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Early Recognition and Management of Clinical Deterioration in Emergency Care: The Collaborative Role of Nurses and Emergency Medical Technicians — A Narrative Review

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ABSTRACT:

Background: Clinical deterioration is a major concern in emergency healthcare, where changes in a patient's condition can occur rapidly and require immediate intervention. Delays in recognizing physiological abnormalities, communicating clinical concerns, or initiating appropriate treatment may contribute to preventable complications, intensive care admission, and mortality. Nurses and emergency medical technicians (EMTs) are often among the first healthcare professionals to identify these changes, placing them in an important position to support early recognition and timely management.

Objective: This narrative review examines the role of nurses and EMTs in identifying and managing clinical deterioration in emergency care settings. It explores early warning signs, physiological monitoring, clinical assessment, communication practices, and interprofessional collaboration, with particular attention to strategies that may improve patient safety and clinical outcomes.

Methods: A narrative approach was adopted to synthesize published evidence and clinical guidance concerning the recognition and management of deteriorating patients. Relevant literature includes studies of early warning scores, rapid response systems, emergency assessment, prehospital care, clinical communication, and multidisciplinary teamwork.

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The review integrates findings from observational studies, systematic reviews, and professional guidelines to identify common challenges and practical approaches to care.

Results: The literature supports the importance of systematic physiological assessment, repeated monitoring, early escalation of clinical concerns, and coordinated responses to acute deterioration. Early warning scores can support the identification of patients at increased risk, although their performance varies across clinical populations and settings. Effective communication between EMTs, nurses, and physicians is particularly important during patient transfer and escalation of care. Education, simulation-based training, and standardized response protocols may strengthen clinical preparedness.

Conclusion: Early recognition and management of clinical deterioration require more than the identification of abnormal vital signs. They depend on clinical judgment, timely communication, appropriate escalation, and coordinated action among healthcare professionals. Nurses and EMTs have complementary responsibilities across prehospital and emergency department settings. Strengthening collaboration, clinical assessment skills, and organizational response systems may contribute to safer emergency care and more timely intervention.

1. INTRODUCTION

Clinical deterioration refers to a worsening of a patient's physiological or clinical condition that may progress to organ dysfunction, respiratory failure, circulatory collapse, cardiac arrest, or death if not recognized and managed appropriately. In emergency care, deterioration can develop suddenly or evolve gradually through changes that may initially appear minor. Identifying these changes early is essential because the opportunity to prevent severe complications often depends on how quickly healthcare professionals recognize the problem and respond.

Emergency departments and prehospital services operate in demanding environments characterized by unpredictable patient presentations, limited assessment time, competing priorities, and frequent transitions between healthcare teams. Within these environments, nurses and emergency medical technicians play important roles in the early identification of clinical instability. EMTs may encounter deteriorating patients at the scene of an emergency or during transportation, while emergency nurses continue assessment, monitoring, and treatment following hospital arrival.

Although their professional responsibilities differ according to training, certification, and local regulations, both groups contribute to the continuity of emergency care. Their ability to recognize changes in consciousness, respiratory effort, circulation, and other physiological parameters can influence how rapidly patients receive advanced assessment and treatment.

Research has shown that abnormal physiological observations may precede serious adverse events, including cardiac arrest and unplanned intensive care admission 1,2. This has encouraged healthcare organizations to introduce early warning systems, standardized observation charts, and rapid response mechanisms intended to support timely intervention.

However, recognition alone does not guarantee an effective clinical response. Abnormal findings must be interpreted, communicated, and followed by appropriate action. A patient may have clearly abnormal vital signs, yet delays can occur because of workload, unclear escalation responsibilities, communication barriers, or insufficient resources.

This narrative review discusses the recognition and management of clinical deterioration from the perspectives of emergency nursing and prehospital emergency care. It considers physiological assessment, early warning tools, teamwork, escalation processes, and educational strategies, while highlighting opportunities to strengthen patient safety across emergency care pathways.

2. UNDERSTANDING CLINICAL DETERIORATION IN EMERGENCY SETTINGS

Clinical deterioration is not a single disease process but a change in a patient's condition that may arise from numerous underlying causes. Common examples include sepsis, major hemorrhage, acute coronary syndromes, respiratory infections,

pulmonary embolism, stroke, trauma, and metabolic disturbances. Despite differences in their underlying mechanisms, these conditions may produce recognizable physiological abnormalities.

Changes in respiratory rate, oxygen saturation, blood pressure, heart rate, temperature, and level of consciousness are particularly important. A rising respiratory rate may reflect developing respiratory distress, metabolic acidosis, or systemic infection. Similarly, altered mental status may indicate reduced cerebral perfusion, hypoxemia, hypoglycemia, or neurological injury.

Importantly, deterioration does not always begin with dramatic symptoms. A patient who becomes unusually restless, develops mild confusion, or requires increasing oxygen support may already be experiencing clinically significant instability. These early manifestations can be overlooked when attention is focused primarily on obvious emergencies.

Studies of hospitalized patients have demonstrated that physiological abnormalities may be present hours before serious adverse events 1,2. Although much of this evidence originates from inpatient settings, it reinforces the value of systematic monitoring and reassessment in emergency care.

For nurses and EMTs, understanding clinical deterioration requires recognizing patterns rather than interpreting isolated measurements. A single blood pressure reading may be less informative than a progressive decline accompanied by tachycardia, pallor, and altered consciousness. Similarly, an oxygen saturation measurement should be interpreted alongside respiratory effort, airway patency, perfusion, and the patient's overall clinical presentation.

This broader approach encourages clinicians to combine objective measurements with professional judgment and repeated assessment.

3. NARRATIVE REVIEW APPROACH

This article uses a narrative review approach to examine clinical deterioration across prehospital and emergency department settings. The discussion is informed by peer-reviewed research and professional guidance addressing early warning scores, physiological assessment, emergency response systems, and interprofessional communication.

Relevant literature was identified through targeted consideration of publications indexed in PubMed and available professional guidelines, with emphasis on clinically applicable evidence and recent recommendations. Foundational studies were also considered where they contributed to understanding the development of early recognition systems.

The literature was organized into themes reflecting the emergency care pathway: identification of deterioration, use of structured assessment tools, professional responsibilities, escalation of care, and organizational strategies.

Because this is a narrative rather than a systematic review, the article does not claim exhaustive study identification, formal risk-of-bias assessment, or pooled quantitative estimates. The conclusions are therefore interpretive and should be considered alongside the limitations of the underlying evidence.

4. EARLY RECOGNITION OF PHYSIOLOGICAL WARNING SIGNS

The first step in managing deterioration is recognizing that a patient's clinical condition is changing. In practice, this requires both systematic observation and the ability to identify subtle deviations from the expected clinical course.

Respiratory abnormalities are particularly important. An increasing respiratory rate, greater work of breathing, abnormal breathing patterns, or a new oxygen requirement may indicate worsening respiratory or metabolic function. Respiratory rate should therefore be measured accurately rather than estimated, particularly when the patient's appearance suggests distress.

Circulatory changes also provide valuable information. Tachycardia, falling blood pressure, delayed capillary refill, cool extremities, and reduced peripheral perfusion may suggest developing shock. However, blood pressure can remain relatively preserved during early compensatory stages, making it essential to consider the entire clinical picture.

Neurological changes are another important warning sign. New confusion, agitation, drowsiness, or a reduction in responsiveness may indicate cerebral hypoperfusion, hypoxemia, metabolic disturbance, or neurological injury. These findings warrant prompt assessment even when other vital signs appear relatively stable.

For emergency nurses, repeated observations provide an opportunity to identify trends after triage, treatment, or transfer between clinical areas. For EMTs, serial assessment during transport can reveal deterioration that was not evident during the initial encounter.

A practical challenge is that emergency care environments often encourage rapid decision-making based on limited information. Under these circumstances, clinical teams may focus on the most obvious presenting complaint while overlooking less prominent physiological changes. Standardized assessment methods can reduce this risk by encouraging clinicians to evaluate the patient as a whole.

5. EARLY WARNING SCORES AND CLINICAL ASSESSMENT TOOLS

Early warning scores were developed to support healthcare professionals in identifying patients at risk of deterioration using combinations of physiological measurements. Common examples include the National Early Warning Score 2 (NEWS2) and Modified Early Warning Score (MEWS).

NEWS2 incorporates respiratory rate, oxygen saturation, supplemental oxygen use, systolic blood pressure, pulse rate, temperature, and consciousness or new confusion. By combining these parameters, it provides a structured representation of physiological disturbance (8).

Nevertheless, an early warning score is not a diagnosis. Its principal purpose is to support recognition and guide escalation according to locally established response protocols.

Guan and colleagues conducted a systematic review and meta-analysis of 20 studies examining early warning scores in emergency departments and prehospital settings. They found that several scoring systems could predict adverse outcomes in emergency department populations, while their usefulness for longer-term outcomes in prehospital patients was less consistent 3. PubMed

More recent evidence also supports a cautious interpretation. A systematic review of prehospital early warning scores reported moderate-to-good predictive accuracy for short-term mortality, but emphasized the possibility of under-triage and over-triage when scores are used without clinical judgment (4,7). PMC

This distinction is important for nurses and EMTs. A patient may have a relatively low numerical score despite presenting with concerning symptoms, particularly during the early stages of a rapidly developing condition. Conversely, chronic physiological abnormalities may produce elevated scores without necessarily representing a new emergency.

The most appropriate approach is to use early warning scores as one component of assessment rather than as a replacement for professional judgment.

6. THE ROLE OF EMERGENCY MEDICAL TECHNICIANS IN EARLY RECOGNITION

Emergency medical technicians frequently assess patients before hospital-based evaluation is available. Their responsibilities may include initial patient assessment, vital sign measurement, basic emergency interventions, reassessment, transport monitoring, and communication with receiving facilities. The precise scope of practice varies by jurisdiction and level of certification.

At the scene of an emergency, the EMT must often make decisions in an environment with limited equipment, incomplete medical history, and uncertain clinical information. These conditions make a structured assessment approach especially valuable.

The airway, breathing, circulation, disability, and exposure (ABCDE) framework provides a practical method for identifying immediately life-threatening abnormalities. It encourages clinicians to prioritize physiological threats while continuing to reassess the patient.

An important aspect of prehospital recognition is identifying changes between assessments. For example, a patient initially presenting with mild shortness of breath may develop increasing respiratory effort, tachycardia, or reduced responsiveness during transportation. Recognizing this progression allows the emergency team to request additional support, adjust care within its authorized scope, and notify the receiving hospital.

EMTs also contribute to continuity of care through accurate documentation. The time of symptom onset, initial vital signs, observed changes, interventions performed, and responses to treatment can provide essential information for emergency nurses and physicians.

Prehospital early warning scores may provide additional support, but evidence suggests that their predictive value varies according to the population, outcome, and time horizon (3,4,7). Consequently, they should complement rather than replace comprehensive assessment.

7. THE ROLE OF EMERGENCY NURSES IN MONITORING AND MANAGEMENT

Emergency nurses have a central role in recognizing and responding to deterioration after hospital arrival. Their responsibilities include triage, physiological monitoring, clinical reassessment, medication administration under appropriate orders or protocols, and coordination with the multidisciplinary team.

One of the most important nursing responsibilities is reassessment. A patient's condition at triage may differ substantially from their condition later in the emergency department. This is particularly relevant for patients awaiting diagnostic investigations, specialist consultation, or admission.

A patient initially classified as clinically stable may subsequently develop respiratory distress, hypotension, altered consciousness, or other warning signs. Repeated assessment allows the nurse to identify these changes and initiate escalation.

Clinical judgment remains essential. Experienced nurses may recognize deterioration through a combination of physiological findings, behavioral changes, and concern that a patient is not following an expected clinical course. Such concerns should be communicated and investigated even when a formal scoring threshold has not been reached.

The nursing role also extends beyond identifying deterioration. Nurses help prepare equipment, support airway and circulatory interventions, administer prescribed emergency treatments, monitor treatment responses, and coordinate movement to higher-acuity areas when necessary.

These activities require effective communication and clear knowledge of local escalation procedures. Without established response pathways, recognition of deterioration may not translate into timely treatment.

8. INTERPROFESSIONAL COLLABORATION AND COMMUNICATION

Clinical deterioration often occurs across professional and organizational boundaries. EMTs, emergency nurses, physicians, respiratory therapists, and other healthcare professionals may all contribute to assessment and management at different stages.

A major transition occurs when a patient is transferred from prehospital services to the emergency department. During this process, information about the patient's initial condition, changes during transportation, and treatment response must be communicated accurately.

Incomplete handovers can create uncertainty about the patient's clinical trajectory. For example, a receiving team may observe a blood pressure that appears acceptable without realizing that it has declined significantly from the initial measurement.

Structured communication tools can help address this problem. The Situation, Background, Assessment, and Recommendation (SBAR) framework encourages clinicians to communicate relevant information in a consistent format.

The 2025 European Resuscitation Council guidance emphasizes structured communication, recognition of clinical concern, and the ability of healthcare staff to request assistance when deterioration is suspected 5. erc.edu

Effective collaboration also requires mutual respect for professional observations. An EMT's concern about progressive deterioration during transport should be taken seriously by the receiving team. Similarly, emergency nurses must be able to escalate concerns promptly when a patient's condition changes.

A culture in which healthcare professionals can raise concerns without unnecessary hierarchy may improve the timeliness of emergency responses.

9. MANAGEMENT OF CLINICAL DETERIORATION

Once deterioration is recognized, the immediate priority is to assess and address life-threatening abnormalities while obtaining appropriate clinical support.

The ABCDE approach provides a structured foundation for initial management. Airway assessment focuses on identifying obstruction or loss of airway protection. Breathing assessment considers respiratory effort, oxygenation, ventilation, and signs of respiratory failure. Circulatory assessment evaluates perfusion, heart rate, blood pressure, and possible causes of shock.

Neurological assessment examines consciousness, responsiveness, and potentially reversible causes of altered mental status, including hypoglycemia. Exposure and further examination may identify injuries, bleeding, infection-related findings, or other clinical abnormalities.

Interventions should follow the patient's clinical needs, current resuscitation guidance, local protocols, and the professional's authorized scope of practice. Depending on the situation, these may include positioning, appropriate oxygen or ventilatory support, hemorrhage control, glucose assessment, cardiac monitoring, intravenous access by authorized personnel, and preparation for advanced resuscitation.

The 2025 American Heart Association guidelines support early warning systems and rapid response teams as potentially beneficial components of systems designed to identify deterioration and prevent in-hospital cardiac arrest 6. PMC

The effectiveness of any intervention depends on timely reassessment. After an initial response, clinicians must determine whether the patient's condition has improved, remained unchanged, or worsened. Continued deterioration may require additional expertise, advanced airway management, resuscitation, or transfer to a higher level of care.

Early management should therefore be viewed as a continuous process rather than a single clinical action.

10. CHALLENGES IN RECOGNIZING AND RESPONDING TO DETERIORATION

Despite improvements in emergency care systems, several barriers continue to affect the recognition and management of deteriorating patients.

Emergency department overcrowding is one important challenge. When patient volumes exceed available resources, reassessment may be delayed, monitoring capacity may be limited, and healthcare professionals may have difficulty responding promptly to new abnormalities.

Staffing levels and workload also influence clinical surveillance. Nurses responsible for several patients may struggle to maintain the frequency of observations required for individuals at increased risk. Prehospital teams face different challenges, including transportation delays, limited personnel, and restricted access to diagnostic equipment.

Communication failures represent another concern. Important information may be lost during shift changes, ambulance handovers, or transfers between emergency department areas. The absence of clear escalation procedures can further delay the response.

Technology may introduce additional difficulties. Although electronic monitoring and automated alerts can improve awareness, excessive non-actionable alarms may contribute to alarm fatigue. Clinicians may become less responsive when alerts are frequent and poorly differentiated.

Training and experience also influence recognition. Less experienced professionals may have difficulty interpreting subtle physiological changes or identifying patterns that suggest impending deterioration.

These challenges highlight the importance of organizational systems that support clinicians rather than relying exclusively on individual vigilance.

11. EDUCATION, SIMULATION, AND CLINICAL PREPAREDNESS

Education is a fundamental component of effective deterioration management. Nurses and EMTs require both theoretical knowledge and practical experience to recognize evolving clinical instability.

Traditional education provides an understanding of physiology, emergency conditions, and assessment principles. However, classroom instruction alone may not fully prepare clinicians for the complexity and time pressure of emergency situations.

Simulation-based training offers opportunities to practice recognition, communication, and coordinated response in realistic scenarios. For example, a simulated patient may develop progressive respiratory failure, requiring participants to identify warning signs, communicate concerns, and initiate appropriate interventions.

Interprofessional simulation is particularly valuable because it allows nurses and EMTs to practice working together. Participants can develop a better understanding of each other's responsibilities, communication needs, and clinical limitations.

Regular training should also include structured handover, escalation procedures, and reassessment following interventions.

The effectiveness of educational programs should be evaluated through meaningful measures, including assessment accuracy, escalation time, communication quality, and adherence to clinical protocols. Improvements in knowledge or confidence alone do not necessarily demonstrate improvements in patient outcomes.

12. TECHNOLOGY AND DIGITAL SUPPORT SYSTEMS

Digital healthcare technologies have created new opportunities to support the recognition of clinical deterioration.

Electronic early warning systems can automatically calculate scores using recorded physiological observations. Some systems also generate alerts when predefined thresholds are reached, potentially reducing delays associated with manual scoring.

Continuous monitoring technologies may provide additional information about changes in heart rate, oxygen saturation, and respiratory status. When integrated into clinical workflows, these systems may support earlier reassessment.

Predictive analytics and artificial intelligence are also being investigated as tools for identifying patterns associated with deterioration. Such systems may combine physiological measurements with laboratory results, clinical history, and other electronic health record information.

However, predictive performance does not necessarily establish clinical benefit. Digital systems must be evaluated for false alerts, missed deterioration, usability, and their impact on healthcare professionals' workload.

An additional concern is the possibility of excessive reliance on automated predictions. A reassuring digital score should not override obvious clinical abnormalities or a professional's concern about the patient.

Technology is therefore most useful when integrated with clinical judgment, clear response procedures, and appropriate human oversight.

13. DISCUSSION

The literature suggests that early recognition of clinical deterioration is best understood as a coordinated process involving assessment, interpretation, communication, and intervention.

A major strength of early warning systems is their ability to translate multiple physiological measurements into a standardized indication of risk. This can be particularly helpful in busy clinical environments where healthcare professionals must prioritize patients with different levels of acuity.

However, the evidence also demonstrates important limitations. Predictive performance varies between settings, and a score that performs reasonably well in an emergency department may be less reliable when applied to an unselected prehospital population.

The distinction between predicting deterioration and preventing adverse outcomes is especially important. A tool may accurately identify patients at higher risk without necessarily improving survival unless its use leads to appropriate clinical action.

This issue is reflected in contemporary resuscitation guidance, which emphasizes the importance of combining recognition systems with effective clinical response mechanisms 6.

The relationship between emergency nurses and EMTs deserves particular attention. Although these professionals work in different operational environments, their responsibilities form part of a continuous emergency care pathway. Deterioration may begin before hospital arrival, progress during transportation, or become apparent after emergency department admission.

Effective management therefore depends on preserving information across transitions. Serial physiological measurements, clinical observations, treatment responses, and concerns expressed by the prehospital team should inform subsequent hospital assessment.

Another important finding is that professional judgment remains indispensable. Early warning scores cannot fully account for every clinical presentation, and certain conditions may progress rapidly before a scoring threshold is reached.

Organizational factors also influence the effectiveness of deterioration management. Staffing, monitoring resources, clinical leadership, escalation policies, and team communication all affect whether early recognition results in timely treatment.

The available evidence supports a combined approach in which structured tools assist clinicians, multidisciplinary teams respond to abnormalities, and healthcare organizations monitor the effectiveness of their emergency care processes.

14. IMPLICATIONS FOR CLINICAL PRACTICE

Several practical implications emerge from this review.

First, emergency care organizations should encourage systematic physiological assessment and reassessment. Monitoring frequency should reflect the patient's condition and risk rather than relying solely on fixed routines.

Second, nurses and EMTs should be supported in communicating concerns promptly. Clinical escalation pathways must allow staff to request assistance when deterioration is suspected, including when numerical scores do not meet predefined thresholds.

Third, standardized handover practices should be incorporated into transitions between prehospital and hospital care. Particular attention should be given to changes in vital signs, interventions performed, and the patient's response during transportation.

Fourth, early warning scores should be selected and implemented according to the population and clinical environment in which they are intended to operate. Local validation and ongoing evaluation are important.

Finally, quality improvement programs should examine the entire recognition-to-response process. Potential indicators include time from abnormal observation to escalation, completeness of handover documentation, frequency of reassessment, and response to clinical deterioration.

15. FUTURE RESEARCH DIRECTIONS

Further research is needed to clarify how early recognition strategies can improve outcomes across the full emergency care pathway.

Studies comparing different early warning systems in prehospital and emergency department populations may help identify which approaches are most useful in specific clinical environments.

Research should also examine how communication between EMTs and emergency nurses influences treatment delays, escalation decisions, and patient outcomes.

Additional studies are needed to evaluate the effectiveness of interprofessional simulation programs, particularly whether improvements in team performance translate into measurable clinical benefits.

Digital monitoring and predictive technologies represent another important area for investigation. Future evaluations should move beyond predictive accuracy to consider patient outcomes, workflow integration, alert burden, and unintended consequences.

Research conducted in different healthcare systems, including resource-limited emergency services, would also improve understanding of how organizational context affects deterioration management.

16. LIMITATIONS OF THIS REVIEW

This narrative review has several limitations. It does not use a systematic search strategy with predefined eligibility criteria, and therefore relevant publications may have been missed.

The included evidence encompasses different patient populations, healthcare settings, and study designs, limiting direct comparison between findings.

Much of the evidence concerning early warning scores and rapid response systems originates from hospital-based populations. Findings from these settings may not be directly transferable to prehospital emergency care.

Furthermore, the effectiveness of individual interventions may be influenced by staffing, training, organizational culture, and available resources.

Accordingly, the conclusions should be interpreted as a clinically informed synthesis rather than definitive evidence that any single tool or intervention improves patient outcomes.

17. CONCLUSION

Early recognition and management of clinical deterioration remain essential components of safe emergency care. Nurses and emergency medical technicians have complementary responsibilities in identifying physiological abnormalities, monitoring changes, communicating clinical concerns, and supporting timely interventions.

The available evidence indicates that structured assessment tools and early warning scores can assist in identifying patients at increased risk. However, these tools are most valuable when combined with professional judgment, effective communication, and reliable escalation systems.

Strengthening collaboration between prehospital and hospital-based professionals may improve continuity of care and reduce delays in recognizing clinical instability. Continued education, simulation training, and quality improvement initiatives can further support clinical preparedness.

Ultimately, the management of deterioration should be approached as a shared responsibility across the emergency care pathway, with emphasis on early recognition, coordinated action, and continuous reassessment.

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