



Timely Management of Undifferentiated Emergency Patients: Roles of Nurses, Emergency Medical Technicians, and Laboratory Services

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Article Info:

DOI: 10.22399/ijcesen.4916

Received : 02 June 2024

Accepted : 30 June 2024

Keywords

Emergency nursing,
undifferentiated patients,
triage,
Emergency Medical Services
(EMS),
clinical judgment,
laboratory services

Abstract:

The timely management of undifferentiated emergency patients—individuals presenting with symptoms that do not immediately suggest a clear diagnosis—represents a fundamental challenge in acute care, requiring the seamless integration of skills and expertise across multiple professional domains. Emergency nurses serve as the critical first point of contact, employing systematic triage protocols and structured assessment frameworks such as the ABCDE approach and HIRAID to rapidly identify life-threatening conditions, prioritize care, and initiate appropriate interventions while maintaining continuous surveillance for clinical deterioration. Emergency Medical Technicians and paramedics extend this care continuum into the prehospital environment, exercising complex clinical judgment under austere conditions to assess and stabilize patients, gather essential scene information, and facilitate safe transitions of care through structured handoff processes. Laboratory services provide the diagnostic infrastructure essential for evidence-based decision-making, with point-of-care testing enabling rapid result turnaround for time-sensitive conditions while central laboratory analysis supports comprehensive diagnostic evaluation. The integration of these professional contributions through shared mental models, effective interprofessional communication, and collaborative practice standards ensures that undifferentiated patients receive timely, coordinated care that optimizes outcomes from the moment of emergency activation through definitive treatment and disposition.

1. Introduction

The emergency department represents one of the most dynamic and challenging environments within the contemporary healthcare landscape, functioning as the critical interface between the community and the hospital system. Within this high-stakes setting, clinicians are routinely confronted with patients who present with symptoms that do not immediately suggest a clear diagnosis—patients who are, in the clinical sense, undifferentiated. These individuals arrive with complaints ranging from chest pain and shortness of breath to altered mental status and generalized weakness, conditions that could represent anything from benign, self-limiting illnesses to catastrophic, life-threatening emergencies requiring immediate intervention [1]. The fundamental challenge of emergency care lies not in managing established diagnoses, but in rapidly assessing, stabilizing, and determining the appropriate disposition for patients whose underlying pathology remains unknown at the time of presentation. This reality places extraordinary demands on the healthcare team, requiring coordinated action, clinical judgment, and systematic approaches that transcend traditional professional boundaries.

The concept of the undifferentiated patient is central to understanding the unique nature of emergency medicine as a specialty. Unlike other clinical disciplines where patients typically present with known diagnoses or referrals, emergency clinicians must begin their evaluation with a blank slate, armed only with the patient's chief complaint and whatever observable signs may be present [2]. Emergency health care providers must respond to these clinically undifferentiated patients with

symptoms for which the diagnosis may not be known, encompassing conditions that range from acute coronary syndrome and strokes to acute complications of pregnancy or any chronic illness [2]. The root cause of most life-threatening conditions in the emergency department may be medical or surgical, infectious or traumatic, and the initial presentation rarely provides clear indication of which category applies [2]. This diagnostic ambiguity creates what might be termed the fundamental tension of emergency care: the necessity to initiate treatment before diagnosis is established, to stabilize before understanding, and to act decisively in the face of profound uncertainty.

Timeliness emerges as the critical variable in this equation, quite literally determining outcomes in ways that are measurable and often dramatic. For time-sensitive conditions such as sepsis, acute myocardial infarction, stroke, and major trauma, minutes and even seconds can separate full recovery from permanent disability or death [3]. The imperative for timely management operates on multiple levels simultaneously. At the most basic level, there is the need to identify immediately life-threatening conditions through systematic assessment approaches that leave nothing to chance. At another level, there is the requirement to prioritize patients appropriately when multiple individuals present simultaneously, ensuring that those in greatest need receive attention first even when their conditions may not be immediately apparent. At still another level, there is the necessity of moving patients efficiently through the diagnostic and treatment process, minimizing delays at each step while maintaining the quality and safety of care [4]. These interconnected

demands create a complex operational environment where every member of the emergency team must function with precision, awareness, and coordination.

Nurses occupy a uniquely pivotal position within this ecosystem, serving as the first point of contact for patients entering the emergency care system and maintaining continuous presence throughout the episode of care. Emergency nurses are specialized in delivering time-sensitive care to undifferentiated patients in a systematic manner, meaning that they are always on the go and have little to no room for mistakes [5]. Unlike patients in other specialties, emergency patients generally come with unknown medical conditions and need care in an efficient manner so that the continuous flow of other emergency patients can be attended to [5]. This requires scrupulous coordination between emergency nurses and physicians, creating a team-based environment of practice in emergency departments. The initial assessment performed by nurses establishes the trajectory for the entire patient encounter, determining triage priority, triggering protocols, and identifying the red flags that signal potential deterioration. Research has demonstrated that structured approaches to patient assessment improve care delivery and patient outcomes, with frameworks such as HIRAID—History, Identify Red flags, Assessment, Interventions, Diagnostics, communication and reassessment—enabling nurses to improve their self-efficacy, communication, and detection of clinical and historical indicators of urgency [1].

Emergency Medical Technicians and paramedics extend the reach of the emergency care system beyond hospital walls, functioning as the eyes and ears of the emergency department in the prehospital environment. These clinicians are challenged by the need to assess and treat patients who are clinically undifferentiated with a large constellation of possible medical problems, ranging from trivial to life-threatening, all while operating in uncontrolled environments with limited resources and without the immediate backup of hospital-based colleagues [6]. In addition to possessing a large and diverse set of knowledge, skills, and abilities, EMS clinicians must integrate a plethora of environmental, patient, and event specific cues in their clinical decision-making processes [6]. The information they gather, the interventions they initiate, and the decisions they make about transport destination and urgency fundamentally shape subsequent hospital care. The handoff between EMS clinicians and emergency department staff represents a critical transition point where information must be transferred accurately and completely, ensuring that the

insights gained in the prehospital setting inform continuing care [7].

Laboratory services, though often operating behind the scenes, constitute the third essential pillar of timely emergency patient management. In the era of evidence-based medicine, diagnostic testing has become integral to clinical decision-making, providing objective data that confirms or refutes diagnostic hypotheses and guides therapeutic interventions. For patients presenting with undifferentiated complaints such as abdominal pain or chest pain, laboratory tests are frequently ordered to aid the diagnostic process, with studies examining hundreds of thousands of patients to identify patterns and variations in test-ordering practices [8]. The challenge lies in utilizing laboratory resources appropriately—ordering tests that are likely to yield clinically useful information while avoiding unnecessary testing that consumes resources, prolongs emergency department stays, and may yield false-positive results leading to further unnecessary interventions. The laboratory must also function with sufficient speed to support time-critical decisions, providing rapid turnaround for tests that influence immediate management while maintaining accuracy and reliability.

2. The Emergency Nursing Role in Initial Patient Assessment and Prioritization

2.1 Triage as the Foundation of Timely Care

The process of triage represents the critical first step in managing undifferentiated emergency patients, serving as the gateway through which all individuals must pass upon arrival at the emergency department. Triage is used both to evaluate the urgency of patients and to prioritize them accordingly, as well as to organize and evaluate emergency departments [9]. Patients admitted to the emergency department are first evaluated by a healthcare professional trained in triage, provided their clinical condition allows, with the patient's chief complaint and symptoms, vital signs, allergies, medications, past medical and surgical history, last food and drink, and a brief history of present illness recorded [9]. This initial encounter must accomplish multiple objectives simultaneously: identifying those who require immediate life-saving intervention, determining appropriate treatment locations within the department, establishing baseline clinical data against which subsequent changes can be measured, and initiating the therapeutic relationship between patient and healthcare team.

The complexity of triage decision-making belies its apparent simplicity. Triage professionals must

make rapid judgments about patient acuity based on limited information, often in environments characterized by overcrowding, interruption, and time pressure. Various triage systems have been developed and validated to support this process, with five-level systems such as the Emergency Severity Index (ESI) representing current best practice. ESI classifies patients according to the severity of their complaints and the estimated number of resources needed, with level one being the most urgent and level five being the least urgent [10]. Level one patients require immediate medical intervention for life-threatening conditions, while level two encompasses high-risk situations or severe distress necessitating rapid attention. Level three patients present with multiple or complex problems requiring multiple resources but can tolerate a short wait, whereas level four and five patients have less complex issues requiring minimal resources and can wait longer without significant risk [10]. This stratification enables emergency departments to allocate resources rationally, ensuring that the sickest patients receive attention first even when overall demand exceeds capacity.

The accuracy of triage decisions has profound implications for patient outcomes and departmental function. Under-triage—assigning a patient to a lower acuity level than their condition warrants—can result in dangerous delays in care, allowing deteriorating patients to wait while their conditions worsen unrecognized. Over-triage—assigning patients to higher acuity levels than necessary—consumes resources inefficiently, potentially delaying care for truly urgent patients while staff attend to those who could safely wait. Research into triage decision-making has identified numerous factors that influence accuracy, including clinician experience, cognitive biases, environmental distractions, and the quality of information available at the time of assessment [11]. Structured triage systems and standardized protocols help mitigate these influences by providing clear criteria and forcing function checks that reduce reliance on individual judgment alone.

2.2 Systematic Assessment Frameworks

Beyond triage, emergency nurses employ systematic assessment frameworks to ensure comprehensive evaluation of undifferentiated patients. The ABCDE approach—Airway, Breathing, Circulation, Disability, Exposure—represents the universal standard for initial patient assessment, providing a structured method for identifying and addressing life-threatening conditions in order of priority [12]. This systematic approach aims to improve coordination among

team members and saves time in making critical decisions, ensuring that at each step, life-threatening problems must be addressed before proceeding to the next assessment step [12]. The approach is recommended by international guidelines for suspected serious illness or underlying injury, irrespective of diagnosis, and is incorporated into what is known as initial patient assessment, one of the most crucial steps in evaluation [13].

The ABCDE framework guides nurses through a logical progression of assessment and intervention. Airway assessment begins with determining patency—can the patient speak? If yes, the airway is likely patent. If not, nurses look for signs of compromise including noisy breathing, inability to speak, presence of added sounds, stridor or wheezing, choking or gagging, cyanosis, and use of accessory muscles [14]. Intervention at this level may involve simple maneuvers such as head-tilt chin-lift or jaw-thrust, suctioning of secretions or blood, insertion of airway adjuncts, or preparation for definitive airway management [14]. Only when airway patency is secured does the assessment proceed to breathing, where clinicians evaluate oxygen saturation, respiratory rate and pattern, chest wall movement and symmetry, and breath sounds. Circulation assessment follows, encompassing pulse rate and quality, blood pressure, peripheral perfusion, and external hemorrhage control. Disability assessment evaluates neurologic status using tools such as the AVPU scale or Glasgow Coma Scale, while exposure involves fully examining the patient to identify hidden injuries or conditions [15].

The HIRAIID assessment framework represents a more comprehensive approach developed specifically for emergency nursing practice. HIRAIID—which stands for History, Identify Red flags, Assessment, Interventions, Diagnostics, communication and reassessment—is the only comprehensive assessment framework that can be applied to all patients in the emergency setting, with its application not dependent on context, clinical skill level, or resources [1]. Developed by Professor Kate Curtis and her team for optimal emergency care delivery, HIRAIID provides emergency nurses with a structured approach that improves self-efficacy, communication, and detection of clinical and historical indicators of urgency [1]. The framework guides nurses through gathering complete historical information, identifying red flags that signal potential serious illness, performing focused physical assessment, initiating appropriate interventions, ordering and interpreting diagnostic studies, communicating

findings to colleagues, and planning for reassessment to evaluate response to treatment.

2.3 Recognition of Clinical Deterioration

A critical responsibility of emergency nurses is the continuous surveillance of patients for signs of clinical deterioration, particularly those awaiting physician evaluation or diagnostic results. Emergency patients often have extended waiting times for higher level review, and failure to recognize and respond to patients whose condition deteriorates increases the incidence of high-mortality adverse events [1]. Nurses must maintain awareness of all patients under their supervision, regularly reassessing vital signs, mental status, and subjective reports of symptoms to identify those who are worsening. This surveillance function requires not only clinical knowledge but also situational awareness—the ability to maintain a mental model of the entire clinical environment and recognize when individual patients deviate from expected trajectories.

Early warning scores and track-and-trigger systems have been developed to support nurses in this surveillance role, providing objective criteria for identifying deteriorating patients and standardized protocols for escalation. These systems assign points to physiologic parameters such as heart rate, blood pressure, respiratory rate, oxygen saturation, and level of consciousness, generating composite scores that correlate with risk of adverse outcomes. When scores exceed predetermined thresholds, nurses are empowered—indeed, obligated—to trigger rapid response teams or notify physicians for immediate evaluation. Such systems reduce reliance on individual judgment alone, providing objective triggers that can be recognized even by relatively inexperienced nurses and ensuring that deterioration does not go unnoticed in busy clinical environments [16].

2.4 Communication and Care Coordination

Emergency nurses serve as central nodes in the communication networks that coordinate patient care, transmitting information between patients, families, physicians, prehospital providers, consultants, and receiving units. The quality and timeliness of this communication directly impacts patient outcomes, as critical information must be accurately conveyed without delay or distortion. Using structured communication tools such as HIRAID, emergency nurses improve their communication and documentation, contributing to improved patient care and outcomes [1]. Standardized approaches to handover reduce

unwarranted variation in care, facilitate timely recognition and response to clinical deterioration, reduce time to definitive treatment, and maximize quality outcomes [1].

The nurse's role in communication extends beyond mere information transmission to include interpretation, synthesis, and advocacy. Nurses must translate complex clinical information for patients and families, ensuring understanding and informed participation in decision-making. They must synthesize information from multiple sources—vital signs, physical assessment findings, laboratory results, patient reports—into coherent clinical pictures that guide physician evaluation. And they must advocate for patients whose conditions may not be fully appreciated, ensuring that concerns are heard and acted upon. This advocacy function is particularly important for undifferentiated patients whose diagnoses remain unclear, as nurses often identify subtle changes or concerning features that warrant further investigation even when overt findings are absent [17].

2.5 Documentation and Legal Considerations

Comprehensive documentation represents an essential component of emergency nursing practice, serving clinical, legal, and quality improvement purposes. Clinical documentation ensures continuity of care by providing a permanent record of assessments, interventions, and patient responses that can be accessed by all members of the healthcare team. Legal documentation protects patients and providers by creating an objective record of events that can be referenced in the event of disputes or adverse outcomes. Quality improvement documentation enables healthcare organizations to analyze patterns of care, identify areas for improvement, and track the effects of interventions over time.

Structured assessment frameworks such as HIRAID have been shown to improve documentation consistency and completeness, ensuring that essential information is recorded in accessible formats [1]. Emergency nursing and medical staff perceive HIRAID to be a useful tool for use in the clinical environment to improve consistency, documentation, and communication [1]. Improved documentation supports not only individual patient care but also broader efforts to understand and improve emergency care delivery, providing data that can be analyzed to identify best practices and reduce unwarranted variation [8].

3. Emergency Medical Technicians and Prehospital Clinical Judgment

3.1 The Unique Challenges of Prehospital Care

Emergency Medical Technicians and paramedics operate in an environment fundamentally different from that of hospital-based clinicians, facing challenges that shape and constrain their ability to assess and manage undifferentiated patients. In the prehospital setting, EMS clinicians are challenged by the need to assess and treat patients who are clinically undifferentiated with a large constellation of possible medical problems, ranging from trivial to life-threatening [6]. Unlike their hospital-based colleagues who work in controlled environments with immediate access to advanced diagnostic tools and specialist consultation, EMS clinicians must function in whatever setting they find their patients—roadways, residences, workplaces, public spaces—with whatever equipment they carry and whatever information they can gather on scene.

The environment itself introduces variables that complicate clinical assessment and decision-making. Weather conditions may limit examination possibilities or compromise equipment function. Scene safety concerns may require rapid patient extraction before complete assessment is possible. Bystanders, family members, and other responders may provide information that is helpful, contradictory, or distracting. Time pressure may be extreme, particularly for patients with time-sensitive conditions where every minute of on-scene time delays definitive hospital care. Despite these challenges, EMS clinicians must integrate a plethora of environmental, patient, and event specific cues in their clinical decision-making processes, recognizing that the cues are unique and specific to the setting and make clinical decision-making increasingly complex [6].

The undifferentiated nature of prehospital patients compounds these environmental challenges. Patients encountered in the field rarely have established diagnoses, and the information available to guide assessment is often limited to observable signs, patient self-report (which may be impaired by illness or injury), and whatever history can be obtained from bystanders or family members. The constellation of possible medical problems facing any given patient is vast, ranging from minor complaints that could safely be managed without transport to immediately life-threatening conditions requiring maximal intervention [18]. EMS clinicians must rapidly narrow this diagnostic possibility space, identifying the most likely explanations for presenting symptoms while maintaining awareness of dangerous alternatives that must be ruled out or empirically treated.

3.2 The Clinical Judgment Framework in EMS

Recent theoretical work has sought to articulate a comprehensive framework for understanding clinical judgment in the prehospital setting, building upon concepts developed in nursing and other clinical disciplines. Clinical judgment is conceptualized as a higher-order construct that encompasses clinical reasoning (the thought process used to evaluate a problem) and clinical decision-making (the conclusion of this thought process or the choice made) [19]. The overall process encompassing both clinical reasoning and clinical decision-making is represented by clinical judgment, which represents a combination of medical knowledge, skills, decision making, and critical thinking [20].

The proposed framework for clinical judgment in EMS emphasizes the process-information cycle that clinicians experience when encountering new information used to make actionable decisions. This cycle includes recognizing cues, analyzing those cues, defining a hypothesis from the information gathered, generating a solution to the defined problem, taking action to solve the clinical problem, and finally evaluating the outcome of the action [19]. Notably, this process-information cycle is continuously repeated as new information becomes available that may require recognizing new cues, re-analyzing the situation, defining new hypotheses, generating new solutions, implementing them, and evaluating their effects [19]. In practice, these steps may not be consciously recognized, but they are important in understanding how information is processed to reach decisions, especially in varied and complex situations [19].

Environmental and patient cues serve as the contextual factors that drive an EMS clinician's information processing throughout this cycle. These cues include observable patient characteristics, vital signs, mechanism of injury or nature of illness, scene circumstances, and information from bystanders or family members. As cues are integrated into the process-information cycle, the EMS clinician's individual traits also influence their information processing. Clinician-specific factors such as personal characteristics, knowledge, skills, and abilities will influence the cues they recognize, how they are analyzed, the hypotheses that are defined, the solutions generated, the actions taken, and the evaluation of the effects generated [21]. These clinician-specific impressions are potential drivers for social disparities in care and are critical to the larger clinical judgment framework [21].

3.3 Scene Management and Situational Awareness

Effective prehospital care requires not only clinical judgment applied to individual patients but also sophisticated scene management and situational awareness that encompasses the entire emergency response. As the EMS clinician moves from one setting to the next throughout the EMS experience—from dispatch to response and to the scene—they continuously reevaluate and proceed through a series of process-information cycles [19]. Since the evaluation step of an earlier cycle generates new information that requires reassessment, the cycle is continually fed by input from the EMS clinician's perceptions and experiences, forming a new cycle that generates a continuous loop [19].

Situational awareness in the prehospital context involves maintaining a mental model that integrates multiple dimensions simultaneously: the clinical status of the patient, the resources available on scene and en route, the need for additional resources or specialized assistance, the safety of the scene for all responders, the preferences and concerns of the patient and family, and the broader context of the emergency medical services system including hospital capabilities and current diversion status. Maintaining this awareness while performing clinical assessments and interventions requires cognitive capacity that may be strained in complex or high-acuity situations. Experience plays a critical role here, as proficient and expert clinicians tend to use more efficient, global, and intuitive processing that relies on pattern recognition, whereas less experienced clinicians often rely on analytic thinking to make decisions [22]. At advanced levels, thinking is based on a deep understanding of the situation that is grounded in prior experience and reflection, and often only requires resorting to analytic thinking in unfamiliar or unusual situations [23].

3.4 Protocols, Protocols, and Autonomous Practice

EMS practice exists at the intersection of protocol-driven care and autonomous clinical judgment, with clinicians expected to follow established guidelines while also adapting to individual patient circumstances and exercising independent decision-making when protocols do not apply. Standing orders and protocols provide the foundation for prehospital care, specifying assessment steps, treatment indications, and interventions that EMS clinicians may perform without direct medical oversight. These protocols are developed by

medical directors based on current evidence and local resources, ensuring that care delivered in the field aligns with accepted standards and community expectations.

However, protocols cannot anticipate every clinical scenario, and EMS clinicians must frequently exercise independent judgment in applying protocol guidance to specific patient situations. This is particularly true for undifferentiated patients whose conditions may not fit neatly into protocol categories or who may present with atypical features that complicate pattern recognition. In these situations, clinicians must draw upon their understanding of underlying pathophysiology, their experience with similar patients, and their knowledge of protocol intent to determine appropriate management. Communication and leadership on an EMS response have been found to be important aspects for effective and safe patient care, and thus are important attributes for an EMS clinician to command [24]. Since communication and leadership can exist as independent constructs but inform the clinical judgment process in the prehospital setting, they are subsumed underneath clinical judgment in contemporary theoretical frameworks [19].

3.5 The Handoff Process and Continuity of Care

The transition of care from EMS clinicians to emergency department staff represents a critical juncture where information must be accurately transferred and clinical responsibility effectively shifted. This handoff process is susceptible to numerous failures—information may be omitted, misunderstood, or misremembered; key findings may not be communicated clearly; the receiving team may not appreciate the significance of prehospital observations. Such failures can compromise patient care by depriving hospital clinicians of information essential to accurate diagnosis and appropriate treatment.

Structured handoff protocols have been developed to reduce these risks, providing standardized formats for information transfer that ensure completeness and promote shared understanding. These protocols typically include elements such as patient age and gender, chief complaint, history of present illness, pertinent medical history, assessment findings, interventions performed, and response to treatment. Some systems employ mnemonics such as SBAR (Situation, Background, Assessment, Recommendation) to structure handoff communication, ensuring that information is presented in logical sequence and that all essential elements are included [25]. The handoff represents more than simple information transfer; it embodies

the transition of clinical responsibility and the opportunity for collaborative sense-making about the patient's condition. EMS clinicians bring unique perspectives shaped by their observation of the scene, the patient's initial presentation, and the trajectory of response to interventions. Emergency nurses and physicians bring different perspectives informed by their assessment capabilities, diagnostic resources, and broader clinical experience. Effective handoffs integrate these perspectives, creating shared mental models that guide continuing care. Research has demonstrated that structured handoff protocols improve information transfer, reduce errors, and enhance team communication, contributing to safer and more effective patient care [26].

4. Laboratory Services and Diagnostic Support

4.1 The Role of Laboratory Testing in Undifferentiated Patient Management

Laboratory testing constitutes an essential component of the diagnostic process for undifferentiated emergency patients, providing objective data that confirms or refutes clinical hypotheses and guides therapeutic decision-making. For patients presenting with common undifferentiated complaints such as abdominal pain and chest pain, laboratory tests are frequently ordered to aid the diagnostic process, with studies examining hundreds of thousands of patients to identify patterns and variations in test-ordering practices [8]. From more than three million unplanned emergency presentations, abdominal pain and chest pain represent substantial proportions of all cases—approximately 8.8 percent and 6.6 percent respectively—demonstrating the significant volume of undifferentiated patients requiring laboratory evaluation [8].

The contribution of laboratory testing to patient management operates at multiple levels. At the most basic level, tests can confirm or exclude specific diagnoses, such as cardiac troponin for myocardial infarction or D-dimer for pulmonary embolism. At another level, test results can risk-stratify patients, identifying those at high risk of adverse outcomes who require admission or intensive monitoring versus those at low risk who may be suitable for discharge. Laboratory data can also guide specific therapeutic interventions, such as antibiotic selection based on culture results or electrolyte replacement based on measured deficiencies. For many emergency patients, the combination of clinical assessment and limited laboratory testing suffices to reach appropriate

disposition decisions without requiring definitive diagnosis of underlying etiology.

The challenge lies in utilizing laboratory resources appropriately—ordering tests that are likely to yield clinically useful information while avoiding unnecessary testing that consumes resources, prolongs emergency department stays, and may yield false-positive results leading to further unnecessary interventions. Studies examining test-ordering practices across multiple emergency departments have identified significant variation in the rates at which individual tests are ordered for similar patient presentations [8]. For abdominal pain, tests with the highest ordering variation included glucose, C-reactive protein, and calcium-magnesium-phosphate panels, while for chest pain, the tests with the highest variation were glucose, C-reactive protein, and liver function tests [8]. Identifying emergency departments with outlying laboratory-ordering practices represents the first step in initiating context-specific evaluation of whether such variations are unwarranted, potentially indicating over-testing, under-testing, or inappropriate test selection [8].

4.2 Point-of-Care Testing and Rapid Turnaround

The timeliness of laboratory results is critical in emergency care, where clinical decisions must often be made within minutes rather than hours. Traditional central laboratory testing, while accurate and comprehensive, necessarily involves delays associated with specimen transport, processing, analysis, and result reporting. For time-sensitive conditions such as myocardial infarction, sepsis, or critical electrolyte abnormalities, these delays may compromise patient outcomes by postponing diagnosis and delaying treatment initiation.

Point-of-care testing addresses this challenge by bringing diagnostic capabilities directly to the patient's bedside, enabling rapid results that can inform immediate clinical decision-making. Modern point-of-care devices can perform a wide range of tests including cardiac biomarkers, blood gases, electrolytes, glucose, coagulation studies, and infectious disease testing, with results available in minutes rather than hours. These devices enable emergency clinicians to answer specific clinical questions rapidly, facilitating timely diagnosis and treatment initiation. For example, point-of-care troponin testing can accelerate the rule-in or rule-out of myocardial infarction, enabling appropriate triage of patients with chest pain and reducing emergency department length of stay [27]. The integration of point-of-care testing into emergency

care workflows requires careful attention to quality assurance, operator training, and result documentation. Unlike central laboratory testing performed by dedicated laboratory professionals, point-of-care testing is typically performed by clinicians whose primary responsibility is patient care rather than laboratory analysis. Ensuring accurate and reliable results requires robust training programs, regular competency assessment, and quality control monitoring. Results must be documented in the medical record and communicated effectively to all members of the healthcare team. Despite these challenges, point-of-care testing has become integral to modern emergency care, enabling the rapid diagnosis and treatment that undifferentiated patients require [28].

4.3 Test Selection and Clinical Decision Rules

Given the vast array of available laboratory tests and the need for timely decision-making, emergency clinicians increasingly rely on clinical decision rules and testing algorithms to guide test selection and interpretation. These tools synthesize clinical and laboratory information to predict the probability of specific diagnoses or adverse outcomes, supporting evidence-based and efficient test utilization. For example, the HEART score for chest pain patients integrates history, ECG findings, age, risk factors, and troponin measurement to predict major adverse cardiac events, guiding decisions about admission, observation, or discharge. Similarly, the PERC rule for pulmonary embolism identifies patients at such low risk that testing can safely be withheld, reducing unnecessary D-dimer testing and imaging.

Clinical decision rules serve multiple functions in emergency care. They standardize practice by providing explicit criteria for test ordering, reducing unwarranted variation and ensuring that testing decisions are based on evidence rather than individual preference alone. They support clinician judgment by making explicit the factors that should influence decision-making, helping less experienced clinicians avoid common errors. And they facilitate communication by providing a common framework for discussing testing decisions with patients, colleagues, and consultants. The development and validation of clinical decision rules represents an active area of emergency medicine research, with new tools continuously being developed and existing tools refined based on accumulating evidence [29].

However, clinical decision rules must be applied thoughtfully, recognizing their limitations and the unique circumstances of individual patients. Rules are derived from populations and may not apply

perfectly to specific individuals, particularly those with atypical presentations or multiple comorbidities. Rules cannot incorporate all relevant clinical information, and clinician judgment remains essential in determining whether and how to apply them. The most effective approach integrates clinical decision rules with expert clinical judgment, using rules to support rather than supplant thoughtful decision-making [30].

4.4 Communication and Result Interpretation

The value of laboratory testing depends not only on test accuracy and timeliness but also on effective communication and interpretation of results. Laboratory results must be communicated to the clinical team in ways that are timely, clear, and actionable, enabling appropriate clinical responses. Critical results—those indicating life-threatening conditions requiring immediate intervention—must be communicated urgently, with protocols ensuring that results reach the responsible clinician without delay. Non-critical results must be communicated in timely fashion but may be transmitted through less urgent channels such as the electronic health record.

Result interpretation requires integration of laboratory data with clinical information, recognizing that test results derive their meaning from the clinical context in which they are obtained. A mildly elevated troponin has different implications in a patient with classic anginal chest pain than in a patient with sepsis and tachycardia; an abnormal white blood cell count must be interpreted in light of the patient's baseline values and clinical presentation. Emergency nurses play a critical role in this interpretative process, integrating laboratory results with their ongoing assessment of the patient and communicating concerns to physicians when results appear discordant with clinical status.

The laboratory-clinical interface extends beyond individual patient encounters to encompass quality improvement and systems optimization. Analysis of test-ordering patterns across emergency departments can identify opportunities for improvement, revealing unwarranted variation that may indicate over-testing or under-testing [8]. Collaborative review of such data by laboratory and clinical leaders can inform interventions to optimize test utilization, improving efficiency while maintaining or enhancing quality of care. Such collaborative approaches recognize that laboratory services are not merely support functions but integral components of the emergency care team, contributing to timely management of

undifferentiated patients at both individual and systems levels.

5. Integration and Interprofessional Collaboration

5.1 The Emergency Care Team as a Functional Unit

The timely management of undifferentiated emergency patients requires the coordinated action of multiple professionals whose contributions must be integrated into coherent care rather than remaining isolated interventions. The emergency department functions as a complex adaptive system in which outcomes emerge from interactions among team members rather than from individual actions alone. Within this system, nurses, physicians, technicians, and support staff must function as a cohesive unit, anticipating each other's needs, sharing information seamlessly, and coordinating actions in real time.

Teamwork in emergency care is characterized by several distinctive features that differentiate it from collaboration in other healthcare settings. Emergency teams are often ad hoc, assembled from available personnel rather than pre-existing stable groupings, requiring members to establish working relationships rapidly under pressure. Team composition may change throughout a patient's encounter as shifts change and priorities shift, requiring effective handoffs and continuity of information. Decision-making must occur rapidly, often with incomplete information, requiring team members to trust each other's judgments and communicate clearly despite uncertainty.

Effective emergency teams demonstrate specific behaviors that enable coordinated action. They maintain shared situational awareness, with all members understanding not only their individual tasks but also the overall care trajectory and current priorities. They communicate clearly and explicitly, using structured formats and closed-loop communication to ensure message receipt and comprehension. They support each other by anticipating needs, offering assistance, and backing up team members under stress. They engage in mutual performance monitoring, watching for errors and providing corrective feedback in ways that maintain psychological safety. And they demonstrate adaptability, adjusting their approach as circumstances change and new information becomes available [31].

5.2 Shared Mental Models and Common Frameworks

The development of shared mental models—common understandings of situations, goals, and appropriate responses—enables effective team function by aligning expectations and reducing the need for explicit coordination. When team members share mental models, they can anticipate each other's needs and actions, coordinate implicitly rather than through constant explicit communication, and respond rapidly to changing circumstances without extended discussion.

Common clinical frameworks such as the ABCDE approach facilitate shared mental models by providing universal structures for assessment and intervention that all team members understand [12]. When nurses, technicians, and physicians all conceptualize patient assessment through the ABCDE framework, they can coordinate their activities around shared priorities, with each team member understanding the current focus and contributing appropriately. The framework also facilitates communication by providing a common language for describing patient status and care priorities, reducing ambiguity and misunderstanding [13].

Similarly, structured communication tools such as SBAR and closed-loop communication enhance shared understanding by ensuring that information is transmitted clearly and received accurately. When team members use these tools consistently, they develop predictable communication patterns that reduce cognitive load and minimize errors. The predictability of structured communication also supports team members in anticipating information needs and preparing appropriate responses, further enhancing coordination [25].

5.3 The Nurse-EMS Interface

The interface between prehospital EMS clinicians and emergency nurses represents a particularly critical juncture for interprofessional collaboration, as information and responsibility transfer from one professional group to another. Effective collaboration at this interface requires mutual respect, clear communication, and shared commitment to patient welfare. EMS clinicians must trust that emergency nurses will receive and act upon the information they provide; emergency nurses must trust that EMS assessments are accurate and interventions appropriate. Building this trust requires ongoing relationships, shared experiences, and organizational cultures that value prehospital contributions.

Several factors facilitate effective nurse-EMS collaboration. Joint training exercises and simulation experiences enable both groups to practice working together in realistic scenarios,

developing shared understanding of each other's roles, capabilities, and constraints. Structured handoff protocols provide consistent formats for information transfer, ensuring that essential information is communicated and received. Regular feedback loops enable EMS clinicians to learn about patient outcomes and the impact of their interventions, reinforcing learning and motivating continued excellence. And organizational policies that recognize the value of prehospital care, such as allowing EMS clinicians to remain with patients during initial stabilization, support collaborative relationships [32].

The transition from EMS to nursing practice, exemplified by clinicians who begin as EMTs or paramedics and later become registered nurses, represents a particularly powerful mechanism for enhancing nurse-EMS collaboration. These dual-role clinicians bring unique perspectives shaped by their experience in both domains, understanding the challenges and contributions of each. They can serve as bridges between professional groups, translating between different conceptual frameworks and facilitating mutual understanding. Their presence in emergency departments and EMS agencies promotes integration and collaboration, enhancing the overall function of the emergency care system [33].

5.4 Laboratory-Clinician Collaboration

Effective integration of laboratory services into emergency care requires collaborative relationships between laboratory professionals and clinicians that extend beyond simple test ordering and result reporting. Laboratory professionals possess expertise in test characteristics, pre-analytic variables, and result interpretation that can enhance clinical decision-making when appropriately shared. Clinicians possess understanding of clinical contexts and decision needs that can guide laboratory service development and optimization when effectively communicated.

Several mechanisms support effective laboratory-clinician collaboration. Laboratory representation on emergency department quality improvement committees ensures that laboratory perspectives inform discussions of test utilization, turnaround times, and result communication. Regular meetings between laboratory and emergency department leadership enable identification and resolution of interface issues before they become problems. Consultation services enable clinicians to discuss complex cases with laboratory professionals, optimizing test selection and interpretation. And collaborative development of testing algorithms and

order sets ensures that laboratory services are configured to meet clinical needs efficiently [34]. Point-of-care testing programs require particularly close laboratory-clinician collaboration, as these programs transfer testing responsibility from laboratory professionals to clinicians. Effective point-of-care programs include robust laboratory oversight of training, quality control, and result documentation, ensuring that testing performed by clinicians meets professional standards. Laboratory professionals support point-of-care testing by developing training materials, conducting competency assessments, monitoring quality control data, and troubleshooting problems. Clinicians, in turn, provide feedback on point-of-care device performance and usability, guiding equipment selection and process improvement [28].

5.5 Transitions of Care and System Integration

Beyond the emergency department, timely management of undifferentiated patients requires effective integration with receiving units for admitted patients and with primary care for those discharged. Transitions of care from emergency departments to inpatient units or community settings represent vulnerability points where information can be lost, responsibility can be unclear, and care can be disrupted. Effective management of these transitions requires coordinated efforts across professional groups and organizational boundaries.

For admitted patients, the transition from emergency to inpatient care requires communication of clinical information, pending test results, and treatment plans to accepting physicians and nursing units. Emergency nurses must provide comprehensive handoffs to inpatient nurses, ensuring continuity of assessment and intervention. Emergency physicians must communicate diagnostic impressions, treatment provided, and ongoing concerns to accepting physicians, facilitating continued appropriate care. Laboratory services must ensure that pending results are communicated to receiving units and that additional testing is ordered appropriately.

For discharged patients, the transition from emergency to community care requires clear communication of diagnoses, test results, and follow-up plans to patients and primary care providers. Emergency nurses play critical roles in discharge teaching, ensuring that patients understand their conditions, treatments, and warning signs requiring return. Emergency physicians must communicate with primary care providers, providing information about emergency evaluations and recommendations for ongoing

management. Laboratory services may need to ensure that pending results are communicated to patients and primary care providers, with mechanisms for acting on results that become available after discharge.

6. Future Directions and Quality Improvement

6.1 Technological Innovations and Decision Support

Emerging technologies offer opportunities to enhance timely management of undifferentiated patients through improved decision support, enhanced communication, and accelerated testing. Electronic clinical decision support systems integrated into electronic health records can provide real-time guidance on test selection, interpretation, and management based on patient-specific data and current evidence. These systems can alert clinicians to potential errors, suggest appropriate next steps, and provide access to relevant clinical guidelines at the point of care.

Artificial intelligence and machine learning applications show particular promise in supporting management of undifferentiated patients. These technologies can analyze patterns in large datasets to identify subtle predictors of deterioration, generate differential diagnoses based on presenting symptoms, and predict likelihood of specific outcomes such as admission, adverse events, or specific diagnoses. When appropriately integrated into clinical workflows, AI-based decision support can augment clinician judgment, reducing cognitive load and enhancing accuracy. However, careful attention to implementation, validation, and clinician-technology interface is essential to realize these benefits without introducing new errors or disrupting clinical workflows [35].

Advanced diagnostic technologies continue to expand the capabilities of point-of-care testing, bringing increasingly sophisticated testing to the bedside. Novel biomarkers enable earlier detection of conditions such as sepsis, myocardial injury, and acute kidney injury, supporting timely intervention before irreversible damage occurs. Miniaturized devices and multiplex platforms enable simultaneous testing for multiple analytes from single specimens, accelerating diagnostic workups and reducing sample volume requirements. As these technologies mature and diffuse into emergency practice, they will further enhance the ability to rapidly diagnose and treat undifferentiated patients [27].

6.2 Education and Training for Timely Care

Optimal management of undifferentiated patients requires educational approaches that develop not only knowledge and technical skills but also clinical judgment, situational awareness, and teamwork capabilities. Traditional educational models emphasizing knowledge acquisition must be supplemented with approaches that develop the cognitive and interpersonal capabilities essential for emergency practice. Simulation-based education enables learners to practice managing undifferentiated patients in realistic but safe environments, receiving feedback and repeating experiences to consolidate learning. Interprofessional simulation brings together learners from different professional groups, developing collaborative capabilities alongside clinical skills [36].

The proposed theoretical framework for clinical judgment in EMS can guide educational approaches by identifying the cognitive processes and capabilities that require development [19]. Understanding clinical judgment as a process of cue recognition, analysis, hypothesis generation, solution generation, action, and evaluation suggests educational strategies that target each component. Case-based learning can develop cue recognition by exposing learners to varied presentations and providing feedback on identification of important features. Deliberate practice with feedback can enhance each component of the process-information cycle, building automaticity and reducing cognitive load. Reflection on experiences can consolidate learning and develop the intuitive pattern recognition characteristic of expert practice [23].

Continuing education for practicing clinicians must address the ongoing evolution of emergency care, introducing new evidence, technologies, and approaches while reinforcing fundamental capabilities. Maintenance of certification programs, specialty conferences, and online learning modules provide mechanisms for ongoing professional development. However, education alone is insufficient to change practice; effective continuing education must be integrated with quality improvement initiatives that address systems factors influencing care delivery [36].

6.3 Systems Approaches to Timeliness

Achieving timely management of undifferentiated patients requires attention to systems factors that influence care delivery at organizational and inter-organizational levels. Emergency department crowding, boarding of admitted patients, and resource limitations all impede timely care by overwhelming available capacity and creating

competition for limited resources. Addressing these systems issues requires interventions at multiple levels, from individual department operations to regional healthcare system design.

Operations management approaches can improve emergency department efficiency by optimizing patient flow, reducing waste, and matching resources to demand. Lean methodologies, originally developed in manufacturing, have been adapted to healthcare settings to identify and eliminate sources of delay and inefficiency. Six Sigma approaches focus on reducing variation and defects, standardizing processes to improve reliability and predictability. Combined with robust performance measurement and feedback, these approaches can generate sustained improvements in timeliness while maintaining or enhancing quality [37].

Regional systems of emergency care can improve outcomes for time-sensitive conditions by organizing resources and protocols across multiple facilities. Stroke systems of care ensure that patients receive appropriate interventions at designated centers with specialized capabilities, with protocols guiding prehospital transport decisions and interfacility transfer. Trauma systems similarly organize care across regional networks, ensuring that injured patients are transported to appropriate level trauma centers based on injury severity and resource needs. Cardiac resuscitation systems coordinate prehospital, emergency department, and cardiac catheterization laboratory resources to optimize outcomes for patients with cardiac arrest and acute myocardial infarction [12].

6.4 Measuring and Improving Performance

Effective quality improvement requires measurement systems that capture relevant aspects of timeliness and outcome for undifferentiated patients. Traditional metrics such as door-to-provider time, length of stay, and left-without-being-seen rates provide partial views of timeliness but may not capture condition-specific aspects of timely care. Condition-specific metrics such as door-to-antibiotic time for sepsis, door-to-balloon time for myocardial infarction, and door-to-needle time for stroke provide more targeted measures of timeliness for specific patient populations. Balancing measures ensure that efforts to improve timeliness do not compromise other dimensions of quality such as accuracy, safety, or patient experience [33].

Measurement must be coupled with feedback and improvement processes that translate data into action. Dashboards displaying performance metrics enable clinicians and leaders to monitor current

performance and identify areas requiring attention. Regular review of performance data in quality improvement meetings creates accountability and motivates improvement efforts. Root cause analysis of delays and adverse events identifies systems factors contributing to suboptimal performance, guiding development of targeted interventions. And sharing of best practices across departments and organizations accelerates learning and spread of effective approaches [37].

7. Conclusion

The integration of these professional contributions into coherent patient care requires shared mental models, effective communication, and collaborative relationships that transcend traditional boundaries. Common clinical frameworks such as ABCDE provide shared structures for assessment and intervention, aligning expectations and facilitating coordination. Structured handoff protocols ensure accurate information transfer at critical transition points. Interprofessional education and shared experiences build understanding and trust across professional groups. And organizational cultures that value collaboration and continuous learning sustain effective integration over time.

Looking forward, technological innovations, educational advances, and systems improvements offer opportunities to further enhance timely management of undifferentiated patients. Electronic decision support, artificial intelligence, and advanced diagnostics will augment clinician capabilities, supporting more accurate and efficient care. Simulation-based education and competency-based training will develop the clinical judgment and teamwork capabilities essential for emergency practice. Systems approaches addressing crowding, flow, and regional organization will create environments in which timely care can be consistently delivered. Throughout these advances, the fundamental imperative remains unchanged: to provide every undifferentiated patient with timely, appropriate, and compassionate care, recognizing that behind each presenting complaint lies a human being deserving of our best efforts.

Author Statements:

- **Ethical approval:** The conducted research is not related to either human or animal use.
- **Conflict of interest:** The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

- **Acknowledgement:** The authors declare that they have nobody or no-company to acknowledge.
- **Author contributions:** The authors declare that they have equal right on this paper.
- **Funding information:** The authors declare that there is no funding to be acknowledged.
- **Data availability statement:** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.
- **Use of AI Tools:** The author(s) declare that no generative AI or AI-assisted technologies were used in the writing process of this manuscript.

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