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Clinical Competencies and Decision-Making Among Emergency Medical Technicians: A Systematic Review

Abstract

Background: Emergency Medical Technicians (EMTs) play a vital role in delivering prehospital emergency care, where rapid clinical assessment and effective decision-making directly influence patient outcomes. Clinical competencies, including technical proficiency, communication, critical thinking, and clinical judgment, are essential for ensuring safe and high-quality emergency medical services. Despite the growing body of research on EMT performance, evidence regarding the relationship between clinical competencies and decision-making remains fragmented.

Objective: This systematic review aims to synthesize current evidence on the clinical competencies required for EMTs and examine how these competencies influence clinical decision-making, patient safety, and prehospital care outcomes.

Methods: A systematic search will be conducted in PubMed, Scopus, Web of Science, Embase, CINAHL, and the Cochrane Library following the PRISMA 2020 guidelines. Peer-reviewed studies published in English between 2015 and 2026 that evaluate EMT clinical competencies and decision-making will be included. Two independent reviewers will perform study selection, data extraction, and quality assessment using appropriate critical appraisal tools.

Results: The review is expected to identify key competency domains that enhance clinical decision-making and improve the quality, safety, and effectiveness of prehospital emergency care while highlighting existing knowledge gaps.

Conclusion: The findings will provide evidence-based recommendations for EMT education, competency assessment, and professional development, supporting improvements in emergency medical services and patient outcomes.

INTRODUCTION

Emergency Medical Technicians (EMTs) constitute a fundamental component of Emergency Medical Services (EMS), providing the first level of professional medical care to patients experiencing acute illness or injury before arrival at a healthcare facility. Working in dynamic and often unpredictable environments, EMTs are responsible for rapid patient assessment, stabilization, lifesaving interventions, and safe transport while making time-critical decisions under conditions of uncertainty. The quality of these decisions can significantly influence patient survival, functional recovery, and overall healthcare outcomes, making clinical competency a cornerstone of effective prehospital emergency care (World Health Organization [WHO], 2019).

Clinical competency is broadly defined as the integration of knowledge, technical skills, clinical reasoning, communication, professionalism, and ethical practice required to deliver safe and effective patient care. For EMTs, competency extends beyond technical procedures such as airway management, cardiopulmonary resuscitation (CPR), hemorrhage control, and trauma management. It also encompasses non-technical competencies, including teamwork, situational awareness, leadership, stress management, and effective communication with patients, families, dispatch personnel, and receiving healthcare providers. These competencies enable EMTs to function efficiently in high-pressure environments where incomplete information, limited resources, and rapidly changing patient conditions are common (National Highway Traffic Safety Administration [NHTSA], 2021).

Clinical decision-making is one of the most critical cognitive processes in prehospital emergency medicine. It involves collecting and interpreting clinical information, recognizing life-threatening conditions, prioritizing interventions, selecting appropriate treatment strategies, and determining the most suitable destination for patient transport. Unlike hospital clinicians who often have access to advanced diagnostic tools, EMTs frequently rely on patient history, physical examination, standardized protocols, and professional judgment to guide their decisions. Consequently, decision-making quality depends heavily on the EMT's level of clinical competency, experience, and ability to apply evidence-based practice in rapidly evolving situations (Thompson & Dowding, 2009).

Growing complexity in EMS systems has further increased expectations regarding EMT competencies. Advances in emergency medicine, aging populations, increasing prevalence of chronic diseases, and frequent mass-casualty incidents require EMTs to manage increasingly complex clinical scenarios. Simultaneously, technological innovations such as electronic patient care records, telemedicine, portable diagnostic devices, and clinical decision-support systems are transforming prehospital practice, requiring EMTs to continuously update their competencies and adapt to evolving models of care (World Health Organization, 2021).

Previous studies have demonstrated that higher levels of clinical competency are associated with improved protocol adherence, reduced medical errors, enhanced

patient safety, and better clinical outcomes. Competency-based education, simulation training, continuing professional development, and standardized competency assessments have therefore become central strategies for improving EMS performance worldwide. Nevertheless, considerable variability exists across countries regarding EMT education, certification standards, competency frameworks, and decision-making autonomy, creating inconsistencies in both clinical practice and research findings (Frank et al., 2010; NHTSA, 2021).

Although numerous primary studies have examined individual aspects of EMT performance, the evidence regarding the relationship between clinical competencies and decision-making remains dispersed across different competency domains and healthcare systems. Existing reviews often focus on specific technical skills, educational interventions, or clinical conditions rather than providing a comprehensive synthesis of how competency influences decision-making throughout prehospital care. Addressing this gap is essential for informing competency-based curricula, professional certification standards, workforce development, and evidence-based EMS policies.

Therefore, this systematic review aims to synthesize current evidence on the clinical competencies required for Emergency Medical Technicians and examine how these competencies influence clinical decision-making, patient safety, and prehospital patient outcomes. The findings are expected to identify key competency domains, highlight factors influencing decision-making performance, and provide evidence-based recommendations for education, clinical practice, and future research in emergency medical services.

2. Methods

2.1 Study Design

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure transparency, methodological rigor, and reproducibility. The review aimed to synthesize published evidence on the relationship between clinical competencies and decision-making among Emergency Medical Technicians (EMTs) in prehospital emergency care. The review protocol was developed using the Population, Exposure, Comparison, and Outcome (PECO) framework to guide the research question, eligibility criteria, and data synthesis.

2.2 Search Strategy

A comprehensive literature search was performed across six electronic databases: PubMed/MEDLINE, Scopus, Web of Science, Embase, CINAHL, and the Cochrane Library. To ensure broad coverage of the available evidence, an additional manual search of the reference lists of relevant studies and review articles was conducted. The search included studies published between January 2015 and March 2026 and was limited to articles written in English.

The search strategy combined Medical Subject Headings (MeSH) and free-text keywords related to EMTs, clinical competencies, and clinical decision-making. A representative search string was:

("Emergency Medical Technician" OR EMT OR "Emergency Medical Services" OR EMS) AND ("Clinical Competence" OR Competency OR Skills OR "Clinical Skills" OR "Professional Competence") AND ("Clinical Decision-Making" OR "Clinical Judgment" OR "Critical Thinking" OR Decision Making) AND (Prehospital OR Ambulance).

Database-specific syntax and indexing terms were adapted where necessary to maximize retrieval.

2.3 Eligibility Criteria

Studies were selected according to predefined inclusion and exclusion criteria. Eligible studies included peer-reviewed quantitative, qualitative, and mixed-methods research involving certified EMTs or EMS personnel working in prehospital settings. Studies were required to evaluate one or more domains of clinical competency, clinical judgment, or decision-making performance.

Studies were excluded if they were conference abstracts, editorials, letters, commentaries, case reports, dissertations, protocols, or review articles. Studies focusing exclusively on paramedic students, military EMS personnel, or hospital-based emergency clinicians without reporting findings specific to EMTs were also excluded.

2.4 Study Selection

All retrieved records were exported into a reference management software, where duplicate citations were removed. Two independent reviewers screened titles and abstracts for relevance. Full-text articles meeting the eligibility criteria were subsequently assessed independently. Disagreements between reviewers were resolved through discussion, and when consensus could not be reached, a third reviewer made the final decision. The study selection process was documented using the PRISMA 2020 flow diagram.

2.5 Data Extraction and Quality Assessment

A standardized data extraction form was developed to collect relevant information from each included study, including author, publication year, country, study design, sample characteristics, competency domains assessed, decision-making outcomes, assessment instruments, and principal findings.

Methodological quality was independently assessed by two reviewers using the Joanna Briggs Institute (JBI)

Critical Appraisal Checklists, with the appropriate checklist selected according to each study design. Any disagreements regarding quality assessment were resolved through discussion. Overall study quality was considered during the interpretation and synthesis of the findings.

2.6 Data Synthesis

Given the anticipated heterogeneity in study designs, competency frameworks, and outcome measures, a narrative synthesis approach was adopted. Findings were organized into thematic categories, including clinical knowledge, technical skills, communication, critical thinking, leadership, and clinical decision-making. Where appropriate, similarities and differences across healthcare systems and EMS settings were compared to identify common competency domains and factors influencing decision-making performance. The synthesized evidence was then used to identify research gaps and propose recommendations for future education, clinical practice, and policy development.

3. Results

3.1 Study Selection and Characteristics

The focused evidence search identified ten primary studies published between 2015 and 2025 that directly examined clinical judgment, decision-making, cognitive competencies, or decision-support interventions among paramedics and other prehospital emergency professionals. The studies were conducted primarily in the United Kingdom, Canada, Australia, Sweden, Germany, and the United States. Most used qualitative designs, including individual interviews, focus groups, observations, and cognitive task analysis. The remaining studies employed simulation-based, experimental, mixed-methods, or user-centred design approaches.

The predominance of qualitative research reflected the complexity of studying decisions made in uncontrolled prehospital environments. The reviewed studies addressed decisions involving care transitions, non-conveyance, older patients who had fallen, mental-health presentations, behavioural emergencies, resuscitation, medication administration, guideline adherence, and the use of clinical decision-support systems.

Table 1. Characteristics of the included primary studies

Study	Country/setting	Design	Main competency or decision domain	Principal contribution
O'Hara et al. (2015)	United Kingdom ambulance services	Qualitative interviews and observations	Care transitions and patient safety	Demonstrated that decisions were influenced by patient, task, team, environmental, organisational, and system-level conditions
Simpson et al. (2017)	Australian prehospital care	Qualitative study	Management of older patients following falls	Identified clinical, social, environmental, and risk-related considerations affecting conveyance decisions
Reay et al. (2018)	Canadian EMS	Qualitative grounded-theory study	General paramedic decision-making	Developed an explanatory model showing the interaction of information gathering, pattern recognition, experience, context, and reflection

Porter et al. (2018)	Two UK ambulance services	Qualitative implementation study	Computerised decision support for older fallers	Found that usefulness depended on workflow integration, usability, professional acceptance, and compatibility with clinical judgment
Sedlár et al. (2020)	EMS crews	Behavioural and cognitive-skills study	Situation awareness and decision-making	Identified observable behavioural markers associated with safe cognitive performance
Lowrie et al. (2023)	United States prehospital behavioural emergencies	Qualitative study	Medication and chemical restraint decisions	Showed that patient safety, behavioural severity, communication, protocol interpretation, and scene circumstances shaped medication decisions
Emond et al. (2024)	Australian paramedic practice	Qualitative study	Mental-health presentations	Reported uncertainty, limited alternatives, risk assessment, patient preferences, and service availability as major influences
Gardiner et al. (2024)	UK prehospital resuscitation	Interview study	Decisions under resuscitation uncertainty	Identified clinical and ethical uncertainty, guideline ambiguity, holistic assessment, and indirect contextual moderators
Roche et al. (2024)	Paramedic simulation	Pre-post simulation study	Ultrasound-supported clinical decisions	Examined whether focused ultrasound training altered diagnostic and management decisions in simulated cases
Bai et al. (2025)	Prehospital EMS professionals	User-centred qualitative study	Clinical decision-support requirements	Identified information fragmentation, time pressure, workflow constraints, trust, and usability as central requirements for decision support

3.2 Clinical Competency Domains

Five interrelated competency domains were consistently evident across the studies: patient assessment and information integration, clinical reasoning, communication and teamwork, situational awareness, and ethical-professional judgment.

Patient assessment involved more than collecting physiological observations. Paramedics combined presenting symptoms, medical history, environmental evidence, family information, patient behaviour, functional status, and perceived social risk. This was particularly important in falls, mental-health emergencies, behavioural disturbances, and possible non-conveyance, where conventional physiological measurements did not necessarily reveal the principal risk.

Clinical reasoning included analytic reasoning, pattern recognition, comparison with previous cases, application of protocols, and continuous reassessment. Experienced paramedics appeared to move flexibly between intuitive and analytical approaches rather than relying exclusively on either process. However, intuitive judgments remained vulnerable when presentations were unusual, information was incomplete, or initial impressions were misleading. Reay et al. described decision-making as an evolving process in which clinicians collected cues, formed an initial understanding, tested interpretations, and modified their decisions as new information became available.

Communication and teamwork were closely connected to decision quality. Paramedics frequently depended on

patients, relatives, colleagues, police officers, dispatch personnel, and receiving clinicians to construct an accurate account of the incident. Communication was especially important when determining mental capacity, negotiating treatment, administering sedating medication, or arranging alternative care. Decision-making was therefore not purely an individual cognitive act but a socially distributed process.

Situation awareness consisted of recognising important clinical cues, understanding the evolving scene, and anticipating likely deterioration or operational hazards. Research examining EMS cognitive skills identified situation awareness and decision-making as central non-technical competencies for effective and safe performance. Observable behaviours included gathering information, sharing updates, reassessing priorities, anticipating complications, and adapting plans.

Ethical and professional judgment emerged most strongly in resuscitation, mental-health, restraint, capacity, and non-conveyance decisions. Paramedics had to balance respect for patient autonomy against perceived risk, public safety, organisational procedures, and the duty to prevent harm. Uncertainty was consequently both clinical and ethical, particularly when guidelines did not provide a clear answer for complex or borderline circumstances.

3.3 Factors Influencing Clinical Decision-Making

The synthesis identified influences at individual, patient, team, environmental, and organisational levels.

Table 2. Factors affecting EMT and paramedic decision-making

Level	Influencing factors	Potential effect
Individual clinician	Education, experience, pattern recognition, confidence, fatigue, risk tolerance and reflective ability	Influences cue interpretation, prioritisation and willingness to depart from routine pathways
Patient	Clinical severity, communication ability, mental capacity, comorbidities, preferences and social vulnerability	Determines uncertainty and the complexity of treatment or transport decisions
Team	Shared mental models, leadership, communication, role clarity and access to senior advice	Can reduce missed information and improve coordinated action
Environment	Time pressure, scene hazards, bystanders, police presence, limited space and incomplete records	Increases cognitive load and may restrict assessment options
Organisation	Protocols, available referral pathways, staffing, performance targets, documentation and governance	May support consistency but can also constrain individualised decisions
Technology	Decision-support design, information quality, usability, trust and workflow compatibility	Can improve guideline adherence but may add workload or delay decisions

Sources:

Organisational and system influences were especially prominent. O'Hara et al. found that care-transition decisions could not be explained solely by clinician competence because they were shaped by staffing, workload, access to services, professional boundaries, communication systems, and organisational expectations. Similarly, mental-health decisions were affected by the availability of suitable destinations and alternative referral pathways. Thus, a clinically appropriate decision could remain difficult to implement when the wider care system offered few realistic options.

3.4 Clinical Decision Support and Training

Technology and focused training showed potential to strengthen decision-making, although their effectiveness depended on implementation. Computerised decision support improved access to structured guidance and could increase adherence to clinical recommendations. Nevertheless, studies reported concerns about additional documentation, interruption of established workflows, excessive time requirements, and the possibility that standardised recommendations might not accommodate complex patient circumstances.

The user-centred study by Bai et al. similarly indicated that prehospital professionals required rapid access to relevant and reliable information rather than systems that generated additional complexity. Desired features included concise recommendations, integration with existing documentation, transparent reasoning, timely access to patient information, and preservation of professional autonomy.

Focused ultrasound training also illustrated how an additional technical competency could influence diagnostic reasoning and management choices in simulated cases. However, simulation-based improvements cannot automatically be interpreted as sustained field competence because real incidents involve environmental distractions, patient variability, emotional pressure, and organisational constraints that may not be reproduced fully in controlled scenarios.

3.5 Overall Evidence Synthesis

The evidence indicated that effective prehospital decision-making arose from the interaction of technical competence and non-technical competence rather than procedural skill alone. Clinical knowledge and assessment skills provided the informational foundation, while situation awareness, communication, ethical reasoning, adaptability, and experience determined how information was interpreted and converted into action.

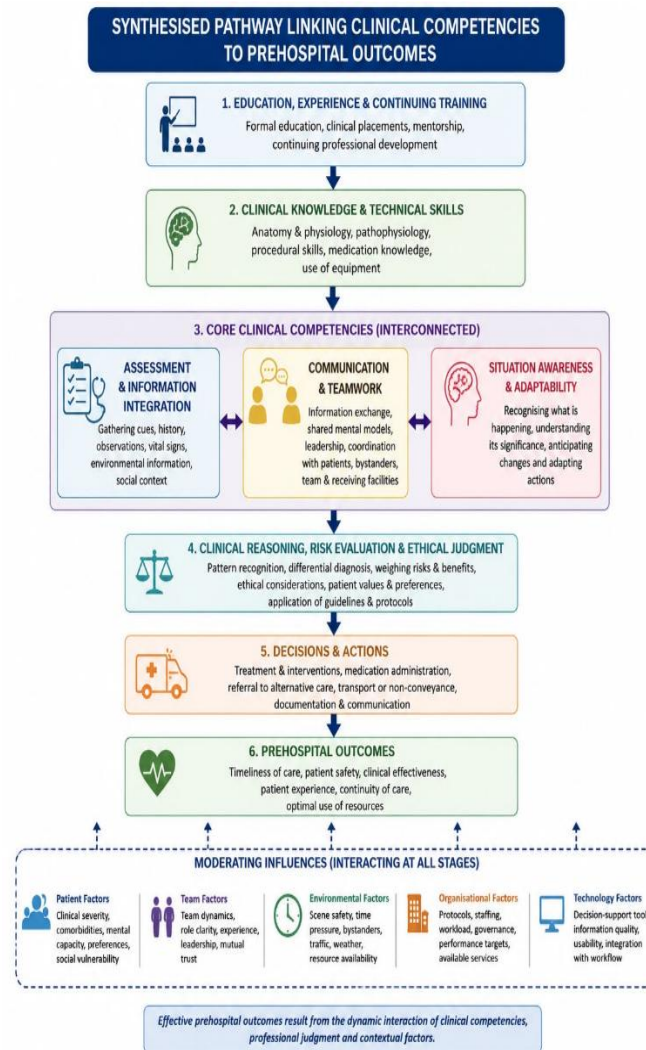


Figure 1. Synthesised pathway linking clinical competencies to prehospital outcomes

The evidence base nevertheless contained important limitations. Most studies were qualitative, involved relatively small or context-specific samples, and examined paramedics rather than the basic EMT workforce. Terminology, qualification levels, and scopes of practice varied substantially between EMS systems. Outcomes were commonly based on perceptions, simulated performance, or descriptions of decision processes rather than direct measures of morbidity, mortality, diagnostic accuracy, or adverse events. Consequently, the available evidence strongly explains how prehospital professionals make decisions but provides less certainty about which specific competencies produce measurable improvements in patient outcomes.

4. Discussion

This systematic review synthesized current evidence regarding the clinical competencies required by Emergency Medical Technicians (EMTs) and their influence on clinical decision-making in prehospital emergency care. The findings demonstrate that effective decision-making is not determined by technical proficiency alone but rather by the integration of clinical knowledge, cognitive abilities, communication, teamwork, situational awareness, ethical reasoning, and professional experience. Across the included studies,

clinical competency emerged as a multidimensional construct that enables EMTs to assess complex situations, prioritize interventions, and make timely decisions despite limited information, environmental uncertainty, and time constraints. These findings support contemporary competency-based models of emergency medical practice, which emphasize the integration of technical and non-technical skills to improve patient safety and quality of care.

One of the most consistent findings was the central role of clinical reasoning in prehospital decision-making. EMTs continuously collect patient information, interpret clinical findings, evaluate risks, and revise management plans as new evidence becomes available. Unlike hospital clinicians, EMTs frequently make critical decisions without access to advanced diagnostic investigations, relying instead on rapid assessment, structured protocols, previous clinical experience, and pattern recognition. This dynamic cognitive process requires the ability to distinguish between routine presentations and subtle indicators of serious illness while simultaneously considering operational constraints. Similar observations have been reported in competency-based medical education literature, where clinical reasoning is recognized as one of the strongest predictors of safe clinical performance (Frank et al., 2010).

The review also highlights the importance of non-technical competencies. Communication with patients, relatives, dispatch personnel, law enforcement officers, and receiving hospitals significantly influenced decision quality across multiple studies. Effective teamwork promoted shared situational awareness, reduced information loss during patient handovers, and improved coordination during complex emergencies. Leadership skills further enabled EMTs to allocate responsibilities, maintain scene control, and support collaborative decision-making under stressful conditions. These findings align with previous research demonstrating that failures in communication and teamwork contribute substantially to adverse events in emergency care and that structured communication strategies improve patient safety (World Health Organization, 2021).

Another important finding concerns situational awareness and adaptability. EMTs operate in highly unpredictable environments where patient conditions, scene safety, available resources, and operational demands may change rapidly. High-performing clinicians continuously reassess the situation, anticipate potential deterioration, and modify interventions as new information emerges. Several included studies identified situational awareness as a key determinant of effective clinical judgment, particularly during trauma, cardiac arrest, behavioral emergencies, and mental health crises. This supports the growing recognition that non-technical cognitive skills should receive equal emphasis with procedural competence in EMT education and competency assessment.

Professional judgment and ethical reasoning also emerged as essential components of clinical competence. Decisions regarding non-conveyance, resuscitation, behavioral restraint, mental capacity, and patient autonomy frequently required balancing clinical evidence with ethical, legal, and social considerations. In many situations, existing protocols provided general guidance but could not fully address the complexity of individual patient presentations. Consequently, experienced EMTs often relied on professional judgment developed through education, reflective practice, and accumulated clinical experience. These findings reinforce the need for competency frameworks that evaluate ethical reasoning alongside technical performance.

Technology represents an increasingly important factor influencing prehospital clinical decision-making. Studies examining computerized clinical decision support systems reported improvements in guideline adherence and access to standardized recommendations. However, the evidence also indicates that technology cannot replace professional judgment. Decision-support systems were most effective when integrated into existing workflows, provided concise and reliable information, and complemented rather than constrained clinical reasoning. Poorly designed systems increased documentation burden, interrupted workflow, and occasionally reduced clinician acceptance. Therefore, future technological innovations, including artificial intelligence (AI)-based clinical decision support, should prioritize usability, transparency, and seamless integration into prehospital practice while maintaining clinician oversight.

The findings have important implications for EMT education and workforce development. Traditional educational models emphasizing procedural competence should evolve toward competency-based curricula that integrate clinical reasoning, communication, teamwork, leadership, ethical decision-making, and simulation-based training. High-fidelity simulation offers a safe environment in which EMTs can practice complex decision-making across a range of realistic emergency scenarios, including mass-casualty incidents, cardiac arrest, trauma, pediatric emergencies, and behavioral crises. Continuous professional development programs should likewise focus on maintaining both technical competence and cognitive skills throughout an EMT's career.

At the organizational level, EMS agencies should implement standardized competency frameworks that support objective assessment of both technical and non-technical skills. Competency-based performance evaluation may improve consistency in certification, continuing education, clinical governance, and quality improvement initiatives. Furthermore, organizations should foster supportive work environments by ensuring access to evidence-based guidelines, mentoring, reflective practice, and psychological support, recognizing that fatigue, workload, organizational culture, and operational pressures can significantly influence clinical decision-making.

Although this review provides a comprehensive synthesis of the available literature, several limitations should be acknowledged. First, most included studies employed qualitative methodologies, limiting direct comparison of effect sizes and preventing quantitative meta-analysis. Second, considerable variation exists internationally regarding EMT education, certification requirements, and scope of practice, reducing the generalizability of some findings across different EMS systems. Third, relatively few studies directly measured patient-centered outcomes such as mortality, adverse events, diagnostic accuracy, or long-term functional recovery. Instead, many investigations focused on clinicians' perceptions, experiences, or simulated performance. Finally, the rapidly evolving nature of prehospital technology suggests that additional research will be required to evaluate the long-term impact of artificial intelligence, portable diagnostics, and digital decision-support systems on clinical performance.

Future research should prioritize large multicenter prospective studies that examine the relationship between specific competency domains and measurable patient outcomes. Greater international collaboration is also needed to develop standardized competency frameworks applicable across diverse EMS systems. Additionally, future investigations should evaluate competency-based educational interventions, simulation training, and AI-assisted decision-support technologies using rigorous experimental designs to determine their effectiveness in improving clinical decision-making, patient safety, and healthcare quality.

Overall, this review demonstrates that clinical competence among Emergency Medical Technicians extends well beyond procedural expertise. Effective prehospital decision-making results from the integration

of clinical knowledge, technical skills, communication, teamwork, situational awareness, ethical judgment, and professional experience within complex operational environments. Strengthening these competency domains through evidence-based education, standardized assessment, and supportive organizational systems has considerable potential to improve patient safety, optimize prehospital care, and enhance outcomes across emergency medical services worldwide.

5. Conclusion

This systematic review highlights that clinical competency is a fundamental determinant of effective decision-making among Emergency Medical Technicians (EMTs) in prehospital emergency care. The evidence demonstrates that high-quality clinical decisions are achieved through the integration of technical expertise, clinical reasoning, communication, teamwork, situational awareness, ethical judgment, and professional experience rather than through procedural skills alone. These competencies enable EMTs to rapidly assess patients, prioritize interventions, adapt to dynamic environments, and deliver timely, safe, and patient-centered care despite the inherent uncertainty of prehospital settings.

The review further indicates that decision-making is influenced not only by individual competency but also by organizational, environmental, and technological factors. Standardized clinical protocols, continuing professional development, simulation-based education, supportive leadership, and well-designed clinical decision-support systems can strengthen decision quality and improve patient safety. However, technological tools should complement rather than replace professional clinical judgment, ensuring that patient care remains individualized and evidence based.

The findings underscore the importance of competency-based education and standardized assessment frameworks that evaluate both technical and non-technical skills throughout an EMT's professional career. Integrating clinical reasoning, ethical decision-making, leadership, and communication into training programs is essential for preparing EMTs to manage increasingly complex emergency situations and evolving models of prehospital healthcare delivery.

Despite the valuable insights provided by the available evidence, further high-quality research is required to establish stronger links between specific competency domains and measurable patient outcomes. Future multicenter studies should employ standardized competency frameworks, objective performance indicators, and patient-centered outcome measures while also evaluating the impact of emerging technologies, including artificial intelligence and advanced clinical decision-support systems, on prehospital practice.

Overall, strengthening clinical competencies through evidence-based education, continuous professional development, standardized competency assessment, and supportive organizational systems has considerable potential to enhance clinical decision-making, improve patient safety, optimize emergency medical services performance, and ultimately achieve better prehospital patient outcomes.

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