

Original Article

The Role of The National Early Warning Score (NEWS) in Identifying Critically Ill Patients at Risk of Mortality in Nigeria. A Retrospective Record Review

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Abstract

Background: Clinical deterioration in critically ill patients is a common phenomenon that can occur several hours before an adverse outcome. Early detection of subtle changes in vital signs, such as alterations in pulse rate and blood pressure, is crucial for preventing adverse events. However, these are not often recognized early enough to prompt quick intervention. The use of warning scores or assessment systems in the management of the critically ill in Nigeria has not been well evaluated. We assessed the association between the National Early Warning Score (NEWS) system and outcomes particularly mortality among the critically ill at the Jos University Teaching Hospital (JUTH), Nigeria.

Methodology: This study is a retrospective study involving adults admitted to the medical and surgical wards between January 2021 and July 2021. The records of all patients admitted to inpatient care at JUTH during a 6-month period were reviewed. Patient medical records were used to obtain data such as socio-demographics, and vital signs, which were used to compute the NEWS variable, diagnosis, length of stay, outcomes, and complications. Patients were classified as low, medium, and high-risk based on their NEWS scores within the first 24 hours of admission and 24 hours prior to the outcome of interest (death or discharge). The study received ethical approval from the human research and ethics committee at JUTH.

Results: A total of 405 patients were included in this study. Patients with low, medium, and high-risk NEWS scores within the first 24 hours of admission, had an 11.1%, 9%, and 17% chance of death respectively. In the NEWS score high-risk group 24 hours prior to outcome (death or discharge), the risk of mortality increased to 20.6% and there was a four-fold increase in odds of death.

Conclusion: Our results showed that the NEWS score predicted outcome and may suggest that the implementation of the NEWS score as a routine tool for monitoring inpatients at the Jos University Teaching Hospital could help to detect patients at risk of adverse events.

Keywords: National Early Warning Score; NEWS; Critically Ill; Risk of Mortality; Nigeria.

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Quick Response Code:



Introduction

Clinical deterioration in critically ill patients is a common phenomenon that can occur several hours before an adverse outcome. Early detection of subtle changes in vital signs, such as alterations in pulse and blood pressure, is crucial in preventing adverse events. However, these are not often recognized early enough to prompt quick intervention. This increases the chances of adverse events occurring.

To address this issue, several scoring systems have been developed with the aim of identifying patients at risk of deterioration before it occurs. One such scoring system is the National Early Warning Score (NEWS), which uses bedside vital signs to predict clinical deterioration in critically ill patients.^[1] When fully implemented, the NEWS system has been shown to prevent mortality from sepsis and reduce unplanned ICU admissions.^[2] The NEWS2 scoring system measures six physiological parameters, including respiration rate, oxygen saturation, systolic blood pressure, pulse rate, level of consciousness, and temperature. A score of 0, 1, 2, or 3 is allocated to each parameter, with a higher score indicating that the parameter is further from the normal range and should trigger a response.^[3]

In Nigeria, inpatient mortality rates range from 7%- 31% among different classes of patients. However, most studies have only evaluated mortality patterns among patients and not predictors of inpatient mortality.^[4,5] The use of warning scores or assessment systems in the management of the critically ill in Nigeria has not been well evaluated. In this study, we aim to evaluate the relationship between the NEWS score and the risk of adverse outcomes and to determine if the NEWS score at presentation is associated with the outcome at the end of admission. Additionally, we will determine if the NEWS score 24 hours before discharge or demise is related to the outcome. Based on our findings, we will make a case for the implementation of the NEWS score as a routine tool for monitoring inpatients at the Jos University Teaching Hospital.

Materials and Methods

This was a retrospective study that aims to assess the effectiveness of the National Early Warning Score (NEWS) system in identifying patients at risk of deterioration at the Jos University Teaching Hospital (JUTH) in Nigeria. The study involved all adults admitted to the medical and surgical wards between January 2021 and July 2021. Patients than 18 years and those admitted to the obstetrics and gynaecology wards were excluded.

Medical records of all patients admitted to inpatient care at JUTH during the 6-month period were obtained and reviewed. The information recorded for this study included demographic data, diagnosis at index admission, duration of stay on admission, and which ward the patient was admitted to. They also noted if, at any time during the inpatient admission, the patient was escalated to the High Dependency Unit (HDU) or Intensive Care Unit (ICU). This data was documented using a Glide app developed by the investigators to capture the data. The vital signs were recorded and recorded, with the first vital sign at presentation considered for calculation of the NEWS score at admission and the last vital signs documented 24 hours before the outcome of interest (discharge or demise).

A NEWS score calculator was designed using Excel to automatically calculate the NEWS score when the vital signs were inputted. A nurse with 3 years of experience using the NEWS scoring system in a busy NHS hospital blindly validated the score, and there was 100% congruence between the calculator and the nurse's figures. The NEWS score was stratified into three risk categories based on the score: low, medium, and high risk. Low risk for those who score less than 4, medium for those who score 3 in any one parameter or 4-7, and high was greater than 7. The score that was captured for the presentation was the first readings taken at the presentation while the score for 24 hours prior to discharge or demise was taken as the last vital sign recorded for that day. The study received ethical approval from the human research and ethics committee at JUTH.

Statistical analysis

The data was gathered and organized in an Excel file, and then cleaned and analyzed using SPSS version 20. Descriptive statistics such as frequency tables and measures of central tendency were generated for all variables. Categorical variables were analyzed using chi-square tests and non-parametric data were analyzed using the Mann-Whitney U test. The study also used the area under the curve (AUC) to determine the discriminatory ability of the National Early Warning Score (NEWS) in predicting mortality in the different risk categories. Furthermore, binary logistic regression was used to analyze the predictive ability of the low, medium, and high-risk scores for mortality.

Results

"A total of 405 patients' data was analyzed in this study, with males making up 50.4% of the admissions. The mean (SD) age of the patients studied was 46.7 ± 17.3 years. Out of the 405 patients, 54 (13.3%) died while 351 (86.7%) were discharged from the hospital. Forty-two percent of the patients were classified as surgical patients and 55.8% were medical patients. The study also evaluated the patient's risk of death using the National Early Warning Score (NEWS) at presentation and 24 hours prior to the outcome. The study found that when evaluating the patient's risk of death within the first 24 hours using the NEWS, patients with low-risk scores had an 11.1% chance of death and a 13.7% chance of not dying, with an odds ratio of 0.79 (95% CI 0.26-1.99) and a P-value of 0.607. Patients with medium-risk scores had a 25.9% chance of death and a 40.2% chance of not dying, with an odds ratio of 0.52 (95% CI 0.27-0.99) and a P-value of 0.048. Patients with high-risk scores had a 63% chance of death and a 46.2% chance of not dying, with an odds ratio of 1.98 (95%CI 1.06-3.78) and a P-value of 0.023. We found that when evaluating the patient's risk of death or discharge 24 hours prior to the outcome (discharge or death), those with low-risk scores had a 1.9% chance of death and a 14% chance of discharge, with an odds ratio of 0.12 (95% CI 0.01-0.86) and a P-value of 0.035. Patients with medium-risk scores had an 18.5% chance of death and a 38.7% chance of discharge, with an odds ratio of 0.36 (95%CI 0.18-0.74) and a P-value of 0.005. Patients with high-risk scores had a 79.65% chance of death and a 47.3% chance of discharge, with an odds ratio of 4.36 (95% CI 2.18-8.73) and a P-value of <0.001.

Additionally, the study found that the median (IQR) NEWS score at presentation for patients who died was 8(5-9) while it was 6(5-8) for those who were discharged alive, with a P-value of 0.002. The median score 24 hours prior to the outcome (discharge or death) was 9(7-13) for those who died and 6(5-8) for those who were discharged home. The mortality rate at the end of inpatient care was 13.3%. The AUC for the score at presentation in discriminating in-hospital mortality was 0.604 (95% CI=0.520-0.688 p-value=0.014) and the AUC for the NEWS score 24 hours before the last day of inpatient care in discriminating in-hospital mortality was 0.52 (95% CI=0.43-0.62 p-value=0.593)."

Discussion

In this retrospective study of 405 inpatients at a tertiary institution in Nigeria, we aimed to investigate the potential of the National Early Warning Score (NEWS) as a predictor of mortality in patients admitted into the hospital for inpatient care. The NEWS score is a widely used early warning system for detecting clinically deteriorating patients and has been shown to be effective in reducing unplanned ICU admissions and mortality in several studies.^[6,7,8]

Our study found a significant difference in mortality between those with low, medium, and high-risk NEWS scores 24 hours before death occurred. Patients with a medium or high-risk NEWS score were found to have a two-fold and three-fold increase in odds of in-hospital mortality, respectively, compared to those with a low-risk score. These findings are consistent with previous studies that have reported an increased risk of inpatient mortality among patients who had a medium and high-risk NEWS score.^[7,8,9]

Additionally, our study found that the median NEWS score in the first 24 hours of the presentation was significantly different between those who eventually died and those who survived. Similarly, the median

Davwar PM, et al - The Role of the National Early Warning Score (News) in Identifying Critically Ill Patients NEWS score 24 hours prior to demise or discharge between those who died and those who were alive was also significantly different. Patients who were classified as high-risk at presentation also had a two-fold increase in the risk of death while the risk increases to four-fold 24 hours prior to death or discharge. The AUC of the NEWS score was able to discriminate between patients who survived and those who died, similar to what has been previously reported among Swedish inpatients.^[6]

The goal of the NEWS score is to improve the detection and response to clinically deteriorating patients and to ensure rapid response to prevent peri-arrest or unplanned ICU care ^[10] Our study, being a retrospective study in a setting where this scoring system is not currently implemented, gives us insight into the performance of the score in predicting mortality. This endpoint is usually difficult to determine in prospective studies since the whole goal of the score is to prevent deterioration. These findings make this study an important case for the introduction of the NEWS score in our facility since it has shown that it has the ability to identify potentially deteriorating patients who proceed to death.

Changes in the vital signs of patients have been shown over the years to precede clinical deterioration, peri-arrest, and mortality. Early warning scores have consistently been shown to predict deterioration and in England and many other countries in Europe, this scoring system has been integrated into the acute and emergency care of patients. ^[11,12] However, in Nigeria and in our hospital, this is not the case yet. Although the score was not intended to predict mortality, its role is to identify deteriorating patients. We have been able to demonstrate that it can predict mortality and should be used to identify patients with potential for deterioration and actions taken to prevent further deterioration and death.

Since all the parameters required to determine the NEWS score are currently captured in the regular vital signs which are routinely recorded in our hospital, it is important to introduce this point-based risk stratification and implement its triggers based on the scale. The use of electronic methods for recording the NEWS score has been shown to improve the speed and reduce time wastage. ^[13] However, further studies are needed to determine the optimal method of implementation in our setting.

In conclusion, our study provides evidence that the NEWS score has good predictive capabilities on in-hospital mortality in patients admitted to a hospital ward. The results of our study indicate that the NEWS score can be used to predict in-hospital mortality in a mixed patient population. The implementation of the NEWS score in our facility could aid in identifying potentially deteriorating patients and prevent further deterioration and death. Further studies, including randomized controlled trials, are needed to determine the optimal method of implementation in our setting and the potential impact on patient outcomes.

What is already known on this topic?

1. NEWS score has previously been demonstrated in the Western world to predict patients that will deteriorate
2. It also helps reduce unplanned ICU admission.

What this study adds

1. This study shows that in African patients high NEWS increases the risk of death.
2. And predicts those patients with high NEWS scores will die on admission, if necessary, actions are not taken to prevent deterioration.

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