



Descriptive Study on the Application of Early Warning Systems in Emergency Nursing Practice

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Abstract: This study aims to describe and analyze the implementation of the Early Warning System (EWS) in emergency nursing practice as a mechanism to enhance patient safety and clinical responsiveness. Employing a qualitative descriptive approach through a literature-based study, this research integrates data from peer-reviewed journals, academic reports, and relevant clinical documents published between 2015 and 2025. Data were collected through systematic literature review and analyzed inductively using thematic identification, data reduction, conceptual categorization, and interpretation to obtain a comprehensive understanding of EWS application in clinical settings. The findings reveal that EWS contributes significantly to early detection of patient deterioration, reduction of unplanned ICU admissions and cardiac arrests, and improvement in nurses' clinical judgment and interprofessional collaboration. However, challenges such as limited compliance, alert fatigue, and contextual variations in system effectiveness remain obstacles to optimal implementation. The study highlights the importance of continuous education, system customization, and institutional support to ensure sustainable integration of EWS in emergency care. The results contribute to the theoretical enrichment of patient safety frameworks and offer practical guidance for developing adaptive, evidence-based nursing systems. In conclusion, the application of EWS represents a vital step toward advancing proactive, data-informed nursing practices that strengthen patient safety and professional competence in emergency healthcare environments.

Keywords: Early Warning System, Emergency Nursing, Patient Safety, Qualitative Study, Clinical Monitoring

Introduction

The rapid evolution of healthcare systems and the increasing complexity of patient conditions have heightened the need for proactive monitoring mechanisms to ensure patient safety in emergency nursing practice. The Early Warning System (EWS) has emerged as a critical tool for early detection of patient deterioration through the systematic assessment of physiological parameters. In recent years, the implementation of EWS in emergency nursing has garnered global attention as an evidence-based approach to reducing preventable morbidity and mortality (Burgos-Esteban et al, 2022).

Globally, patient safety remains a top priority in healthcare policy. Adverse events caused by delayed recognition of clinical deterioration continue to pose a significant burden in hospital emergency departments. Studies indicate that up to 66% of in-hospital cardiac

arrests are preceded by physiological abnormalities within 6–8 hours prior to collapse, suggesting a window of opportunity for early intervention (Weigand et al, 2025). The implementation of EWS serves as a structured strategy to address this issue by promoting timely and standardized nursing responses.

In Indonesia and other developing countries, emergency departments often face challenges such as high patient loads, limited staffing, and varying levels of clinical experience among nurses. These factors increase the risk of delayed clinical recognition and intervention (Purnamasari & Aryani, 2020). Therefore, integrating EWS into emergency nursing practice is not only a clinical necessity but also an operational strategy to enhance patient outcomes.

The urgency of implementing EWS is reinforced by emerging trends in AI-assisted monitoring systems, which have demonstrated potential in improving the accuracy and responsiveness of early warning signals Singh et al, (2025). showed that artificial intelligence–driven EWS can enhance nursing interventions in critical care units, leading to faster decision-making and reduced unplanned ICU admissions. These findings highlight the potential for EWS to bridge technological innovation with nursing competence.

Despite its proven benefits, the implementation of EWS in emergency nursing faces several barriers. Nurses' knowledge, attitudes, and perceptions toward the system significantly influence its effectiveness (Triwijayanti, 2024). Research suggests that knowledge gaps and inconsistent adherence to EWS protocols can compromise the reliability of patient monitoring outcomes (Kholis et al, 2020). Thus, continuous education and institutional support are essential for sustainable EWS integration.

Another major challenge involves workload pressures and systemic barriers that limit EWS utilization Petersen et al, (2017) and Wood et al, (2019) identified that heavy workloads, limited collaboration, and skepticism toward scoring systems often hinder the consistent application of EWS protocols. These operational constraints underscore the need for organizational policies that balance workload management with clinical safety practices.

Furthermore, technological dependence without adequate clinical judgment has emerged as a double-edged sword. Overreliance on EWS scores may overlook the importance of nurses' holistic assessment and intuition (Connor et al, 2024). Hence, the integration of EWS must complement, rather than replace, clinical reasoning within the nursing process.

Recent research highlights that EWS implementation fosters stronger interdisciplinary collaboration, particularly between nurses and physicians. Vasconcelos dkk. (2019) and Burns dkk. (2018) reported that EWS improved communication and coordination in emergency care, resulting in faster escalation of care and enhanced patient safety culture. These findings affirm EWS as both a clinical and organizational innovation.

Moreover, EWS adoption aligns with the broader patient safety movement and the WHO's Global Patient Safety Action Plan (2021–2030), which emphasizes proactive risk management and early detection of deterioration. This alignment underscores the relevance of EWS within international healthcare quality frameworks.

In the context of nursing education, EWS provides an empirical foundation for competency-based learning. Studies have demonstrated that educational interventions

significantly improve nurses' knowledge, confidence, and accuracy in clinical assessment (Purnamasari & Aryani, 2020) (Triwijayanti, 2024). Thus, EWS not only serves as a clinical tool but also as a pedagogical mechanism for enhancing professional practice.

Another key dimension is the integration of rapid response teams (RRTs) with EWS protocols. Weigand et al, (2025) demonstrated that such integration reduces cardiac arrests and ICU readmissions by facilitating immediate escalation and intervention. Liaw dkk. (2024) also reported improved patient outcomes through the implementation of modified EWS combined with RRT activation protocols.

Despite these advancements, gaps remain in optimizing EWS implementation, particularly regarding its contextual adaptation to emergency care environments. The variability of patient acuity, limited resources, and time-critical decision-making present unique challenges that demand tailored EWS frameworks (Cidade dkk., 2025). Addressing these gaps is essential for ensuring EWS effectiveness across diverse healthcare settings.

This article aims to provide a descriptive analysis of the application of EWS in emergency nursing practice, identifying its core mechanisms, benefits, and challenges. By synthesizing recent empirical findings, it seeks to illuminate the factors influencing EWS effectiveness, including knowledge, training, collaboration, and organizational support.

The primary goal of this paper is to explore how EWS implementation contributes to improved clinical decision-making and patient safety in emergency care. Through a descriptive lens, this study underscores the system's role in enhancing early detection, optimizing workflow efficiency, and reinforcing interprofessional collaboration.

Theoretically, this study contributes to the understanding of clinical governance and evidence-based nursing practices, while practically, it provides insights for healthcare managers and educators to refine training, monitoring, and policy design. Ultimately, this research aspires to support the creation of safer, more responsive, and patient-centered emergency care environments through the strategic application of EWS.

Methodology

This study employs a qualitative research method with a descriptive approach through a library research design. The qualitative-descriptive paradigm was chosen to provide a deep understanding of the application of the Early Warning System (EWS) in emergency nursing practice. This method allows for the systematic exploration of literature, aiming to identify, interpret, and synthesize the core concepts, challenges, and outcomes associated with EWS implementation. As emphasized by Bingham (2023) and Pratt (2025), qualitative research provides interpretive depth and contextual insight, allowing researchers to analyze complex nursing phenomena within their real-world settings.

The descriptive approach in qualitative inquiry is particularly relevant in healthcare and nursing studies because it focuses on depicting phenomena as experienced by participants or documented in existing studies (Abraham, 2024) (Doyle et al, 2019). This approach aligns with the objective of this article—to explore how EWS is applied in emergency care, emphasizing nurses' knowledge, clinical judgment, and system interactions. According to Baillie, (2019), qualitative descriptive designs are most effective

when the goal is to capture comprehensive descriptions of real-world practices rather than abstract theoretical constructs.

The data sources used in this study consist exclusively of secondary data collected from scholarly materials. These include peer-reviewed journal articles, academic books, research reports, and official documents related to emergency nursing and EWS application. The inclusion criteria were determined based on publication recency (2015–2025), relevance to the EWS implementation framework, and methodological credibility. Studies that lacked methodological rigor or that focused solely on non-emergency settings were excluded. This selection ensured that the data represented both contemporary developments and scientifically validated perspectives (Jimenez et al, 2024) (Togia & Malliari, 2017).

The data collection technique utilized a structured literature search and document analysis process. The literature was retrieved from credible academic databases, such as PubMed, ScienceDirect, and library repositories, using keywords like “Early Warning System,” “emergency nursing,” “descriptive qualitative research,” and “patient safety.” The retrieved materials were then screened based on inclusion criteria, and relevant data were extracted systematically using a review matrix. The library research approach enables a comprehensive synthesis of existing findings and theories without direct field data collection (Bandaranayake, 2024) (Granikov et al, 2020).

The data analysis procedure followed an inductive qualitative process consisting of four stages: (1) theme identification, (2) data reduction, (3) conceptual categorization, and (4) inductive conclusion drawing. Each stage was iterative, involving continuous comparison and refinement to ensure coherence and validity (Bingham, 2023; Vila-Henninger et al., 2022). Thematic analysis served as the core analytical framework, supported by coding techniques that grouped data according to recurring concepts and relationships. According to Kalpokaite and Radivojevic (2018), such a structured and cyclical process enhances transparency and trustworthiness in qualitative data interpretation.

To ensure data validity and reliability, several verification strategies were applied, including source triangulation and conceptual peer review. Triangulation involved cross-verifying data from multiple literature sources to confirm consistency and credibility (Belotto, 2018). Meanwhile, peer review and conceptual validation ensured that interpretations aligned with established theoretical frameworks and previous empirical findings (Fife & Gossner, 2024). Through this approach, the study maintained methodological rigor and minimized interpretive bias. Ultimately, the qualitative-descriptive design through library research provided a valid and accountable method to synthesize contemporary insights on EWS implementation, supporting both theoretical enrichment and practical nursing application.

Result and Discussion

The findings of this study provide a comprehensive overview of how the Early Warning System (EWS) has been implemented in emergency nursing practice across different healthcare contexts. Based on an extensive literature review of the latest empirical studies, several critical themes emerged: the clinical benefits of EWS, its influence on nursing competence, the main challenges in its application, and innovative directions for its optimization. Each of these dimensions contributes to the understanding of EWS as both a patient safety mechanism and a professional nursing tool.

Clinical Benefits of EWS Implementation

Evidence consistently indicates that EWS significantly improves early detection of patient deterioration, reduces unplanned ICU readmissions, prevents cardiac arrests, and lowers mortality rates in emergency settings (Badr et al, 2021) (Liaw et al, 2024) (Singh et al, 2025) (Warren et al, 2021) (Weigand et al, 2025). The introduction of AI-powered systems has further enhanced response times and clinical decision-making (Singh et al, 2025). Studies by Guan et al, (2022) and Mallela (2025) also demonstrated that digitalized and standardized scoring systems such as NEWS2 and MEWS facilitate more accurate triage and improve interprofessional communication, which are essential in fast-paced emergency care.

Influence on Nursing Competence and Professional Role

EWS adoption has proven to strengthen nurses' knowledge, confidence, and sense of responsibility in detecting clinical deterioration (Al-Kalaldehy et al, 2019) (Triwijayanti, 2024). The inclusion of EWS-related education within emergency care training has led to measurable improvements in clinical vigilance and situational awareness (Warren et al, 2021). Furthermore, interprofessional communication and collaboration have been enhanced due to standardized EWS reporting, fostering better teamwork between nurses, physicians, and rapid response units (Penney et al, 2021). However, despite these advances, several studies note that the impact on competence is not uniform and is shaped by contextual variables such as workload, prior experience, and institutional culture (Afacan et al, 2022) (Jensen et al, 2018) (Wood et al, 2019).

Challenges and Limitations in Implementation

The most prominent challenges associated with EWS implementation include non-adherence to protocols, excessive workload, alert fatigue, and limited clinical interpretation of scoring results (Afacan et al, 2022) (Bedoya et al, 2019) (McGaughey et al, 2021) (Wood et al, 2019). Overreliance on numeric scores without integrating holistic clinical judgment has been identified as a potential risk that may delay or misguide clinical responses (Ginestra et al, 2019). Additionally, studies by Xiong et al, (2025) and Bae et al, (2025) highlighted that EWS accuracy decreases in elderly populations and in non-ICU contexts, emphasizing the need for patient-specific calibration and adaptation. These findings collectively underline that EWS should complement—not replace—nursing assessment and intuition.

Innovations and Developmental Recommendations

Recent research underscores the importance of customizing EWS frameworks to enhance sensitivity and specificity. Delphi-based approaches have been proposed to create condition-specific indicators for critical care monitoring (Xiong et al, 2025). Moreover, Gazmuri et al, (2025) demonstrated that modified EWS models with broader clinical criteria and lower activation thresholds outperform conventional versions in response speed and reliability. Continuous education, regular simulation training, and integration with local data systems are also recommended to sustain nurses' proficiency and ensure contextual validity (Jensen et al, 2018) (Warren et al, 2021) (Weigand et al, 2025).

Table 1. below consolidates the key findings, summarizing the primary benefits, barriers, and suggested solutions regarding EWS application in emergency nursing

Aspect	Key Findings	References
Early detection & outcomes	Reduced ICU readmissions, cardiac arrests, and mortality; accelerated nursing interventions	(Badr et al, 2021) (Liaw et al, 2024) (Singh et al, 2025) (Weigand et al, 2025)
Nursing competence	Improved knowledge, confidence, and collaboration	(Al-Kalaldeh et al, 2019) (Penney et al, 2021) (Triwijayanti, 2024)
Implementation challenges	Non-adherence, high workload, alert fatigue, limited prediction in older adults	(Afacan et al, 2022) (Bae et al, 2025) (Bedoya et al, 2019) (Wood et al, 2019)
Recommendations	Continuous training, system modification, digital integration, local validation	(Jensen et al, 2018) (McGaughey et al, 2021) (Warren et al, 2021) (Xiong et al, 2025)

Comparative Analysis with Previous Studies

When compared with earlier findings from the pre-2020 literature, recent studies emphasize greater integration of artificial intelligence and digital technology into EWS design. Traditional manual scoring systems were often criticized for delays and subjective variability (McGaughey et al, 2021) (Wood et al, 2019), while current research highlights the advantages of automation and interoperability (Mallela, 2025) (Singh et al, 2025). However, the persistent challenge remains ensuring nurse engagement, system trust, and real-time adaptability to patient-specific dynamics. This suggests that while EWS efficacy has improved technologically, human and contextual factors continue to determine its ultimate success in clinical environments.

Discussion

The integration of the Early Warning System (EWS) into emergency nursing practice represents a transformative evolution in clinical surveillance and patient safety. The findings indicate that EWS enhances early detection of patient deterioration, facilitates prompt interventions, and significantly reduces cardiac arrest rates, ICU readmissions, and in-hospital mortality (Badrc, 2021) (Liaw et al, 2024) (Singh et al, 2025) (Weigand et al, 2025). From a theoretical standpoint, these outcomes align with Benner's Novice to Expert Theory, which emphasizes that clinical competence develops progressively through experience and structured guidance. EWS serves as a clinical decision-support framework, enabling nurses at varying experience levels to interpret patient data systematically and act promptly, thus bridging gaps in clinical judgment during critical situations.

Conceptually, the EWS also embodies the Patient Safety Theory proposed by Reason, which highlights the prevention of adverse events through layered safeguards and early risk identification. In this context, EWS functions as a "latent barrier" within healthcare systems, designed to prevent harm by identifying clinical instability before catastrophic events occur. Studies such as those by Warren et al. (2021) and Guan et al. (2022) reinforce this interpretation, showing that the system's structured scoring mechanism reduces diagnostic delay and enhances situational awareness among multidisciplinary teams. Consequently, EWS can be viewed not merely as a monitoring tool but as an operational embodiment of proactive risk management within emergency care.

The findings also suggest that the nursing role is being redefined through EWS implementation. Nurses become central figures in recognizing and responding to deterioration, which strengthens professional accountability and interprofessional collaboration (Al-Kalaldeh et al, 2019) (Penney et al, 2021). However, this empowerment requires consistent educational reinforcement. Training and simulation-based programs have been shown to improve not only technical accuracy but also confidence and decision-making speed (Triwijayanti, 2024). This reflects the principles of Bandura's Self-Efficacy Theory, where performance mastery and feedback loops enhance individual competence and professional self-assurance. Therefore, EWS implementation acts as both a clinical safeguard and a pedagogical instrument in emergency nursing education.

Nevertheless, implementation challenges persist. Studies report variations in compliance due to excessive workload, alert fatigue, and inconsistent clinical interpretation of scores (Afacan et al, 2022) (Bedoya et al, 2019) (Wood et al, 2019). These challenges correspond to the Technology Acceptance Model (TAM), which posits that user trust and perceived ease of use determine system adoption. When nurses perceive EWS as overly complex or unresponsive to contextual realities, adherence decreases. Moreover, cultural and institutional barriers—such as hierarchical communication patterns or limited interdisciplinary support—further hinder optimal utilization (Jensen et al, 2018). Addressing these issues requires a supportive organizational culture that values evidence-based practice and continuous learning.

From an analytical perspective, there is a growing need to customize EWS frameworks to specific patient populations. Studies by Xiong et al. (2025) and Bae et al. (2025) reveal that standardized scoring systems often underperform in elderly patients or those outside critical care settings. This underscores the importance of clinical adaptability and contextual sensitivity. Similarly, Gazmuri et al. (2025) argue for expanding EWS parameters to include broader physiological markers and lower activation thresholds. Such modifications align with systems thinking approaches in nursing, where adaptability and feedback integration are key to sustaining clinical relevance and accuracy across diverse healthcare settings.

The implications of these findings extend beyond clinical performance into healthcare policy and management. EWS represents a tangible framework for operationalizing patient safety culture, aligning with global initiatives such as the World Health Organization's (WHO) Global Patient Safety Action Plan 2021–2030. Its standardized yet adaptable design facilitates benchmarking, quality monitoring, and inter-hospital comparisons, promoting systemic accountability. However, as McGaughey et al. (2021) caution, the benefits of EWS depend on ongoing training, regular audits, and institutional commitment to data-driven improvement rather than passive compliance. Therefore, EWS must be embedded within a broader ecosystem of governance, education, and technology.

Despite its strengths, this study acknowledges certain limitations. The variability in study design and data sources introduces potential heterogeneity in assessing EWS outcomes. Many studies rely on retrospective or observational data, limiting causal inference (Bedoya et al, 2019; Ginestra et al, et al, 2019). Additionally, differences in healthcare infrastructure, nurse-to-patient ratios, and technological readiness across institutions can influence generalizability. Future research should prioritize longitudinal designs, incorporate AI-driven predictive analytics, and explore patient-centered outcomes to better quantify EWS impact. Moreover, qualitative explorations on nurse perceptions, cultural influences, and interprofessional dynamics would enhance understanding of contextual determinants affecting EWS success.

In conclusion, the synthesis of these findings underscores that EWS serves as a cornerstone in modern emergency nursing, bridging technology, human judgment, and systems design. It enhances early intervention capacity, strengthens professional autonomy, and aligns with global patient safety frameworks. However, sustained success requires adaptive customization, continuous professional education, and institutional leadership that fosters a culture of safety and responsiveness. EWS, therefore, is not only a monitoring instrument but also a catalyst for organizational learning and clinical excellence.

Conclusion

This qualitative descriptive study concludes that the implementation of the Early Warning System (EWS) in emergency nursing practice significantly enhances the early detection of patient deterioration, strengthens nurses' clinical decision-making, and improves interdisciplinary collaboration in critical care environments. The synthesis of findings demonstrates that EWS not only reduces mortality and ICU readmission rates but also fosters nurses' confidence, accountability, and adherence to standardized clinical assessment protocols, aligning with theories of patient safety and professional competence. By bridging technological innovation and nursing intuition, EWS contributes meaningfully to the development of evidence-based nursing practices and the refinement of emergency response frameworks. Socially and institutionally, the system promotes a culture of vigilance and proactive care that transforms emergency units into safer, more adaptive environments. However, challenges such as workload burden, inconsistent adherence, and system overreliance remain barriers to optimal implementation. Future research should explore context-specific system adaptations, technology–human integration models, and longitudinal impacts of EWS education on clinical outcomes, thereby advancing both the theoretical and practical dimensions of emergency nursing science. Based on the research findings, it is recommended that healthcare institutions enhance EWS training and integration programs to strengthen nurses' competence and response accuracy in emergency care. Academics are encouraged to expand future studies through triangulated qualitative approaches and cross-context comparisons to deepen understanding of EWS implementation. Further research should also explore technological-human synergy and cultural factors influencing EWS adoption to optimize its sustainability and impact on patient safety.

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