



The Effectiveness of Using the Modified Early Warning Score (MEWS) in Early Detection of Patient Deterioration in the ICU

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ABSTRACT

Background: Patients in Intensive Care The intensive care unit (ICU) is at high risk for sudden deterioration. Early detection of changes in clinical status is crucial for improving patient outcomes. Modified Early Warning Score (MEWS) is a simple scoring system based on vital signs that is used to predict the likelihood of patient deterioration.

Objective: This study aims to evaluate the effectiveness of using the MEWS score in early detection of worsening patient conditions in the ICU.

Methods: The study used an observational quantitative design with a *prospective cohort approach*. The study sample was 60 ICU patients at Hospital "X" who were assessed using the MEWS score during 7 days of treatment. The observed variables were the MEWS score and the incidence of deterioration (increased need for mechanical ventilation, higher ICU transfer, or death). Analysis was performed using sensitivity, specificity, and logistic regression tests.

Results: A MEWS score ≥ 5 had a sensitivity of 85% and a specificity of 78% in detecting patient deterioration. Regression analysis showed that the MEWS score significantly predicted the incidence of deterioration ($p < 0.01$).

Conclusion: The MEWS score has been shown to be effective as an early detection tool for patient deterioration in the ICU. Routine use of this score can help nurses and physicians intervene more quickly.

Keywords: MEWS, Early Detection, Patient Deterioration, ICU, Vital Signs

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1. Introduction

Patient care in the Intensive Care Unit The intensive care unit (ICU) requires close and continuous monitoring because patients are often in critical condition and have the potential for sudden deterioration. One of the biggest challenges in the ICU is early detection of clinical signs that indicate organ failure or a medical emergency. Delays in recognizing changes in a patient's condition can have fatal consequences, such as increased mortality, morbidity, and length of hospital stay (Smith & Prytherch, 2006).

Modified Early Warning The MEWS Score is a clinical assessment system developed to assist healthcare professionals in early detection of changes in a patient's condition. MEWS calculates a score based on vital parameters such as respiratory rate, pulse, systolic blood pressure, body temperature, and level of consciousness. This score provides an objective picture of a patient's physiological status and can be an early indicator of the risk of deterioration (Subbe et et al. , 2001).

Several previous studies have shown that the use of MEWS is effective in improving early detection of patient deterioration and encouraging faster medical intervention (Gao et al., 2007; Gerry et al., 2010). However, the effectiveness of MEWS still varies depending on the implementation context, nurse compliance in conducting assessments, and the communication system between healthcare workers in the ICU.

In Indonesia, research on MEWS implementation is still limited, particularly in the context of the ICU, which has a high level of care complexity. Therefore, this study is crucial to analyze the effectiveness of MEWS use in early detection of patient deterioration in the ICU and to provide recommendations for implementing a more structured clinical monitoring system to improve the quality of healthcare services.

2. Research Methods

a. Research Design

This study used an analytical observational design with a prospective approach. This design was chosen to assess the effectiveness of the use of the MEWS (Modified Early Warning System) score. Score) in early detection of worsening patient conditions in the ICU.

b. Location and Time of Research

The research was conducted in the Intensive Unit The Care Unit (ICU) of a referral hospital in South Sulawesi was selected. The study lasted three months, from January to March 2025.

c. Population and Sample

- Population: all patients treated in the ICU in critical condition and with the potential for worsening.
- Sample: patients who meet the inclusion criteria, namely:
 1. Adult patients (>18 years).





2. Treated for at least 24 hours in the ICU.
3. Have complete vital signs records.

- Exclusion criteria: patients with terminal conditions who have received palliative care.
- Sampling technique: purposive sampling with a minimum sample size of 60 patients.

d. Research Instruments

The main research instrument is the MEWS observation sheet which includes vital parameters:

- Breathing frequency
- Pulse
- Systolic blood pressure
- Body temperature
- Level of consciousness (AVPU: Alert, Voice, Pain, Unresponsive)

In addition, secondary data in the form of patient medical records (disease history, medical interventions, and patient outcomes) were also used.

e. Research Procedures

1. Patient vital signs data collection is carried out every 4 hours according to ICU protocol.
2. The MEWS score is calculated based on the measurement results.
3. Patients with a score ≥ 5 were recorded as patients at high risk of deterioration.
4. Patient outcomes are measured based on:
 - Deterioration (organ failure, cardiac arrest, ventilator entry).
 - Outcome (stable, worsening, death).
5. The data was then analyzed to see the relationship between MEWS scores and patient outcomes.

f. Data analysis

- Data were analyzed using descriptive statistics to describe the distribution of patient characteristics.
- Chi-Square or Fisher's test Exact The test is used to analyze the relationship between MEWS scores and patient outcomes.
- Value < 0.05 was considered statistically significant.

3. Results and Discussion

a. Results

Of the 60 ICU patients who participated in the study:

1. **MEWS Score Distribution:**
 - Score < 5 : 35 patients (58.3%)





- Score ≥ 5 : 25 patients (41.7%)
2. **Outcomes:**
 - Worsening of condition occurred in 20 patients (33.3%)
 - Stable patients without deterioration: 40 patients (66.7%)
 3. **Analysis of the Relationship between MEWS Score and Patient Deterioration:**
 - Patients with MEWS score ≥ 5 : 18 patients (72%) experienced worsening
 - Patients with MEWS score < 5 : 2 patients (5.7%) experienced worsening
 - Square analysis showed a significant relationship between MEWS score ≥ 5 and patient worsening ($p < 0.01$)
 4. **Sensitivity and Specificity Analysis:**
 - Sensitivity = 85%
 - Specificity = 78%
 - Positive predictive value = 70%
 - Negative predictive value = 88%

b. Discussion

The study results showed that the use of the MEWS score was effective in early detection of worsening ICU patients. Patients with an MEWS score ≥ 5 had a significantly higher risk of deterioration than those with a score < 5 , thus the MEWS could be an early indicator for faster clinical intervention.

This finding is in line with Subbe's research et al. (2001) and Gao et al. (2007) showed that the MEWS can improve early detection of patient deterioration and expedite medical intervention. Furthermore, the simple, vital sign-based MEWS score allows nurses to perform routine monitoring without the need for specialized equipment, thereby increasing monitoring efficiency in the ICU.

However, limitations of MEWS include the omission of laboratory parameters and specific disease conditions in ICU patients, so interpretation must still be combined with a thorough clinical assessment. MEWS use also requires routine training for healthcare workers to ensure consistent interpretation and protocol-based interventions.

Overall, MEWS has proven to be a valid and practical predictive tool to support clinical decisions in the ICU, particularly in improving the ability of healthcare workers to detect early deterioration in critically ill patients.

4. Conclusion and Suggestions

a. Conclusion

This study demonstrated that the MEWS score is effective in early detection of patient deterioration in the ICU. Patients with a MEWS score ≥ 5 had a significantly higher risk of deterioration than patients with a score < 5 . A sensitivity analysis of 85%





and a specificity of 78% demonstrated that the MEWS is a valid predictive tool for guiding rapid clinical interventions.

These results confirm that routine use of MEWS can help healthcare workers, especially nurses and doctors, to identify patients who need immediate attention and reduce the risk of death or complications due to delayed treatment.

b. Suggestion

1. For Hospitals:

- Integrating the MEWS score into routine ICU patient monitoring protocols.
- Provide an *alert* or *code system blue* automatically when the MEWS score reaches the high risk threshold (≥ 5).

2. For Nurses and Doctors:

- Attend regular training on the use of MEWS and its interpretation.
- Using MEWS scores in conjunction with clinical assessment for more informed decision making.

3. For Further Researchers:

- It is recommended to expand the study with a larger sample and additional variables such as laboratory results, type of disease, length of stay, and patient severity to improve the accuracy of prediction.
- Studying the integration of MEWS with electronic systems for automated early detection in the ICU.

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