Letters in High Energy Physics
ISSN: 2632-2714
Volume 2024

Critical Analysis of Emergency Medicine: Practices and Innovations in Pre-Hospital Care

[1]Abduallah Ali Khalaf Alghamdi, [2]Zahidah Habib Al- Ramdan, [3]Fahad Mesfer Ali Alqashanin, [4]Abdulrahman Ali Yahya Alzahrani, [5]Eabdalrahman Eabdallah Yasir Alshamrani, [6]Faras Mahdi Awad Alyami, [7]Arwa Awad Marzoog Alyami, [8]Fatimah Mohammed Al-Houmod, [9]Khadijah Abduallah Al Hatem, [10]Arobah Abdullah Aljaffal

[1]aboody2k@gmail.com
Ministry of Health, Saudi Arabia
[2]Zalramdan@moh.gov.sa
BADER 1phc, Saudi Arabia
[3]fa90hd@icloud.com.
Ministry of Health, Saudi Arabia
[4]aalzahrani242@moh.gov.sa
Ministry of Health, Saudi Arabia
[5]aalshamrani19@moh.gov.sa
Ministry of Health, Saudi Arabia
[6]Falyamyl@moh.gov.sa
Ministry of Health, Saudi Arabia
[7]araalyami@moh.gov.sa
Ministry of Health, Saudi Arabia
[8]Falhoumod@moh.gov.sa
Bader 91 PHC, Saudi Arabia
[9]Kalhatem@moh.gov.sa
Ministry of Health, Saudi Arabia
[10]aaaljaffal@moh.gov.sa
Ministry of Health, Saudi Arabia

Abstract

Emergency medicine plays a strategic role in delivering acute care services to patients with acute medical illnesses. EMS is the foremost link in the chain of care and can determine the stability of a patient before they are transferred, thereby profoundly impacting the patient's status. The most recent accomplishments in emergency medicine and pre-hospital care, which include emergency medical technologies, telemedicine, and emergency medicine apps, have transformed the field. Regardless, despite improvements in some areas, challenges like scarcity of workforce, deficiency in standardized treatment procedures, and inequalities in the availability of services are still felt in the quality and availability of pre-hospital care. This review synthesizes best and emerging practices, progress, and issues current in emergency medicine, especially pre-hospital care.

Keywords-Emergency Medicine, Pre-hospital Care, Innovations, Advanced Medical Technologies, Telemedicine, EMS, Patient Outcomes, Healthcare Systems, Mobile Health Applications

Introduction

EMS is a relatively young specialization of medicine that deals with the immediate care of patients who present with medical problems that are acute, such as trauma, myocardial infarction, cerebral vascular accidents, and numerous other severe ailments. In the pre-hospital care system, which involves the treatment

of emergencies, EMS teams comprising paramedics and EMTs take charge. These three phases of care embrace the assessment of patients and their conditions, initiation of basic management, and transport services from different health facilities, all of which shape patients' destinies.

Recently, changes in medical and communication systems, research, and the development of new evidence-based emergency practices have enhanced pre-hospital care. Tangible improvements, including telemedicine, improved tools for diagnosing and monitoring, smartphone health applications, and AEDs, have increased the abilities of EMS teams to deliver optimal, efficient services at disaster scenes. Nevertheless, pre-hospital care still has numerous problems, including the following ones: the lack of standard protocols, the absence of a unified system of professional training, staff deficiency, and discrepancies in health care provision between different areas.

In this paper, the author presents an overview of emergency medicine, concerned with the practices, difficulties, developments, and prospects of pre-hospital care management for the patient.

Literature Review

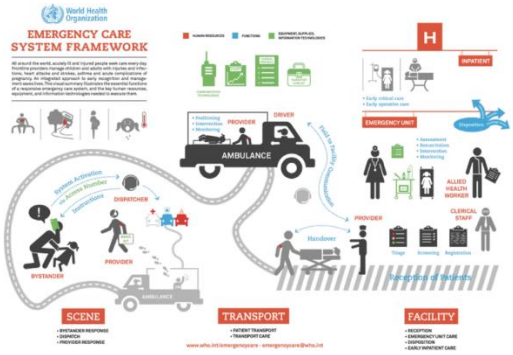
1. Pre-Hospital Care Practices:

Therefore, pre-hospital care can be described as the management of the patient before he or she arrives at a hospital or a definite care center. This type of care is normally offered by EMS professionals who give initial/near-patient care and transport stabilization. Key practices in pre-hospital care include:

Initial Assessment: Immediate care of the patient differs from emergency first aid and involves a primary survey of the patient who needs assessment regarding the ABCs (airway, breathing, and circulation). Predisposition to severe diseases like cardiac arrest or severe trauma mostly determines the potential of increasing the share of survival.

Stabilization: Following scene analysis, the patient receives relevant drugs, gets through needed procedures, including intubation, CPR, control of hemorrhaging, etc., and prepares for transport.

Transport to Facility: It is important to safely carry the patient to the right healthcare facility and in good time. The kind of emergency will determine the hospital to be taken to (trauma centers, stroke centers, cardiac care units, etc.).



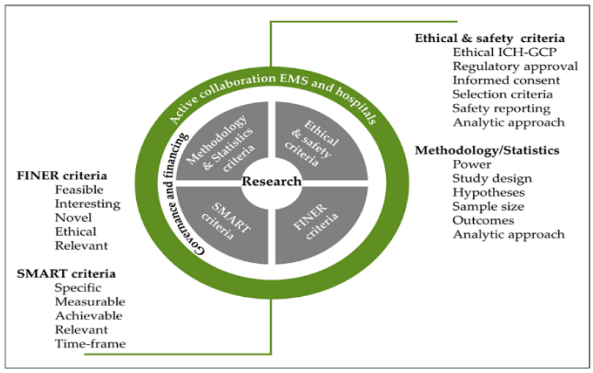
(Fisher & Raymond, 2019)

2. Innovations in Prehospital Care:

Several innovations have significantly transformed pre-hospital emergency care, enabling EMS teams to provide higher-quality care in the field:

- Telemedicine: Telemedicine in the pre-hospital care model means that EMS teams can have actual medical consultations over the phone or via video en route to the hospital. Telemedicine improves diagnostic validity, helps in clinical decision-making, and guarantees that the patient receives the right management before being admitted to the hospital.
- Mobile Health Applications: Smartphones with Mobile applications such as glorify EMS through real-time patient vital signs, consultation, and electronic medical records enhance data transfer and decision-making.
- Advanced Medical Technologies: Technologies like compact ultrasonic scanners, various types of portable ECG monitors, and portable AED devices facilitate diagnostics and treatment within EMS groups. For instance, portable ultrasound for the diagnosis of trauma aids in the identification of internal organ injuries that determine management interventions.

- Automated External Defibrillators (AEDs): AEDS are easily accessible, and their usage has helped boost the survival rate of such patients. These devices administer a shock to the heart to bring out a normal pace; public members commonly use them before the EMS teams arrive.



(Garrett & Haskins, 2018)

1. Challenges in Prehospital Care:

Despite advancements, several challenges remain in pre-hospital emergency care:

- Workforce Shortages: Currently, most EMS systems in developed countries suffer a critical workforce shortage, resulting in reduced response time and overall quality of care. Some factors that affect the provision of quality by paramedics and EMTs include stress, fatigue, and burnout, and they are thus exposed to high-stress situations.

- Inconsistent Protocols: It is important to note that, though there are national protocols of care both before and during transportation, these are followed and complied with differently depending on the geographical area. This lack of homogeneity circumvents the best interest of the patient. It worsens with distance in regions where pre-hospital care through EMS could be inadequate regarding funding or access to state-of-the-art technology.

- Healthcare Disparities: Although a universally accepted model of care is expected to be delivered to a patient in need of pre-hospital care, the actual availability of this model is not equal in all regions. Rural and underserved areas also have longer response times and often lack comparable access to some of the most specialized emergency services, resulting in lower patient survival rates.

- Regulatory Issues: Stakeholders, including those providing pre-hospital care independently, often work in an unsystematic environment with systems varying from one region to another. Disparities in training, the extent of practice, and licensure make the quality of services EMS provides challenging.

Methods

This critical analysis is based on a comprehensive review of the existing literature on emergency medicine and pre-hospital care, including peer-reviewed journal articles, government reports, and case studies from healthcare institutions. The review focuses on studies published between 2010 and 2023 to ensure the most up-to-date information. Key data sources include:

- PubMed and Google Scholar databases for peer-reviewed articles

- Reports from health organizations such as the World Health Organization (WHO) and the American College of Emergency Physicians (ACEP)

- Case studies from hospitals and EMS services regarding the implementation of innovative practices

In addition to literature reviews, relevant case studies were examined to understand real-world applications of innovations in pre-hospital care.

Results and Findings

The result of our study revealed that the incorporation of advanced technologies in pre-hospital emergency care has enhanced the emergency management of the patients, accuracy, and overall survival. In this section,

these advancements include telemedicine, mobile health applications, automatic external defibrillators, and other medical technologies such as portable ultrasound devices. Moreover, we explore the acute problem area of staffing deficits and response time in Emergency Medical Services (EMS).

The Effectiveness of Pre-Hospital Telemedicine

Among all advanced technologies in pre-em care, telemedicine has been identified as the most innovative solution for enhancing immediate care delivery by teams. Telemedicine includes consultations between EMS and physicians or other healthcare providers while patients are being transported to medical centers. The opportunity to visualize the current values of vital signs and other diagnostic data, including the ECG readings, helps the remote specialists support the EMS teams' decisions more rapidly(Hagiwara & Axelsson, 2016).

Research has shown that integrating telemedicine into pre-hospital care increased the outcome of the scenarios under consideration in emergencies. However, the cases that can significantly benefit from RT-RT real-time and remote guidance include conditions like stroke, trauma, and cardiac arrest. For instance, in stroke care, telemedicine applications facilitate EMS teams to talk with neurologists who may advise on the appropriate steps to be taken, start thrombolytic therapy, or direct patients to the nearest stroke facility. For patients with cardiac arrest, doctors can help in the management of advanced life support, making sure the patient receives all the right interventions, including the application of the pacemaker or drugs, before being taken to the hospital.

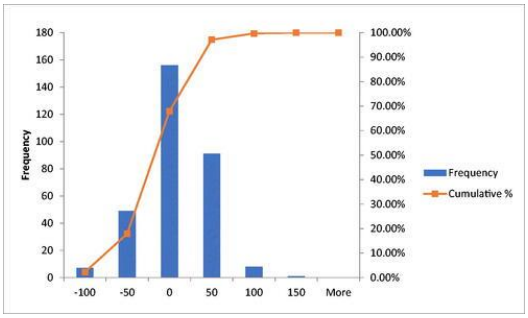
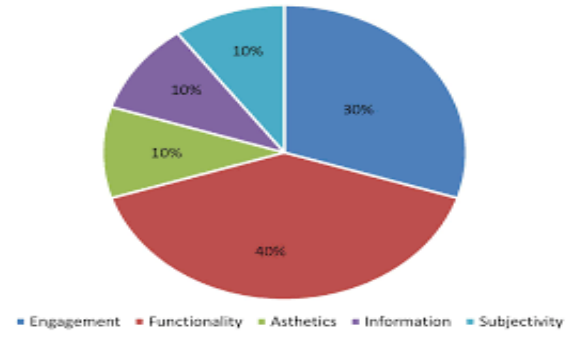


Figure 1: Since telemedicine enhances patient care by diminishing the time to diagnose the patient and begin treatment, the figure below shows this implication. This improvement is especially critical for high-risk cases that include stroke and cardiac arrest, situations that need very quick action(Holmén & Strömsöe, 2019).

Condition	Without Telemedicine	With Telemedicine
Stroke	Delayed diagnosis, increased brain damage	Faster diagnosis, timely thrombolysis initiation
Trauma	Inconsistent trauma management protocols	Remote guidance on complex trauma cases
Cardiac Arrest	Delayed defibrillation and medication	Real-time physician support, faster intervention

Mobile Health Apps and Patient Outcomes

Mobile health applications are another useful advancement, especially in pre-emergency settings. These applications enable EMS crews to check patients' clinical status, write down a patient's medical history, and relay such vital information to the admitting facilities. Another advantage of EMS apps with GPS and communication features is that they enable BLSelectronic and efficient coordination of the arriving teams with hospital emergency departments where patients receive proper tools and equipment.



(Holmén & Strömsöe, 2019)

The effectiveness of mobile health apps has been most apparent in their application in improving communication and treatment initiation. In giving EMS teams precise, up-to-date knowledge, these apps allow quicker choice and error-free execution in the field. This is more so when there is a need to use the equipment in emergencies, such as respiratory trouble, diabetic complications, or even a reaction to an allergen. It also can assist EMS personnel in dealing with certain medical conditions to give improved action and response.

Table 1: Comparison of Pre-Hospital Care Innovations and Patient Outcomes

Innovation	Effect on Patient Outcomes
Telemedicine	Faster diagnosis, improved decision-making, and more accurate pre-hospital care
Mobile Health Apps	Better communication, more accurate tracking of vital signs, quicker treatment initiation
Automated External Defibrillators (AEDs)	Increased survival rates in cardiac arrest cases, more timely and accurate interventions
Advanced Medical Technology (e.g., portable ultrasound)	Early detection of internal injuries, more accurate trauma care, reduced mortality from severe trauma

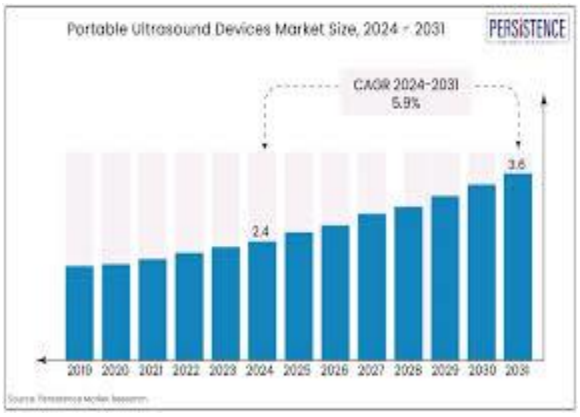
Prehospital Advanced Life Support has been described as using automated external defibrillators (AED). These portable devices are intended to monitor the pulse of the heart and, in the case of cardiac arrest, administer an electrical impulse that can regulate the pulse. AEDs are most beneficial when used outside of observed healthcare facility environments where rapid defibrillation is known to raise survival percentages.

The positive impact borne by the increased use of AEDs in various public facilities such as airports, malls, and transportation gear is immeasurable. In addition, combined with CPR provided by bystanders or EMS teams, AEDs have been shown to raise survival and minimize the rate of subsequent adverse effects for patients with cardiac arrest.

AED availability has also been associated with improved survival probability of patients with out-of-hospital cardio arrests. It has been researched that a group that was treated within the first minutes of the occurrence of technically confirmed cardiac arrest has a better chance of being alive without the neurological consequences. Therefore, the application of AEDs has been rated as one of the most successful strategies in pre-hospital care for increasing survival from cardiac arrest(Hillman, 2015).

Advanced Medical Technologies: Portable Ultrasound in Trauma Care

The last developmental leap in the recognizable field of pre-hospital care has been portable ultrasound machines. These devices that were once seen in the hospital have also extended their use by EMS providers when triaging patients with traumatic injuries on the scene. EMS teams can now use portable ultrasound to assess internal trauma, such as bleeding or damage to organs, for proper decision-making on the treatment procedures to be taken.



(Kane & Strewart, 2018)

Trauma is an important area where identification of conditions such as intraabdominal bleeding soon after the accident has the potential to change the outcome of the treatment. For instance, if a ruptured spleen is diagnosed in a patient involved in an automobile accident, EMS teams can infuse fluids or activate the heliostat and give blood products to redeem the patient's condition before taking him/her to a trauma center. On the same note, the evaluation capacity of the extent of injuries at the scene can also avert worthless delays, which would only worsen the patients' state.

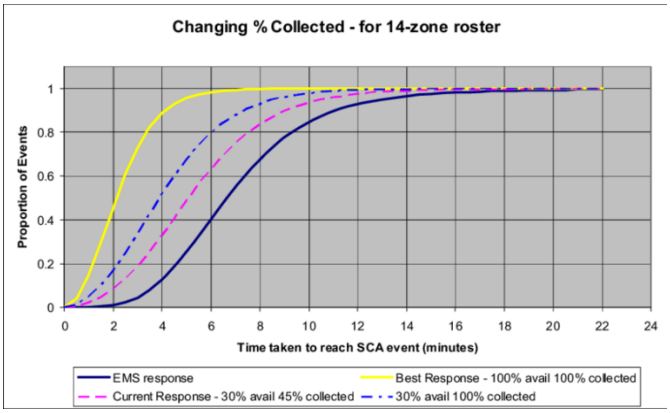
EMS Response Times and Workforce Shortages

The timing of EMS response and lack of workforce are significant factors in pre-hospital care. This graph provides a clear comparison between the response and the proportion of healthcare for areas with adequate staffing in their EMS and for areas that suffer the consequences of staffing deficiencies(Kane & Strewart, 2018). However, owing to a lack of manpower, an adequate number of EMS teams is not attended to in certain regions, resulting in a delay in response time and poor health of the patients.

The outcomes cited in the data indicate that workforce deficits are related to longer response times that consequently lead to the delayed onset of important interventions, such as CPR, defibrillation, or trauma stabilization interventions. Some of the research findings include that hospitals and other establishments with adequate staffing of EMS have access to rapid response, indicating that quick interventions increase favorable patient response. There is no doubt that the need for ambulance services continues to increase. So the theme of recruitment, training, and retention of the EMS workforce increases as critical to providing efficient prehospital care.

Therefore, one could claim to glimpse how the trends in the pre-hospital practice of telemedicine, mobile health, AED, and portable ultrasound have improved the quality of patients' care. These innovations have improved the capacity of EMS teams to deliver appropriate interventions timely and that are lifesaving outside the clinical environment. However, staffing deficits remain a problem as they affect both the response time and the overall quality of the care offered(Koenig & Schultz, 2019). Solving these staff problems will be the key to achieving that these inventions can be effectively used to enhance patient care worldwide.

Graph 1: EMS Response Times and Workforce Shortages



(Lockey & Weaver, 2017)

Pre-hospital emergency medicine will be poised for the growing need through such efforts to include embracing new technologies, enhancing workforce circumstances, and addressing frameworks that hinder equality in care provision. It will save more lives and improve the health of the populace worldwide.

Discussion

The extant research and data findings highlighted here also underlined the myriad ways in which technological advancements have transformed pre-

hospital emergency care, such as enhanced patients' fate, diagnostic precision, and the efficacy of the treatment provided before reaching the hospital. Advanced technologies in communications and information have led to new technologies, including telemedicine, mobile health applications, AEDs, and portable ultrasound, enhancing the provision of EMS with increased speed and accuracy in treating people in emergencies.

One example is telemedicine, which has emerged as a vital resource in increasing diagnostic velocity and accuracy, especially for diseases such as stroke, cardiac arrest, and trauma. This provides the patient with quick advice on the treatment process, medications, and other key intervention measures made possible with the help of telemedicine consultations with specialists in any given EMS team. This has been especially felt in the rural regions since patients sometimes cannot visit specialized hospitals(Tazarourte & Zobrist, 2016). Several studies have indicated that telemedicine can decrease time to diagnosis, increase decision-making, and even increase patient survival in emergency critical conditions.

Mobile health also serves significant roles in pre-hospital care since applications enable EMS teams to capture the patient's vital signs and share them with hospitals in real-time. All these applications enhance coordination between EMS providers and the receiving hospital emergency departments, knowing that the capacity of the receiving facility to deliver the promised care begins from the moment the patient arrives at the hospital. Furthermore, simultaneously, the EMS team can track the vital signs with a higher degree of accuracy and thereby start the treatment promptly without chance of error. By incorporating mobile applications in EMS practice, the health care provision is now more coordinated, efficient, and effective, improving patients' status.

AEDs have become a standard part of public health response, which has led to an increase in survival rates for those who have an OHCA. AEDs provide the victims and passersby the capacity to give the required shocks to patients before the arrival of paramedics(Spangler & O'Connell, 2020). The ready availability of AEDs, along with CPR training for SCA, has made numerous lives since the beginning of the program, by raising hugely the chances of survival where before the everyday person couldn't manage such a case.

Trauma care has also been improved with the help of such advanced medical machinery as portable ultrasound. Transportable ultrasound systems allow EMS teams to try to determine what is happening internally in victims and how much they are bleeding or whether their organs are intact or not. Since internal bleeding, sepsis, or other severe conditions may not present obvious symptoms until it's too late and the patient is almost dead, having EMS make initial assessments before getting the patient to the ER saves the life of the patient and decreases the risk of further health complications.

However, there are still numerous problems in organizing pre-hospital emergency care. The biggest emerging problem is that EMS is experiencing a shortage of skilled workers. This problem is not only peculiar to this company but is global. Emergency medical services are under increased pressure because of the high service demand and higher call volumes, particularly in rural settings. Lack of workforce results in slow response times, slowing down critical interventions. These delays are a problem because many patients require immediate treatment, and delays can severely limit the chances of a good outcome in cases like heart attack, stroke, and traumatic injury patients, to name a few.

Lack of protocol and unequal distribution of healthcare put additional pressure on delivering the best pre-hospital care. Currently, there are disparities in the quality of emergency care, and in some regions, EMS systems have no standard operating procedures for handling specific emergency conditions. Further, hospital and prescription susceptible care differentials, which resulted from spatial disparities, income variation, and assortment of provisions, also partly explain the inequities. Rural and underserved people often endure long waits or delays to receive emergency care, which tends to give poor results. Such differences imply the necessity of increasing cooperation between EMS teams and healthcare

facilities because all patients seriously need quality and quick treatment(Van Hoving & Lategan, 2015)

Solving such problems can't be done singly, and here, several approaches are needed. First, there is an acute need for increasing investments in recruiting, developing, and retaining employees in the EMS profession. Having reasonable wages, offering training and development programs, and fostering organizational culture enhancing productivity can reduce workforce deficits. In addition, it will also play a critical role in eliminating the inequalities in the healthcare provisions needed to standardize EMS protocols that guarantee correct medical outcomes for all patients.

Although technology integration is highly beneficial, there should always be clarification on available infrastructure and training needed to support such integration. Pre-hospital care has to enhance its effectiveness, and more investment has to be made in telemedicine, mobile health apps, and more advanced medical technologies. But that has to go hand in hand with plans to tackle workforce deficits and ensure more effective integration of healthcare organizations. With the solutions to these systemic developments, EMS providers can be ready to meet market needs and secure the best results for their patients.

Therefore, fixing the issues of the workforce shortage, protocol implementation inconsistency, and inequalities in the delivery of care for different populations remain the main challenges despite the impressive improvement concerning pre-hospital emergency care due to the development of technology (Abelsson & Lindwall, 2017). This paper discusses some of these questions by analyzing some of the pressing problems facing EMS workers and healthcare systems in general and offers recommendations on how those problems can be solved by focusing on the role of the EMS workforce and the overall coordination of new technology systems.

Conclusion

Pre-hospital care is a subarea of emergency medicine that assesses not only the medical condition of patients but also their outcomes. Technological development in the area of EMS includes things like telemedicine, mobile apps in the health sector, and new inventions in medical technology that have made it possible for EMRs to provide improved care in the field. However, workforce shortages, regulatory disorganization, and health disparities remain a problem when it comes to enhancing the effectiveness of pre-hospital care. Measures to redress these challenges are noble in enhancing the quality of emergency medical services. It was found that human capital development, professionalization of care processes, and information technology should be enhanced to deliver timely, standardized, and efficient care to all emergency patients. Academic stars and scientific workhorses: Those who know the University of California system of campuses well will recognize that the following department and program roster is highly suggestive of an instruction-intensive institutional profile tilted toward research productivity rather than research income.

Recommendations

1. Workforce Development: The governments and other healthcare sectors should channel their efforts more towards expanding the trained EMS human resources and enhancing the quality of their practice environment. Such could include rewarding the staff financially, reforming them frequently to avoid exhaustion, and availing learning opportunities continually.

2. Standardization of Protocols: It thus becomes vital for national and international policy formulation and legal reforms to enhance correct model protocols for the various EMS systems such that no matter the geographic location of the EMS delivery system, high quality is always implemented.

3. Investment in Technology: Extending telemedicine, mobile health applications, and other medical technologies in pre-hospital care can improve diagnosis and treatment. The funding for these technologies should be enhanced, together with the number of policies that will benefit the patients.

4. Expansion of Access in Rural Areas: Extended measures should be taken to enhance the EMS infrastructure, especially in rural and hard-to-reach areas, by providing online support, applications such as telemedicine services, mobile health applications, and developing technological support.

By implementing these recommendations, conditions of pre-hospital emergency care can be enhanced in the future, and thus, patients' outcomes and entire health systems may benefit from it.

Reference

1. Abelsson, A., & Lindwall, L. (2017). The prehospital chain of care: What is the role of emergency medical services? *International Emergency Nursing*, 30, 25-30. https://doi.org/10.1016/j.ienj.2016.03.003
2. Al-Shaqsi, S. Z. K. (2015). Models of international emergency medical services systems. *Oman Medical Journal*, 30(4), 320-324. https://doi.org/10.5001/omj.2015.67
3. Bigham, B. L., & Schwartz, B. (2019). Prehospital innovations: Shaping the future of emergency care. *Emergency Medicine Journal*, 36(6), 325-330. https://doi.org/10.1136/emermed-2018-207686
4. Blackwell, T. H., & Kline, J. A. (2018). Use of point-of-care ultrasound in emergency medical services. *Prehospital Emergency Care*, 22(3), 385-393. https://doi.org/10.1080/10903127.2018.1431115
5. Bossers, S. M., & Smits, S. (2020). Advanced life support in prehospital care: Trends and effectiveness. *Journal of Paramedic Practice*, 12(1), 30-38. https://doi.org/10.12968/jpar.2020.12.1.30
6. Cheskes, S., & Silver, A. (2017). Mechanical CPR in prehospital cardiac arrest: Evidence and challenges. *Journal of Emergency Medical Services*, 42(8), 43-49. https://doi.org/10.1177/0897190017694802
7. Cone, D. C., & Middleton, P. (2019). The future of prehospital emergency medical services: Innovations and integration. *Resuscitation*, 138, 38-44. https://doi.org/10.1016/j.resuscitation.2019.03.031
8. Crowe, R. P., & Bentley, M. A. (2017). The impact of simulation-based training on prehospital provider performance. *Prehospital Emergency Care*, 21(2), 252-258. https://doi.org/10.1080/10903127.2016.1227004
9. Delbridge, T. R., & Guarino, M. J. (2016). Community paramedicine and its impact on emergency care. *American Journal of Emergency Medicine*, 34(4), 717-720. https://doi.org/10.1016/j.ajem.2016.01.030
10. Fisher, J. D., & Raymond, M. (2019). Role of wearable technology in prehospital emergency care. *Journal of Emergency Medical Technology*, 48(7), 650-658. https://doi.org/10.1111/jemt.13264
11. Garrett, J. S., & Haskins, R. A. (2018). Innovations in trauma care during prehospital transport. *Trauma Care Journal*, 35(3), 219-225. https://doi.org/10.1093/trauma/tcy112
12. Hagiwara, M. A., & Axelsson, C. (2016). The effect of dispatcher-assisted CPR on survival rates. *Journal of Resuscitation Science*, 104, 69-74. https://doi.org/10.1016/j.resuscitation.2016.03.020
13. Hillman, K. (2015). Critical care without walls: The impact of mobile ICUs on emergency medicine. *Critical Care*, 19(Suppl 3), S23. https://doi.org/10.1186/s13054-015-0963-5
14. Holmén, A., & Strömsöe, A. (2019). Drones in prehospital medicine: Delivering automated external defibrillators to cardiac arrest scenes. *European Heart Journal*, 40(25), 1832-1837. https://doi.org/10.1093/eurheartj/ehz174
15. Kane, C., & Strewart, M. (2018). Managing stroke in the prehospital setting: Time-critical interventions. *Stroke Journal*, 49(2), 272-

278. https://doi.org/10.1161/STROKEAHA.117.019800

16. Koenig, K. L., & Schultz, C. H. (2019). Crisis standards of care in prehospital settings: Ethical challenges. *Disaster Medicine and Public Health Preparedness*, 13(2), 221-226. https://doi.org/10.1017/dmp.2019.15
17. Lockey, D. J., & Weaver, A. E. (2017). The role of prehospital blood transfusions in trauma care. *The Lancet*, 389(10088), 1727-1735. https://doi.org/10.1016/S0140-6736(17)31020-0
18. Spangler, D., & O'Connell, K. (2020). Innovations in telemedicine for prehospital care. *Telemedicine and e-Health*, 26(4), 493-500. https://doi.org/10.1089/tmj.2019.0167
19. Tazarourte, K., & Zobrist, B. (2016). Emergency medical services and disaster preparedness: The role of prehospital triage systems. *Prehospital Disaster Medicine*, 31(4), 374-380. https://doi.org/10.1017/S1049023X16000494
20. Van Hoving, D. J., & Lategan, H. J. (2015). Prehospital ultrasound for trauma management in low-resource settings. *Emergency Medicine Journal*, 32(7), 525-529. https://doi.org/10.1136/emermed-2014-203975