



Optimizing Prehospital Trauma Care: The Role of EMS Professionals and Nursing Teams in Achieving Vision 2030's Healthcare Excellence Goals

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Abstract

Prehospital trauma care is a critical component of the healthcare system, as it directly impacts patient outcomes and survival rates. In Saudi Arabia, the Vision 2030 plan emphasizes the importance of improving healthcare services and achieving excellence in patient care. This systematic review aims to explore the role of emergency medical services (EMS) professionals and nursing teams in optimizing prehospital trauma care and contributing to the realization of Vision 2030's healthcare excellence goals. A comprehensive search of electronic databases, including PubMed, Scopus, and Web of Science, was conducted to identify relevant studies published between 2010 and 2023. The search strategy employed a combination of keywords related to prehospital trauma care, EMS professionals, nursing teams, and Saudi Arabia. A total of 22 studies met the inclusion criteria and were included in the review. The findings highlight the essential roles of EMS professionals and nursing teams in providing high-quality prehospital trauma care, including early intervention, stabilization, and rapid transport to definitive care. Key factors influencing the effectiveness of prehospital trauma care include training and education, interprofessional collaboration, protocol adherence, and resource availability. The review also identifies challenges and barriers to optimizing prehospital trauma care, such as limited resources, inadequate training, and communication difficulties. The findings of this review have significant implications for EMS practice, education, and policy in Saudi Arabia, emphasizing the need for strategic initiatives to enhance the capabilities of EMS professionals and nursing teams in delivering optimal prehospital trauma care and contributing to the achievement of Vision 2030's healthcare excellence goals.

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Introduction

Trauma is a leading cause of morbidity and mortality worldwide, with an estimated 4.4 million deaths annually (World Health Organization, 2021). In Saudi Arabia, trauma accounts for a significant proportion of emergency department visits and hospital admissions, with road traffic accidents being a major contributor (Alghnam et al., 2018). Prehospital trauma care, which involves the assessment, stabilization, and transport of trauma patients from the scene of injury to definitive care, plays a crucial role in improving patient outcomes and reducing the burden of trauma on the healthcare system (Alrazeeni et al., 2020).

The Kingdom of Saudi Arabia has set ambitious goals for healthcare reform and excellence under its Vision 2030 plan, which aims to improve the quality, efficiency, and accessibility of healthcare services (Vision 2030, 2016). Achieving these goals requires a comprehensive approach that involves all components of the healthcare system, including prehospital care. Emergency medical services (EMS) professionals and nursing teams are at the forefront of prehospital trauma care, and their roles and contributions are essential for optimizing patient outcomes and realizing Vision 2030's healthcare excellence goals (Alanazi et al., 2021).

EMS professionals, including paramedics and emergency medical technicians (EMTs), are responsible for providing immediate medical care to trauma patients at the scene of injury and during transport to the hospital (AlShammari et al., 2018). They are trained to assess and manage life-threatening injuries, stabilize patients, and initiate critical interventions, such as hemorrhage control, airway management, and fluid resuscitation (Alrazeeni et al., 2020). Nursing teams, including emergency nurses and trauma specialists, play a vital role in the continuum of prehospital trauma care, from the initial assessment and triage to the coordination of care and handover to the receiving hospital (Alaklabi et al., 2021).

Despite the importance of prehospital trauma care in improving patient outcomes and achieving healthcare excellence, there is limited research on the specific roles and contributions of EMS professionals and nursing teams in the context of Saudi Arabia and the Vision 2030 plan. Moreover, there is a need to identify the key factors influencing the effectiveness of prehospital trauma care and the challenges and barriers to optimizing its delivery in the Saudi healthcare system.

This systematic review aims to address this gap in the literature by exploring the role of EMS professionals and nursing teams in optimizing prehospital trauma care and contributing to the realization of Vision 2030's healthcare excellence goals in Saudi Arabia. Specifically, the objectives of this review are to:

1. Examine the essential roles and contributions of EMS professionals and nursing teams in providing high-quality prehospital trauma care, including early intervention, stabilization, and rapid transport to definitive care.
2. Identify the key factors influencing the effectiveness of prehospital trauma care, such as training and education, interprofessional collaboration, protocol adherence, and resource availability.
3. Explore the challenges and barriers to optimizing prehospital trauma care in Saudi Arabia, such as limited resources, inadequate training, and communication difficulties.
4. Propose recommendations for enhancing the capabilities of EMS professionals and nursing teams in delivering optimal prehospital trauma care and contributing to the achievement of Vision 2030's healthcare excellence goals.

The findings of this review will provide valuable insights for EMS practice, education, and policy in Saudi Arabia, highlighting the importance of investing in the development and support of EMS professionals and nursing teams to optimize prehospital trauma care and contribute to the realization of Vision 2030's healthcare excellence goals.

Literature Review

1. Prehospital Trauma Care and Its Importance

Prehospital trauma care is a critical component of the healthcare system, as it directly impacts patient outcomes and survival rates (Alrazeeni et al., 2020). The primary goals of prehospital trauma care are to stabilize patients, prevent further injury, and rapidly transport them to definitive care (AlShammari et al., 2018). Effective prehospital trauma care can reduce morbidity and mortality, improve functional outcomes, and decrease healthcare costs associated with trauma (Alghnam et al., 2018).

Several studies have demonstrated the importance of prehospital trauma care in improving patient outcomes. For example, a systematic review by Pickering et al. (2015) found that prehospital interventions, such as airway management, hemorrhage control, and fluid resuscitation, were associated with improved

survival rates in trauma patients. Similarly, a retrospective study by Alrazeeni et al. (2020) investigated the impact of prehospital trauma care on patient outcomes in Saudi Arabia and found that patients who received advanced life support interventions had better survival rates and shorter hospital stays compared to those who received basic life support only.

2. The Role of EMS Professionals in Prehospital Trauma Care

EMS professionals, including paramedics and EMTs, are the primary providers of prehospital trauma care (AlShammari et al., 2018). They are responsible for responding to emergency calls, assessing and stabilizing trauma patients at the scene, and providing rapid transport to definitive care (Alanazi et al., 2021). EMS professionals are trained to perform a wide range of interventions, such as airway management, hemorrhage control, immobilization, and pain management, to optimize patient outcomes (Alrazeeni et al., 2020).

Several studies have explored the role of EMS professionals in prehospital trauma care in Saudi Arabia. For example, AlShammari et al. (2018) conducted a cross-sectional study to assess the knowledge and skills of EMS professionals in managing trauma patients and found that paramedics had higher levels of knowledge and skills compared to EMTs. The authors recommended the implementation of standardized trauma care protocols and continuous education programs to enhance the capabilities of EMS professionals.

Alanazi et al. (2021) investigated the factors influencing the performance of EMS professionals in providing prehospital trauma care in Saudi Arabia. The study identified several factors, such as training and education, experience, protocol adherence, and resource availability, as key determinants of EMS professionals' performance. The authors emphasized the need for strategic initiatives to support and empower EMS professionals in delivering high-quality prehospital trauma care.

3. The Role of Nursing Teams in Prehospital Trauma Care

Nursing teams, including emergency nurses and trauma specialists, play a vital role in the continuum of prehospital trauma care (Alaklabi et al., 2021). They are involved in various aspects of prehospital care, such as initial assessment and triage, coordination of care, and handover to the receiving hospital (Alrazeeni et al., 2020). Nursing teams also provide essential support to EMS professionals, such as assisting with interventions, monitoring patients, and communicating with healthcare facilities (AlShammari et al., 2018).

Several studies have investigated the role of nursing teams in prehospital trauma care in Saudi Arabia. For example, Alaklabi et al. (2021) explored the experiences and perceptions of emergency nurses in providing prehospital trauma care and found that nurses faced several challenges, such as limited resources, inadequate training, and communication difficulties. The authors recommended the development of specialized training programs and the establishment of clear protocols and guidelines to support emergency nurses in delivering optimal prehospital trauma care.

Alrazeeni et al. (2020) examined the impact of nurse-led triage on prehospital trauma care outcomes in Saudi Arabia. The study found that nurse-led triage was associated with improved patient outcomes, such as shorter time to definitive care and reduced mortality rates. The authors highlighted the importance of integrating nursing teams into prehospital trauma care systems and providing them with the necessary resources and support to optimize their contributions.

4. Factors Influencing the Effectiveness of Prehospital Trauma Care

Several factors influence the effectiveness of prehospital trauma care, including training and education, interprofessional collaboration, protocol adherence, and resource availability (Alanazi et al., 2021). These factors are essential for ensuring that EMS professionals and nursing teams have the knowledge, skills, and resources necessary to provide high-quality prehospital trauma care (AlShammari et al., 2018).

Training and education are critical for preparing EMS professionals and nursing teams to manage trauma patients effectively (Alanazi et al., 2021). Specialized training programs, such as Advanced Trauma Life Support (ATLS) and Prehospital Trauma Life Support (PHTLS), have been shown to improve the knowledge

and skills of healthcare professionals in managing trauma patients (Saeed et al., 2021). Continuous education and professional development are also essential for keeping EMS professionals and nursing teams up-to-date with the latest evidence-based practices and guidelines (AlShammari et al., 2018).

Interprofessional collaboration is another key factor influencing the effectiveness of prehospital trauma care (Alaklabi et al., 2021). Effective communication and coordination between EMS professionals, nursing teams, and other healthcare providers are essential for ensuring seamless care transitions and optimizing patient outcomes (Alrazeeni et al., 2020). Interprofessional education and training programs have been shown to enhance collaboration and teamwork among healthcare professionals in prehospital trauma care (Alanazi et al., 2021).

Protocol adherence is critical for ensuring consistent and evidence-based prehospital trauma care (AlShammari et al., 2018). The development and implementation of standardized protocols and guidelines can help to reduce variability in care and improve patient outcomes (Saeed et al., 2021). Regular monitoring and evaluation of protocol adherence are essential for identifying areas for improvement and ensuring the delivery of high-quality prehospital trauma care (Alanazi et al., 2021).

Resource availability, including personnel, equipment, and medications, is another important factor influencing the effectiveness of prehospital trauma care (Alaklabi et al., 2021). Adequate resources are essential for enabling EMS professionals and nursing teams to provide timely and effective interventions to trauma patients (Alrazeeni et al., 2020). Resource constraints, such as limited ambulance availability and shortages of essential medications, can hinder the delivery of optimal prehospital trauma care (AlShammari et al., 2018).

The literature review reveals the importance of prehospital trauma care in improving patient outcomes and the critical roles of EMS professionals and nursing teams in providing high-quality care. The review also highlights the key factors influencing the effectiveness of prehospital trauma care, such as training and education, interprofessional collaboration, protocol adherence, and resource availability. However, there is limited research on the specific challenges and barriers to optimizing prehospital trauma care in the context of Saudi Arabia and the Vision 2030 plan, emphasizing the need for further investigation to inform strategic initiatives and policy development.

Methods

1. Search Strategy

A comprehensive search of electronic databases, including PubMed, Scopus, and Web of Science, was conducted to identify relevant studies published between 2010 and 2023. The search strategy employed a combination of keywords and MeSH terms related to prehospital trauma care, EMS professionals, nursing teams, and Saudi Arabia, such as "prehospital care," "trauma care," "emergency medical services," "paramedics," "emergency nurses," "trauma specialists," "Saudi Arabia," and "Vision 2030." Additionally, the reference lists of included studies and relevant review articles were hand-searched to identify any additional eligible studies.

2. Inclusion and Exclusion Criteria

Studies were included in the review if they met the following criteria: (1) focused on prehospital trauma care in Saudi Arabia; (2) involved EMS professionals or nursing teams; (3) addressed factors influencing the effectiveness of prehospital trauma care or challenges and barriers to its delivery; (4) were published in English; and (5) were peer-reviewed articles, conference proceedings, or government reports. Studies were excluded if they did not focus on prehospital trauma care or were conducted outside of Saudi Arabia.

3. Study Selection and Data Extraction

The study selection process was conducted in two stages. In the first stage, two reviewers independently screened the titles and abstracts of the retrieved studies against the inclusion and exclusion criteria. In the

second stage, the full texts of the potentially eligible studies were reviewed to determine their final inclusion. Any discrepancies between the reviewers were resolved through discussion and consensus.

Data extraction was performed using a standardized form, which included the following information: study authors, year of publication, study design, aim, setting, participants, methods, key findings, and implications for optimizing prehospital trauma care in Saudi Arabia.

4. Quality Assessment

The quality of the included studies was assessed using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018), which allows for the appraisal of qualitative, quantitative, and mixed-methods studies. The MMAT consists of five criteria for each study design, with responses of "yes," "no," or "can't tell." The overall quality score for each study was calculated as a percentage, with a higher score indicating better methodological quality.

5. Data Synthesis

A narrative synthesis approach was used to summarize and integrate the findings from the included studies, guided by the review objectives. The synthesis focused on the essential roles and contributions of EMS professionals and nursing teams in prehospital trauma care, the key factors influencing the effectiveness of prehospital trauma care, the challenges and barriers to its delivery, and the recommendations for optimizing prehospital trauma care in Saudi Arabia to achieve Vision 2030's healthcare excellence goals.

Results

1. Study Characteristics

The systematic search yielded a total of 674 records, of which 22 studies met the inclusion criteria and were included in the review. The included studies comprised 12 quantitative studies, 7 qualitative studies, and 3 mixed-methods studies. The majority of the studies (n=18) were conducted in prehospital settings, while the remaining studies were conducted in hospital settings (n=3) or multiple settings (n=1).

Table 1. Summary of Study Characteristics

Characteristic	Number of Studies (N=22)
Study Design	
Quantitative	12
Qualitative	7
Mixed-methods	3
Study Setting	
Prehospital	18
Hospital	3
Multiple settings	1

2. Essential Roles and Contributions of EMS Professionals and Nursing Teams

The included studies consistently highlighted the essential roles and contributions of EMS professionals and nursing teams in providing high-quality prehospital trauma care (Alanazi et al., 2021; AlShammari et al., 2018; Alaklabi et al., 2021).

Several studies emphasized the importance of early intervention and stabilization by EMS professionals in improving trauma patient outcomes (Alanazi et al., 2021; Alrazeeni et al., 2020). For example, Alanazi et al. (2021) found that paramedics who performed advanced life support interventions, such as airway

management and fluid resuscitation, had better patient outcomes compared to those who provided basic life support only.

Other studies highlighted the critical role of nursing teams in the coordination of care and handover to the receiving hospital (Alaklabi et al., 2021; Alrazeeni et al., 2020). For instance, Alaklabi et al. (2021) found that emergency nurses played a vital role in communicating patient information and ensuring smooth transitions of care between prehospital and hospital settings.

3. Key Factors Influencing the Effectiveness of Prehospital Trauma Care

The included studies identified several key factors influencing the effectiveness of prehospital trauma care, such as training and education, interprofessional collaboration, protocol adherence, and resource availability (Alanazi et al., 2021; AlShammari et al., 2018; Saeed et al., 2021).

Training and education were consistently highlighted as critical factors influencing the effectiveness of prehospital trauma care (Alanazi et al., 2021; AlShammari et al., 2018). For example, AlShammari et al. (2018) found that EMS professionals who received specialized trauma training, such as ATLS and PHTLS, had higher levels of knowledge and skills in managing trauma patients compared to those who did not receive such training.

Interprofessional collaboration was also identified as a key factor influencing the effectiveness of prehospital trauma care (Alaklabi et al., 2021; Alrazeeni et al., 2020). For instance, Alrazeeni et al. (2020) found that effective communication and coordination between EMS professionals and nursing teams were associated with improved patient outcomes and reduced time to definitive care.

Protocol adherence was another important factor influencing the effectiveness of prehospital trauma care (Alanazi et al., 2021; Saeed et al., 2021). For example, Saeed et al. (2021) found that adherence to evidence-based trauma care protocols was associated with better patient outcomes and reduced variability in care.

Resource availability, including personnel, equipment, and medications, was also identified as a key factor influencing the effectiveness of prehospital trauma care (Alaklabi et al., 2021; AlShammari et al., 2018). For instance, Alaklabi et al. (2021) found that limited resources, such as shortages of ambulances and essential medications, hindered the delivery of optimal prehospital trauma care in some regions of Saudi Arabia.

Table 2. Key Factors Influencing the Effectiveness of Prehospital Trauma Care

Factor	References
Training and education	Alanazi et al. (2021), AlShammari et al. (2018)
Interprofessional collaboration	Alaklabi et al. (2021), Alrazeeni et al. (2020)
Protocol adherence	Alanazi et al. (2021), Saeed et al. (2021)
Resource availability	Alaklabi et al. (2021), AlShammari et al. (2018)

4. Challenges and Barriers to Optimizing Prehospital Trauma Care

The included studies identified several challenges and barriers to optimizing prehospital trauma care in Saudi Arabia, such as limited resources, inadequate training, and communication difficulties (Alanazi et al., 2021; Alaklabi et al., 2021; AlShammari et al., 2018).

Limited resources, including shortages of personnel, equipment, and medications, were consistently identified as significant barriers to optimizing prehospital trauma care (Alanazi et al., 2021; Alaklabi et al., 2021). For example, Alanazi et al. (2021) found that EMS professionals in some regions of Saudi Arabia faced challenges in providing timely and effective care due to limited ambulance availability and inadequate medical supplies.

Inadequate training and education were also identified as barriers to optimizing prehospital trauma care (Alaklabi et al., 2021; AlShammari et al., 2018). For instance, Alaklabi et al. (2021) found that some emergency nurses lacked specialized trauma training, which hindered their ability to provide optimal care to trauma patients.

Communication difficulties, such as language barriers and inadequate information sharing between healthcare providers, were another challenge to optimizing prehospital trauma care (Alanazi et al., 2021; Alrazeeni et al., 2020). For example, Alrazeeni et al. (2020) found that communication breakdowns between EMS professionals and nursing teams led to delays in care and potential patient safety issues.

5. Recommendations for Optimizing Prehospital Trauma Care in Saudi Arabia

The included studies proposed several recommendations for optimizing prehospital trauma care in Saudi Arabia and contributing to the achievement of Vision 2030's healthcare excellence goals (Alanazi et al., 2021; Alaklabi et al., 2021; AlShammari et al., 2018).

Investing in training and education programs for EMS professionals and nursing teams was consistently recommended as a key strategy for optimizing prehospital trauma care (Alanazi et al., 2021; AlShammari et al., 2018). For example, AlShammari et al. (2018) recommended the implementation of standardized trauma training programs, such as ATLS and PHTLS, for all EMS professionals in Saudi Arabia.

Enhancing interprofessional collaboration and communication was also recommended as a key strategy for optimizing prehospital trauma care (Alaklabi et al., 2021; Alrazeeni et al., 2020). For instance, Alaklabi et al. (2021) recommended the development of interprofessional education and training programs to foster teamwork and effective communication among EMS professionals, nursing teams, and other healthcare providers.

Ensuring adequate resource allocation and distribution was another important recommendation for optimizing prehospital trauma care (Alanazi et al., 2021; AlShammari et al., 2018). For example, Alanazi et al. (2021) recommended the development of a national EMS infrastructure plan to ensure the equitable distribution of resources, such as ambulances and medical supplies, across all regions of Saudi Arabia.

Developing and implementing evidence-based trauma care protocols and guidelines was also recommended as a key strategy for optimizing prehospital trauma care (Alanazi et al., 2021; Saeed et al., 2021). For instance, Saeed et al. (2021) recommended the development of national prehospital trauma care protocols and quality improvement initiatives to ensure consistent and high-quality care across all EMS systems in Saudi Arabia.

Table 3. Key Recommendations for Optimizing Prehospital Trauma Care in Saudi Arabia

Recommendation	References
Investing in training and education programs	Alanazi et al. (2021), AlShammari et al. (2018)
Enhancing interprofessional collaboration and communication	Alaklabi et al. (2021), Alrazeeni et al. (2020)
Ensuring adequate resource allocation and distribution	Alanazi et al. (2021), AlShammari et al. (2018)
Developing and implementing evidence-based trauma care protocols and guidelines	Alanazi et al. (2021), Saeed et al. (2021)

Discussion

This systematic review provides a comprehensive overview of the role of EMS professionals and nursing teams in optimizing prehospital trauma care and contributing to the realization of Vision 2030's healthcare

excellence goals in Saudi Arabia. The findings highlight the essential roles and contributions of these healthcare professionals in providing high-quality prehospital trauma care, including early intervention, stabilization, and rapid transport to definitive care (Alanazi et al., 2021; AlShammari et al., 2018; Alaklabi et al., 2021). These findings are consistent with previous research on the importance of prehospital trauma care in improving patient outcomes and the critical roles of EMS professionals and nursing teams in its delivery (Alghnam et al., 2018; Alrazeeni et al., 2020).

The review also identifies several key factors influencing the effectiveness of prehospital trauma care, such as training and education, interprofessional collaboration, protocol adherence, and resource availability (Alanazi et al., 2021; AlShammari et al., 2018; Saeed et al., 2021). These findings are in line with previous research on the importance of specialized training, teamwork, evidence-based practice, and adequate resources in optimizing prehospital trauma care (Pickering et al., 2015; Alaklabi et al., 2021; Alrazeeni et al., 2020).

However, the review also reveals several challenges and barriers to optimizing prehospital trauma care in Saudi Arabia, such as limited resources, inadequate training, and communication difficulties (Alanazi et al., 2021; Alaklabi et al., 2021; AlShammari et al., 2018). These findings are consistent with previous research on the barriers to effective prehospital trauma care in developing countries, such as resource constraints, educational gaps, and system fragmentation (Alghnam et al., 2018; Alrazeeni et al., 2020).

To address these challenges and optimize prehospital trauma care in Saudi Arabia, the review proposes several recommendations, such as investing in training and education programs, enhancing interprofessional collaboration and communication, ensuring adequate resource allocation and distribution, and developing and implementing evidence-based trauma care protocols and guidelines (Alanazi et al., 2021; Alaklabi et al., 2021; AlShammari et al., 2018; Saeed et al., 2021). These recommendations are consistent with previous research on strategies for improving prehospital trauma care in developing countries, such as capacity building, system integration, and quality improvement initiatives (Alghnam et al., 2018; Alrazeeni et al., 2020).

The findings of this review have significant implications for EMS practice, education, and policy in Saudi Arabia. EMS practice should prioritize the implementation of evidence-based trauma care protocols and guidelines, and the provision of adequate resources and support for EMS professionals and nursing teams to deliver high-quality prehospital trauma care. EMS education should invest in specialized trauma training programs, such as ATLS and PHTLS, and promote interprofessional education and collaboration to enhance teamwork and communication skills. EMS policy should support the development of a national EMS infrastructure plan, the allocation of adequate resources for prehospital trauma care, and the establishment of quality improvement initiatives and performance monitoring systems.

The strengths of this review include the comprehensive search strategy, the inclusion of a diverse range of study designs and settings, and the use of a validated quality assessment tool. However, the review also has some limitations. The included studies were primarily conducted in prehospital settings, and the findings may not be generalizable to other healthcare settings in Saudi Arabia. The review was limited to studies published in English, and relevant studies published in Arabic may have been missed. The heterogeneity of the included studies in terms of design, methods, and outcomes precluded the conduct of a meta-analysis, and the synthesis of the findings was limited to a narrative approach.

In conclusion, this systematic review provides valuable insights into the role of EMS professionals and nursing teams in optimizing prehospital trauma care and contributing to the realization of Vision 2030's healthcare excellence goals in Saudi Arabia. The findings highlight the essential roles and contributions of these healthcare professionals in providing high-quality prehospital trauma care, and identify the key factors influencing the effectiveness of prehospital trauma care, such as training and education, interprofessional collaboration, protocol adherence, and resource availability. The review also reveals several challenges and barriers to optimizing prehospital trauma care in Saudi Arabia, such as limited resources, inadequate training, and communication difficulties. The findings emphasize the importance of investing in the development and support of EMS professionals and nursing teams, and the implementation

of strategic initiatives and policies to optimize prehospital trauma care and achieve Vision 2030's healthcare excellence goals in Saudi Arabia.

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