent strategic measures to enhance the quality and safety of emergency care.

3.2.2 NEWS Score

Based on the findings of this study, most patients in the ED of RSUD Umar Wirahadikusumah were categorized as having low NEWS scores, followed by a moderate proportion in the medium-risk category and a smaller proportion in the high-risk category. This distribution suggests that the majority of patients presented in a physiologically stable condition, although continuous clinical observation remained essential to detect potential deterioration. The NEWS system evaluates key physiological parameters, including blood pressure, respiratory rate, body temperature, pulse rate, level of consciousness, and oxygen saturation, thereby providing an objective representation of a patient's clinical risk.

These results are consistent with the study by Wilastri et al. (2025), which reported that most ED patients exhibited low EWS scores, indicating relative physiological stability upon arrival. Romero-Brufau et al. (2021) further emphasized the high predictive validity of NEWS in identifying early clinical deterioration, particularly in the dynamic environment of the emergency department. Supporting this, Yahya et al. (2020) found that patients with high NEWS scores have a significantly increased risk of mortality within the first 24 hours of treatment compared to those with lower scores. Additionally, Sholichin et al. (2021) demonstrated that integrating NEWS into routine clinical assessment enhances nurses' responsiveness and accuracy in responding to emergency situations.

From the researchers' perspective, the distribution of NEWS scores in this study highlights the strategic importance of NEWS as part of the clinical decision-making process in emergency care. Beyond serving as an objective physiological assessment tool, NEWS helps clinicians identify patients with hidden risks who may appear clinically stable during initial triage. Consistent application of NEWS can therefore improve risk classification accuracy, refine triage decision-making, and reduce the likelihood of delayed interventions, particularly for patients whose conditions may deteriorate rapidly.

Moreover, integrating NEWS with continuous monitoring systems and conducting regular audits of physiological assessments may strengthen patient safety practices, enhance service flow, and increase overall responsiveness in the emergency department. These measures are crucial to ensure that patient care aligns with evidence-based standards and supports early recognition of clinical deterioration.

3.2.3. Correlation Between CTAS Level and NEWS Score

Based on Spearman's rank correlation test, this study demonstrated a statistically significant association between CTAS and NEWS ($r = 0.184$; $p < 0.001$). However, the correlation was very weak, indicating that an increase in CTAS category based on color classification corresponding to urgency levels is not always accompanied by an increase in physiological risk as measured by NEWS. These findings highlight a gap between clinical triage and objective physiological assessment in emergency situations.

This discrepancy is also reflected in the distribution of triage accuracy, where overtriage (50.8%) occurred more frequently than undertriage (20.2%), while only 29.0% of patients were classified appropriately. The high proportion of overtriage indicates a more cautious approach by healthcare providers, whereas the presence of undertriage represents a critical concern where patients with higher physiological risk may not receive timely prioritization. Importantly, the majority of undertriaged patients required hospitalization, reinforcing that their actual clinical

condition was more severe than initially assessed. Undertriage is particularly concerning, may delay emergency interventions and increase the risk of clinical deterioration.

The weak correlation can be explained by fundamental differences between CTAS and NEWS. CTAS relies on clinical assessment, including chief complaints, observable symptoms, and perceived risk of deterioration, whereas NEWS is based on objective physiological parameters. In accordance with Indonesian Ministry of Health Regulation No. 47 of 2018, triage prioritization is conducted through a rapid initial assessment, which may not fully capture early physiological instability. Conversely, NEWS enables the early detection of subtle physiological changes that may not yet be clinically apparent.

Several contributing factors may explain this inconsistency, including high workload in the emergency department, incomplete initial clinical data, and variations in nurses' competence and experience. These factors may lead to subjective decision-making and inconsistencies in triage categorization, as supported by Devita (2022) and Ajartha (2023), who identified workload, training, and resource limitations as key determinants of triage accuracy.

The findings of this study are consistent with previous research. Wilastri et al. (2025) reported that higher EWS scores are generally associated with increased clinical urgency, although not always in a linear manner. Similarly, Nielsen et al. (2020) emphasized that early warning systems are effective in identifying deteriorating physiological conditions that may not be detected through initial clinical observation.

This study contributes to the existing literature by integrating correlation analysis with triage accuracy evaluation (undertriage and overtriage) and linking these discrepancies to patient outcomes. This approach offers a more comprehensive perspective on how differences between subjective clinical assessments and objective physiological assessments influence triage decision-making in real-world emergency settings.

From the researchers' perspective, the weak yet significant correlation indicates that CTAS and NEWS assess different but complementary dimensions of patient severity. CTAS reflects clinical urgency based on presented symptoms, while NEWS measures physiological instability. Therefore, integrating these two tools is crucial for improving triage accuracy, reducing misclassification, and enhancing patient safety. Strengthening clinical documentation, optimizing workflows, and enhancing staff competence through structured training are recommended to support effective implementation and improve the overall quality of emergency care.

4. Conclusions

This study aimed to determine the relationship between the Canadian Triage Acuity Scale (CTAS) and the National Early Warning Score (NEWS) levels among patients presenting to the Emergency Department of Umar Wirahadikusumah General Hospital. The results showed that the majority of patients were classified into the yellow triage category, which corresponds to CTAS level 3 (urgent), indicating moderate clinical urgency requiring prompt intervention. Similarly, the majority of patients had low NEWS scores, reflecting a generally stable physiological condition upon arrival, although some patients with moderate to high scores highlight the importance of continuous monitoring. CTAS and NEWS assessments were performed within the recommended timeframe (<5 minutes), indicating an effective early evaluation process aligned with national emergency care standards. The significant yet very weak positive correlation identified between CTAS and NEWS ($r = 0.184$; $p < 0.001$) suggests that increased clinical urgency tends to be associated with increased physiological risk, although this relationship is neither strong nor consistent. This inconsistency is further supported by the distribution of triage accuracy, where overtriage occurred more frequently

than undertriage, and only a portion of patients were classified appropriately. Overtriage reflects a more cautious approach in prioritizing patients, whereas undertriage indicates a more critical issue, as patients with higher physiological risk may not receive timely interventions, potentially increasing the risk of clinical deterioration. This pattern reflects the differing conceptual foundations of the two tools: CTAS emphasizes clinical presentation and potential risk, whereas NEWS focuses on objective physiological indicators. This study contributes to existing knowledge by confirming that CTAS and NEWS measure distinct yet complementary domains in assessing patient severity. The combined use of both tools may improve the accuracy of triage decisions, support the early detection of condition deterioration, and enhance the safety and efficiency of emergency care delivery. Limitations of this study include its single-site design and cross-sectional approach, which limit generalizability and do not allow for the assessment of changes in patient condition over time.

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