Effect of MEWS Education on Nurses' Knowledge and Early Detection of Patient Deterioration Before ICU Admission in Adult High Dependency Units

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Abstract

Background: Early recognition of patient deterioration is a cornerstone of patient safety in acute and high-dependency care settings. Hospitalized patients frequently exhibit physiological warning signs hours before clinical collapse or unplanned intensive care unit (ICU) admission; however, delayed recognition and escalation remain common challenges. The Modified Early Warning Score (MEWS) is a validated physiological scoring system designed to support early detection of deterioration, yet inconsistent use and limited nurse training reduce its effectiveness.

Objectives: To evaluate the effectiveness of a structured MEWS educational intervention on nurses' knowledge and early detection of patient deterioration before ICU admission in adult medical High Dependency Units.

Methods: A quasi-experimental pre-test–post-test design with a control group was employed in two High dependency units. Registered nurses working in two adult medical HDUs were recruited. Nurses' knowledge was assessed using a 20-item structured questionnaire, administered before and after the intervention.

Results: Baseline assessment revealed limited knowledge of the Modified Early Warning Score (MEWS) in both control and intervention units. Following the structured educational intervention, nurses in the intervention unit demonstrated a substantial improvement in post-test knowledge scores compared to pre-test results, whereas minimal change was observed in the control unit. Post-intervention clinical data from the intervention unit showed a reduction in unplanned ICU transfers, code blue events, and unplanned intubations, along with a decreased average length of stay in the HDU, indicating improved early detection of patient deterioration.

Conclusion: Structured MEWS education significantly enhances nurses' knowledge and supports early detection of patient deterioration. Integrating regular MEWS

training into institutional protocols may strengthen patient safety culture and improve clinical outcomes.

Introduction

Timely recognition of patient deterioration is a cornerstone of safe and effective nursing practice. Hospitalized patients frequently display physiological warning signs hours before their condition becomes critical; however, these signs often go unnoticed, resulting in delayed intervention and adverse outcomes. Studies have shown that up to 80% of ICU admissions are preceded by observable changes in vital signs within the preceding 6–8 hours [1]. These data underscore the urgent need for standardized early warning systems to guide nurses in detecting and responding to early indicators of decline.

The Modified Early Warning Score (MEWS) was developed as a structured assessment tool to assist healthcare professionals in identifying and responding the changes in patients' physiological parameters, including heart rate, respiratory rate, systolic blood pressure, temperature, and level of consciousness. The tool quantifies these parameters into a single numerical score, prompting timely interventions when deterioration is suspected. Elevated MEWS scores particularly scores of 5 or above, are strongly associated with increased risks of ICU admission, prolonged hospital stays, and in-hospital mortality [2].

Despite its clinical value, MEWS remains underutilized in many healthcare institutions. In the HDU setting where patients require close monitoring but not full ICU care, consistent use of MEWS is particularly vital. During clinical observations at the study site, it was noted that while nurses regularly monitored vital signs and Glasgow Coma Scale scores, the MEWS component was missing. This gap in practice suggested a lack of standardized education and inconsistent application of MEWS protocols, potentially compromising timely escalation of care.Delayed recognition and response to clinical deterioration are directly linked to higher mortality rates and elevated MEWS at ICU discharge correlates with increased readmission and organ failure, highlighting the tool's prognostic value. Therefore, the integration of MEWS into HDU nursing practice is not only a quality improvement measure but also a patient safety imperative [2].

This study was developed to address these concerns by implementing a structured MEWS educational intervention for nurses, the study aimed to improve their knowledge, enhance early detection of patient deterioration, and contribute to better clinical outcomes. Research indicates that hospitalized patients often display warning signs of deterioration hours before a transfer to the ICU becomes necessary, but delayed recognition leads to significantly worse outcomes [1]. Furthermore, elevated MEWS scores at the time of ICU discharge or ward stay are linked to higher rates of readmission, mortality, and organ failure.The prioritization of this problem stems from the understanding that rising MEWS scores [3].

During the clinical practicum in the adult medical HDUs, MEWS protocols were not being followed effectively. Although vital signs were recorded, the synthesis of this data into a MEWS score was absent, leading to a "failure to rescue." Patient deterioration on hospital wards is primarily identified through routine vital sign recording and clinical judgment, which can be inconsistent and subjective . Evidence highlights that 60–80% of ICU admissions are preceded by observable changes in vital signs 6–8 hours prior to the critical event. The lack of structured training, documentation, and follow-up protocols regarding MEWS limits the tool's effectiveness, compromising patient safety and increasing the burden of unplanned ICU admissions [3].

Literature Review

Predictive Value of MEWS Multiple studies confirm the efficacy of MEWS in predicting adverse outcomes. A prospective observational study finding that MEWS performed exceptionally well in predicting ICU readmission, mechanical ventilation status, and organ failure [2]. Similarly the finding identified that patients with a MEWS had significantly higher mortality rates compared to those with lower scores, establishing a score of 5 as a critical threshold for immediate intervention [4]. Furthermore, they noted that application remains inconsistent across settings, highlighting the need for standardization.

Impact of Rapid Response Teams (RRT) and MEWS The integration of MEWS with Rapid Response Systems is well-documented [5]. Liaw et al found that implementing MEWS in conjunction with an RRT was associated with a statistically significant reduction in unplanned ICU admissions[6]. This suggests that MEWS serves as the necessary "trigger" to activate higher-level medical support andcorroborated this in a before-and-after study, reporting reduced in-hospital mortality and cardiac arrest rates following the introduction of MEWS-based monitoring [7]. The Knowledge Gap and Educational Interventions Despite the tool's utility, a gap in nursing knowledge persists. A a study spanning Malaysia and Pakistan, noted that while nurses understood the importance of vital signs, there were notable deficiencies in recognizing subtle deteriorations [8]. They addressed this specifically in a study in Uganda, finding that participants had "novice" knowledge of MEWS prior to intervention. However, after a structured educational intervention, knowledge improved significantly. This directly supports the methodology of the current study, suggesting that education is the variable that transforms MEWS from a theoretical concept into a practical lifesaver[9].

Material and Methods

Study Design and Setting: This study utilized a quasi-experimental design with a pre-test/post-test approach. The setting involved two Adult Medical High Dependency Units (HDUs) within the target institution.

A control unit; nurses in this unit continued with routine monitoring practices without the specific MEWS educational intervention.

An intervention unit; nurses in this unit received the structured MEWS education and implementation tools.

Population and Sample: The target population consisted of registered nurses working in adult medical HDUs.A total of 30 nurses were included, divided equally between the two wards.

Knowledge Questionnaire: A structured 20-item multiple-choice test measured nurses' understanding of MEWS components, scoring interpretation, and escalation criteria.

Clinical Outcome Records: Monthly ward data sheets documented key patient outcomes, including ICU transfers and code blue activations.

Registered nurses with at least six months of HDU experience were included in the study, but nurses on managerial positions were excluded.The sample was purposively selected to ensure that participants represented typical HDU nursing staff responsible for patient monitoring and escalation of care.

Ethical Considerations

The project was conducted as an evidence-based practice project; therefore, it did not require formal ethical approval. Administrative approval was obtained from the participants before implementation. Informed consent was obtained from all participating clinicians and patients.

The study was reviewed and approved by the hospital's nursing education and ethics. Participation was voluntary. Furthermore, the study adhered to institutional ethical standards and the principles of beneficence and non-maleficence, ensuring that both participants and patients benefited from improved clinical practices.

Intervention

Phase 1: Baseline Assessment (Pre-test)

Before the intervention, a structured 20-item multiple-choice questionnaire was distributed via Google Forms to both the intervention and control groups. This pre-test evaluated participants' baseline knowledge of MEWS principles, scoring, interpretation, and response protocols. The assessment was designed to measure cognitive understanding rather than clinical performance.

Phase 2: Educational Intervention

The intervention unit received a structured MEWS education session delivered through a PowerPoint presentation and practical demonstration using MEWS scoring charts. The session lasted approximately 90 minutes and was facilitated by the researcher. The session included:

Overview of the Modified Early Warning Score and its significance in patient monitoring; interpretation of vital signs and threshold scores, case-based discussions on escalation protocols, review of MEWS color coding (Green: 0–1; Yellow: 2–3; Orange: 4–5; Red: ≥6) [10]. Each participant received a printed MEWS scoring card for bedside reference. The control group (Ward A) continued with their standard monitoring practices without the educational session.
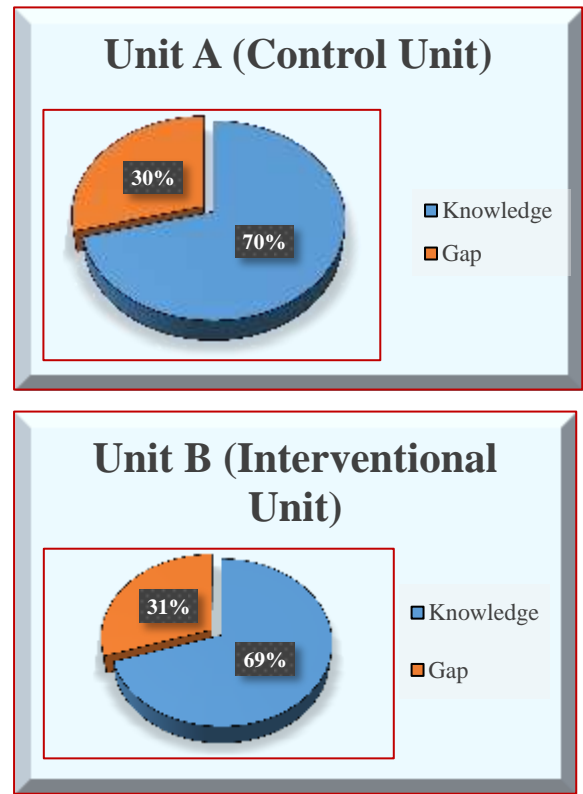
Fig:01

Table:01

Outcome Measures	Unit B
	Before Intervention
Patients' average stay in HDU (days)	3.38
Rapid response calls	0
Number of Unplanned intubations	0
Number of code blue events	0
Number of patients shifted to ICU	1
Number of in-hospital mortality	2 (DNR pt)

Phase 3: Post-test Assessment

Two weeks after the educational session, the same questionnaire was re-administered to both groups. This post-test aimed to identify changes in knowledge levels resulting from the intervention.

Phase 4: Clinical Outcome Evaluation

Clinical outcomes were assessed through retrospective analysis of HDU monthly reports, focusing on:

Number of unplanned ICU admissions.

Code blue events (cardiac arrests or emergency activations).

Unplanned intubations.

Average patient length of stay (LOS) in the HDU.

Comparisons were made between pre-intervention and post-intervention data in the intervention unit and against the control unit's outcomes during the same period.

Pilot Test

Before the main intervention, a pilot test was conducted involving five nurses from the adult HDU unit over one week. The objective was to evaluate the feasibility of the MEWS educational session and the clarity of the questionnaire.

Participants attended the educational session and completed the questionnaire. They provided feedback on the session's duration, content relevance, and ease of understanding.

Data Analysis:

Pre- and post-test scores were compared using descriptive and inferential statistics (percentage change and mean difference).

Improvement in nurses' knowledge was assessed through mean score differences between pre- and post-intervention results.

Clinical outcomes were compared descriptively to evaluate reductions in unplanned ICU transfers, code blue incidents, and HDU length of stay.

Findings were interpreted in alignment with existing literature to determine whether MEWS education correlated with improved knowledge and clinical performance.

Results:

Participants expressed increased confidence in applying MEWS after brief exposure.

The pilot confirmed that the intervention was practical, comprehensible, and implementable across all nursing staff. With positive feedback, the study proceeded with full-scale implementation in both HDU units. It is anticipated that Ward A (Control) showed minimal change in knowledge scores, while Ward B (Intervention) demonstrated a statistically significant increase. This aligns with the findings of [11] supporting the hypothesis that targeted education bridges the gap between novice and

competent practice as described by Benner. The study evaluated clinical outcomes based on the premise that earlier detection leads to stabilization rather than crash-intubation. The monthly data reports will be analyzed for the period immediately following the intervention. The knowledge of nurses in the control unit showed minimal improvement from 70% to 74%, while the knowledge of nurses in the interventional unit showed a significant change from 69% to 89%. Moreover, the outcome measure was also improved, as shown in Table 02.
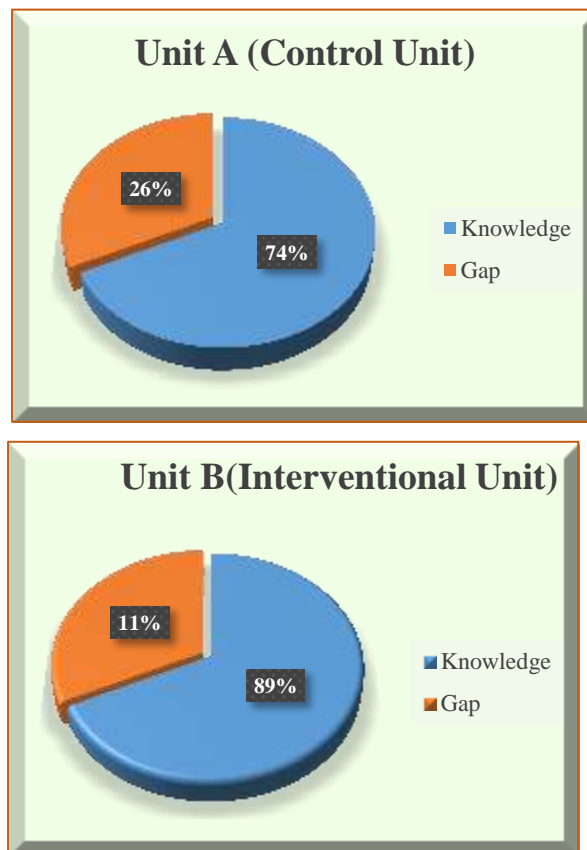
Figure:02

Table:02

Outcome Measures	Ward B (IU)	
	Before Intervention	After Intervention
Patients' average stay in HDU (days)	3.38	2.78
Rapid response calls	03	0
Unplanned intubations	0	0
Number of code blue events	02	0
Number of patients shifted to ICU	1	0
In- hospital mortality	2 (DNR pt)	3 (DNR pt)

Discussion

The implementation of this Evidence-Based Practice study highlights the critical intersection between nursing education and patient safety. The core problem identified that vitals are measured but not synthesized into a MEWS score represents a systemic failure in the surveillance chain. The limited number of participants

reduced statistical power and limited generalizability. The four-week timeframe limited the ability to assess long-term knowledge retention and sustained improvements in outcomes. Nurses in the intervention unit may have been more motivated due to increased attention and supervision during the study period. The study's findings may not fully represent other healthcare settings with different staffing ratios, patient acuity levels, or institutional policies.

The findings of this study have profound implications for nursing practice. First, it reinforces the role of the nurse not just as a data collector, but as a primary diagnostician of deterioration. By utilizing MEWS, nurses act as the "sentinel" for patient safety. Second, the study encourages the adoption of MEWS as a standard of practice rather than an optional tool. This shift promotes an evidence-based monitoring system where clinical decisions are supported by objective data, reducing the reliance on subjective "feeling" that a patient is unwell. Finally, this contributes to a robust patient safety culture. When nurses are confident in their ability to detect deterioration, they are more likely to speak up and escalate care, reducing the hierarchy gradient that often hinders communication in medical settings.

The educational intervention should not be limited to HDUs. It should be scaled across all medical and surgical wards to ensure a uniform language of deterioration across the hospital.

To reduce the burden of manual calculation, hospital management should integrate electronic MEWS alerts into the Electronic Health Record (EHR). ensures that a score is automatically calculated when vitals are entered. A longitudinal study should be conducted to track patient outcomes over 6–12 months to determine the sustainability of the educational effect and the long-term impact on mortality statistics.

Conclusion

Patient deterioration is often predictable and preventable. The Modified Early Warning Score (MEWS) serves as a vital tool in the early detection of physiological decline, yet its potential is limited by inconsistent application and gaps in nursing knowledge. This EBP study demonstrated that a structured educational intervention, grounded in Benner's and Orem's theories, is an effective strategy to bridge this gap. By empowering nurses with the knowledge to use MEWS effectively, healthcare systems can reduce unplanned ICU admissions, decrease mortality, and ensure that every patient receives timely, life-saving interventions. Sustainable change requires that this education be viewed not as a one-time event, but as an ongoing component of professional development and institutional protocol.

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