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Challenges of Patient Management in Aerial Emergency Services: A Qualitative Study

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Abstract

Background & Objectives: Air ambulances play a crucial role in delivering medical care to patients in high-risk or life-threatening situations within the shortest possible time. However, during such missions, aerial emergency medical personnel face numerous challenges in patient management that negatively impact their performance. Accordingly, this study aims to explore the barriers to effective patient management in aerial emergency medical services as perceived by prehospital emergency care personnel in southern Iran.

Materials & Methods: This qualitative study employed purposeful sampling to select participants. A total of 21 in-depth, semi-structured individual interviews were conducted with emergency medical personnel experienced in aerial emergency services. The data were analyzed using Graneheim and Lundman's content analysis approach.

Results: The qualitative data analysis yielded three main themes and nine sub-themes. The main themes included: (1) Inefficient management of human and organizational resources, (2) Lack of professional competencies, and (3) Occupational stress and physical injuries.

Conclusion: Senior managers in emergency medical services are encouraged to utilize the findings of this study to identify key factors that hinder effective patient management and care delivery in aerial emergency settings. Implementing targeted interventions to address these challenges may enhance personnel performance, improve patient safety, and elevate the overall quality of services provided.

Keywords: Emergency Medical Services, Patient Care Management, Air Ambulance, Qualitative Research

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Introduction

Pre-hospital emergency care is defined as all emergency medical services provided to patients outside hospital settings, prior to their transfer to the nearest medical facility (1). In many societies today, high-quality pre-hospital emergency care is regarded as an essential component of comprehensive patient care (2). As symbolized by the Star of Life, the functions of this system include: receiving emergency calls, dispatching units, delivering on-site care by trained personnel, providing continued care during transport (via ambulances or helicopters), and transferring patients to the designated medical facility as determined by the dispatch center (3).

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The efficient functioning of various components of pre-hospital emergency services leads to prompt ambulance dispatch and helps prevent disability or mortality among patients (4). Therefore, time is a critical factor influencing the survival of emergency patients. This depends on several variables: the time elapsed between the onset of an emergency and notification of emergency services, activation of the emergency response system, response time, arrival at the scene, and patient transfer duration to the emergency department. The shorter this total duration—often referred to as the "golden hour"—the higher the quality of emergency care and the more favorable the patient outcomes (5, 6).

The timely and effective transfer of patients within emergency medical systems is a key determinant of care quality (7). In contemporary practice, helicopter emergency medical services (HEMS), as an advanced component of emergency care, significantly reduce patient transport time and provide access to geographically challenging or otherwise inaccessible areas (8). Research has demonstrated that the strategic development of helicopter emergency centers can lower response times, expand access to emergency care, and decrease mortality rates (9, 10).

During their routine operations, HEMS personnel and paramedics face a range of complex challenges that inevitably affect the quality of their performance. These obstacles pose significant threats to both public safety and individual patient outcomes, particularly in regions where aerial emergency services are operational (11). Reported challenges include: time constraints, critical patient conditions, pressure from patients' companions, outdoor working conditions, fear of failure in life-threatening scenarios, limited decision-making capacity in high-stress situations, human resource limitations, and fear of aircraft accidents—all of which contribute to elevated stress levels among personnel (12).

Background in Iran

The first aerial emergency service center in Iran was established in 2001 in the capital city, Tehran. As of August 2022, 51 aerial emergency centers were operating across the country. Factors such as rapid urban expansion, population growth in metropolitan areas, increased incidence of traffic accidents and natural disasters (e.g., floods and earthquakes), difficulty in providing services in mountainous terrains using ground ambulances, and the considerable distance between rural/suburban regions and specialized medical centers have all emphasized the necessity of establishing aerial emergency services in southern Iran. Aerial emergency services in Iran are provided in two primary forms: fixed-wing air ambulances and helicopter-based services. Personnel assigned to aerial missions typically include nurses holding bachelor's or master's degrees and paramedics with bachelor's degrees, all employed within the public healthcare sector. Each mission is staffed by two professionals per shift, either nurses or paramedics. However, it is important to note that the helicopters currently in use within Iran's aerial emergency services are not equipped for night operations (13, 14).

A qualitative research approach offers valuable insights into the key challenges of patient management as experienced by pre-hospital emergency personnel involved in aerial medical care. Through in-depth exploration, such an approach facilitates a comprehensive understanding of the personnel's difficulties and lived experiences. Accordingly, the present study employs a qualitative design to investigate the perceived challenges of patient management in aerial emergency services, as reported by pre-hospital emergency care providers.

Materials and Methods

The present study is a qualitative research project. Qualitative studies focus on individuals' perceptions of reality, and the meaning of the

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phenomenon under investigation emerges from a holistic analysis of its components (15). The reporting of this study adhered to the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (16).

Participants and sampling

Data collection was carried out through semi-structured, individual interviews from May 2022 to October 2022. The inclusion criteria required participants to have a minimum of one year of experience in aerial emergency medical services and a willingness to participate in the study. The exclusion criteria included being physically or emotionally unprepared for an interview or unwilling to continue participation. Thirty-three pre-hospital emergency personnel were invited, but twelve declined participation due to heavy workloads, intensive shifts, Coronavirus disease 2019 (COVID-19) infection, or family obligations. Ultimately, the sample consisted of 21 pre-hospital emergency personnel (seven nurses and fourteen paramedics), selected through purposeful sampling.

After consulting with the head of pre-hospital emergency care, the researchers identified an initial participant deemed capable of effective communication and capable of providing rich, relevant information. This participant was then asked to recommend a colleague with substantial knowledge and experience related to the study topic. This snowball sampling approach continued, with participants nominating others who had a deep understanding of the subject matter. Sampling was continued until data saturation was achieved—defined as the point at which no new information emerged and no additional categories or subcategories could be identified (15). In this study, saturation was reached after 19 interviews, with two additional interviews conducted to ensure completeness.

Data Collection

Data were obtained from 21 semi-structured, in-depth, individual interviews. Fifteen interviews were conducted via video calls using WhatsApp, while six were held face-to-face after coordinating with the participants. All interviews were conducted by the corresponding author, an associate professor of nursing with extensive experience in qualitative research. The interviews were conducted in Persian. For translation purposes, a bilingual translator—a native speaker of both English and Persian, and familiar with Iranian culture—translated the Persian transcripts into English. Finally, during the expert committee phase, the bilingual translator and the authors reviewed both versions and reached a consensus on their conceptual equivalence. With participants' consent, all interviews were audio-recorded and saved as password-protected files on a secure computer. Each interview lasted between 45 and 60 minutes. Interviews began with general questions such as: "How long have you been working in this field?" and "Can you describe a typical day in aerial emergency services?

Next, based on the objectives of the study, more specific questions were asked: "Based on your experience, what are the significant challenges in patient management in aerial emergency services?", "What strategies do you suggest to improve patient management in aerial emergency services?", "What skills do you need to manage patients effectively in aerial emergency and provide quality care?, and "Do your colleagues possess the required skills and competence to provide quality care and manage patients in aerial emergency?. All the interviews were conducted according to the main objective of the study. In addition, follow-up questions were asked to add to the clarity of the data provided by the participants. These questions included "Can you elaborate on that point?", "What do you mean by that?", and "Can you give an example or do you have any experience with that?"

Data Analysis

Data were analyzed following Graneheim and Lundman's content analysis method (2004) (17).

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To gain a comprehensive understanding of participants' experiences, the researchers first read each transcript multiple times. Words, phrases, or paragraphs relevant to the challenges in patient management were identified as meaning units. These units were then coded, and similar codes were grouped together.

Next, the codes were compared for similarities and differences. Similar codes were merged, and both the codes and transcripts were re-examined. Based on conceptual similarities, categories were developed. To ensure accuracy, the research team double-checked the categories and compared them with the original data.

After careful examination and comparison of the categories, themes were derived. Immediately following each interview, the audio content was transcribed, and significant paragraphs were highlighted. Meaning units were selected and assigned specific codes. These codes were then aggregated into categories based on their homogeneity.

To verify the reliability of the coding, the researchers reassessed the categories and compared them with the initial data. Finally, through a series of team meetings, the researchers reviewed the categories and identified the final themes. All data analysis was conducted using MAXQDA v.2007. Table 1 presents an example of the data analysis process.

Rigor

Lincoln and Guba's criteria were used to ensure the trustworthiness of the data (18). Accordingly, the researchers engaged in prolonged interaction with the data, member checking, and peer debriefing to establish credibility. For member checking, seven members of the emergency medical services personnel (four with bachelor's degrees in emergency medical services and three with bachelor's degrees in nursing) were given copies of the coded transcripts and asked to confirm their accuracy. To perform peer checking, the researchers involved six experts (three nursing professors with expertise in qualitative research and three emergency medicine specialists with qualitative research experience) to observe and validate the data analysis process, including the codes and categories. The dependability of the study was strengthened by providing detailed descriptions of the methods used to extract the concepts and themes, as well as by presenting both textual and audio data. In addition, two members of the research team reviewed the findings independently and then met to reconcile any disagreements, thereby ensuring dependability. To enhance confirmability, the researchers asked the participants to verify the accuracy

Table 1. An example of coding and development of categories and themes

Meaning units	Coding	Category	Theme
"Many of the helicopters used for aerial emergency services are for military purposes: they haven't been specifically designed for aerial emergency services and are very hard to work in. There is hardly enough room for performing paramedical activities inside them and they lack many specialized devices, such as heart monitors and mechanical ventilators. What's more, on rainy days and at nighttime, these aerial ambulances can't fly" (participant 14).	Lack many specialized devices, such as heart monitors and mechanical ventilators	Lack of specialized equipment	Inefficient management of human and organizational resources
"As a paramedic, I have had no training in giving care in aerial emergency services, so I'm not familiar with the working conditions in this area and lack the specialized knowledge and skill. Then how can I be expected to provide safe care? Unfortunately, the pre-hospital emergency department managers haven't set up any specialized training courses for us in aerial emergency services" (participant 19).	Lack the specialized knowledge Lack specialized training courses in aerial emergency services	Lack of clinical knowledge	Lack of professional capabilities

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of the identified categories and subcategories. The characteristics of the respondents and the interview procedures were described in detail to support the transferability of the findings.

Furthermore, the researchers minimized bias in conducting, analyzing, and coding the interviews by limiting prior textual reviews and employing bracketing. Bracketing is a method in qualitative research used to reduce the influence of preconceptions that might negatively impact the research process (16). Therefore, the researchers made a conscious effort to set aside their personal knowledge, beliefs, and experiences to authentically present the perspectives of pre-hospital emergency care personnel regarding the challenges of patient management in aerial emergency services. They refrained from judging the data and accepted it as presented.

Finally, transferability was further enhanced by offering a comprehensive description of the study population's characteristics, along with a clear explanation of the data collection and analysis procedures, supported by illustrative quotes from the participants.

Results

The participants' ages ranged from 31 to 49 years. All participants were male, and the type of aerial EMS employed was helicopter-based. Additional demographic characteristics of the participants are presented in Table 2.

Analysis of the qualitative data resulted in three themes and nine sub-themes. The three main themes were inefficient management of human and organizational resources, lack of professional capabilities, and job-related stress and injuries (Table 3).

Inefficient management of human and organizational resources

As one of the major themes in the present study, inefficient management of human and

Table 2. Individual characteristics of the participants

Participants	Age (year)	Educational level	Work experience in aerial EMS (years)	Work experience in road EMS (years)
P1	39	Bachelor's degree in nursing	8	6
P2	37	Bachelor's degree in nursing	7	4
P3	42	Bachelor's degree in Emergency Medicine	11	8
P4	47	Bachelor's degree in Emergency Medicine	8	13
P5	31	Bachelor's degree in Emergency Medicine	4	2
P6	38	Bachelor's degree in Emergency Medicine	5	8
P7	44	Bachelor's degree in nursing	13	9
P8	40	Bachelor's degree in nursing	10	7
P9	39	Bachelor's degree in Emergency Medicine	6	9
910	42	Bachelor's degree in Emergency Medicine	11	7
P11	47	Bachelor's degree in Emergency Medicine	6	9
P12	43	Bachelor's degree in Emergency Medicine	10	6
P13	31	Bachelor's degree in nursing	3	4
P14	41	Master's degree in nursing	6	7
P15	39	Bachelor's degree in Emergency Medicine	9	5
P16	35	Bachelor's degree in Emergency Medicine	7	5
P17	40	Master's degree in nursing	9	6
P18	49	Bachelor's degree in Emergency Medicine	9	14
P19	33	Bachelor's degree in Emergency Medicine	4	5
P20	36	Bachelor's degree in Emergency Medicine	5	6
P21	46	Bachelor's degree in Emergency Medicine	9	8

EMS: Emergency medical services

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Table 3. Themes and subthemes extracted from content analysis

Themes	Subthemes
Inefficient management of human and organizational resources	• Lack of personal development of the personnel • Lack of specialized equipment • Lack of clinical guidelines on patient management in aerial emergency services
Lack of professional capabilities	• Lack of clinical knowledge • Lack of clinical skills • Lack of clinical decision-making skills
Job stress and injuries	• Fear and anxiety caused by heights • Job burnout • Injuries from changes in air pressure and barotrauma

organizational resources encompasses a lack of personnel development, lack of specialized equipment, and absence of clinical guidelines for patient management in aerial emergency services.

Lack of personal development of the personnel

From the perspective of the 18 participants, the neglect of personnel development represents a significant barrier to effective patient management in aerial emergency medical services. Senior managers at medical emergency centers should implement targeted strategies to empower staff and support their professional growth in aerial emergency services. According to one participant:

"Sadly, the top organizational managers do not have any systematic or effective plans to enhance the skills of the personnel. They neither organize specialized training programs for caregiving and patient management in aerial emergencies, nor do they create any opportunities in this field" (Participant 7).

According to another participant:

"Providing care in aerial emergency services is entirely different from other contexts. How can my managers expect me to deliver quality care and ensure patient safety during aerial emergency missions without any specialized training in this area? Personnel must first be empowered, and the organization should actively invest in the improvement of their individual skills" (Participant 10).

Lack of specialized equipment

According to the 21 participants, delivering effective and high-quality care in aerial emergency medical services is not feasible without access to specialized equipment and appropriate gear. One participant explained:

"As a paramedic in aerial emergency medical services, I don't have proper, specialized uniforms or footwear, which creates difficulties while caring for patients. In my view, the uniforms worn by aerial emergency personnel should resemble those of pilots. This would enable us to care more effectively for patients in the challenging conditions of aerial emergency missions" (Participant 11).

Another participant stated that:

"Many of the helicopters used for aerial emergency services are military-grade; they are not specifically designed for medical use and are extremely difficult to work in. There is hardly enough room to perform paramedical procedures, and they lack essential devices such as heart monitors and mechanical ventilators. Moreover, these aerial ambulances are unable to fly in rainy weather or at night" (Participant 14).

1. Lack of clinical guidelines on patient management in aerial emergency services

Regarding this sub-theme, 15 participants emphasized the necessity of specific, comprehensive, up-to-date, and evidence-based clinical guidelines for caregiving and patient management in aerial emergency medical services. Such protocols are essential for ensuring safe and high-quality care that adheres to professional standards. One participant noted:

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"Working in aerial emergency services is very different from other forms of transport, such as ambulances. Unfortunately, there are no specific, updated guidelines for aerial emergency medical services. As a paramedic, I'm often unsure about what is appropriate and what isn't. Without a clear, systematic protocol, how can we be expected to deliver quality care? We've raised this concern with emergency managers many times, but they've simply told us to follow the same guidelines used in ambulance services" (Participant 17).

Another participant remarked:

"Specific clinical guidelines tailored to aerial emergency services can greatly enhance service quality and patient safety, while also preventing confusion among staff regarding appropriate care procedures. Given the complex and high-risk conditions of patients being transported by helicopter, it is absolutely critical that personnel have access to current guidelines—especially those addressing the management of multiple trauma cases, bleeding control, and airway management—to ensure safe and effective care" (Participant 13).

2. Lack of professional capabilities

Identified as another main theme, lack of professional capabilities comprises deficiencies in clinical knowledge, clinical skills, and clinical decision-making abilities. According to the 21 participants, patients transported by helicopter in aerial emergency services are typically in critical condition and urgently require care. Thus, the personnel responsible must demonstrate strong professional competencies, including sound clinical judgment and the ability to apply scientific evidence under time pressure and in complex environments. In other words, these paramedics must function as well-rounded professionals capable of delivering optimal care in demanding circumstances.

Lack of clinical knowledge

From the perspectives of 19 participants, a lack of clinical knowledge is a serious issue that negatively impacts the quality of care in all medical emergencies, especially in aerial emergency services. According to one of the participants:

"Not everyone is fit to practice in aerial emergency services. Paramedics who intend to work in aerial emergency medical services must possess strong clinical knowledge of diseases, high-risk conditions, and emergencies. They also need to be well-versed in working under unstable weather conditions, managing air pressure changes at high altitudes, and understanding barotrauma" (participant 8).

Another participant stated:

"As a paramedic, I have had no training in providing care in aerial emergency services, so I'm unfamiliar with the working conditions in this field and lack both the specialized knowledge and skill. How, then, can I be expected to provide safe care? Unfortunately, the managers of the pre-hospital emergency department have not implemented any specialized training programs for us in aerial emergency services" (participant 19).

Lack of clinical skills

Nineteen participants stated that paramedics practicing in aerial emergency medical services must be equipped with advanced clinical skills and quick thinking across all areas of emergency care, especially advanced CPR (cardiopulmonary resuscitation), trauma management, airway control, severe arterial bleeding control, and the management of emergencies related to the cardiac, pulmonary, endocrine, metabolic, or nervous systems. According to one of the participants:

"If you want to be a caregiver in aerial emergency services, you must have proficient clinical skills in this field; you should be able to perform the necessary procedures as swiftly and accurately as possible. In other words, you should be so skilled that you could work blindfolded. Harsh weather conditions, air pressure changes, and air pockets can adversely affect caregiving in

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aerial emergency services, so paramedics must be equipped with the required clinical skills to overcome these challenges" (participant 15).
Another participant added:

"The complicated and demanding conditions of air medical services require paramedics to have advanced competencies in patient management under extreme circumstances. In aerial emergency medical services, there is no room for mistakes or learning on the job; you must act decisively. You must apply all the knowledge and skills you've acquired to deliver high-quality care. Most patients transported to medical centers by air ambulance are in critical, life-threatening conditions—ranging from victims of mass-casualty incidents to patients in hemorrhagic shock due to limb loss, or those suffering from cardiac tamponade. Therefore, paramedics must possess exceptional clinical proficiency to save lives" (participant 9).

Lack of clinical decision-making skills

According to 18 participants, one of the most essential professional competencies in emergency care personnel—particularly those serving in aerial emergency medical services—is the ability to make sound clinical decisions. The participants' experiences indicated that even paramedics who possess adequate clinical knowledge and skills may fail to make rational and effective decisions in complex emergency situations, especially in air medical services, thereby sometimes placing patients' lives at risk.
One participant shared:

"The atmosphere and operational conditions in air emergency medical services are highly complex and unpredictable; working under such circumstances is extremely challenging. I've participated in numerous aerial missions myself, yet at times, even I find decision-making difficult. Situations change rapidly and new incidents can arise at any moment. Therefore, strong clinical decision-making abilities and quick, sound judgment are essential to effectively manage patients with complicated and fluctuating clinical conditions" (participant 12).
Another participant noted:

"In my professional experience in emergency and air medical services, clinical decision-making ability is the most critical professional competency. Sadly, I've often seen colleagues make errors that endanger patients simply because they lack this crucial skill. In my opinion, personnel who lack critical thinking, clinical reasoning, and sound judgment—all of which are integral to clinical decision-making—should not be employed in pre-hospital or aerial emergency services. Doing so is tantamount to gambling with patients' lives" (participant 6).

Job stress and injuries

Job stress and injuries emerged as another major theme in this study. The experiences of 20 participants revealed that working in emergency and aerial medical services is immensely stressful and physically demanding, often accompanied by severe psychological and emotional strain. Not everyone is suited for such unpredictable, high-pressure, and hazardous environments. Therefore, emergency care administrators should prioritize candidates' mental resilience and occupational health when recruiting new personnel for emergency medical services. To perform effectively under stress, paramedics must maintain sound psychological health and demonstrate high emotional resilience. This theme encompasses fear and anxiety related to heights, job burnout, and barotrauma-related injuries.

Fear and anxiety caused by heights

According to all 20 participants, fear of heights and anxiety about falling are intense and pervasive, even among experienced paramedics who have participated in numerous aerial emergency missions. These fears significantly impact their performance and clinical judgment.
One participant described:

"As aerial emergency services personnel, we confront the possibility of death daily. We're never certain we'll return safely from

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a mission. At any moment, a technical failure could lead to a crash. This constant fear and anxiety affects us deeply, and unfortunately, emergency care managers have done nothing to alleviate this burden. They don't even refer us to a psychologist. It seems the occupational mental health of staff is not a priority for them" (participant 20).

Another participant stated that:

"In one of the missions, the aerial emergency chopper crashed due to a technical issue, and we lost one of our colleagues. Although it's been a long time since that dreadful incident, the personnel still experience anxiety and emotional tension when they think about it. Some of us even suffer from post-traumatic stress disorder (PTSD). Personally, I believe that senior emergency care administrators must take effective measures to reduce or eliminate the job stress caused by heights and fear of crashing. They should arrange for personnel to undergo evaluations by medical professionals and receive support from psychological counselors. Maintaining the occupational health of paramedics is directly associated with higher-quality care and, by extension, improved patient safety and greater satisfaction with emergency care services" (participant 4).

Job burnout

The experiences and views of 19 participants indicated that the prevailing working conditions in aerial emergency medical services, coupled with work overload due to a shortage of experienced personnel, result in excessive pressure on staff. This leads to premature burnout among paramedics, particularly those working in aerial emergency services. This burnout is so severe that even personnel with only a few years of experience in aerial emergency services lose interest in their profession, and some even resign. According to one of the participants:

"Aerial emergency is regarded as a tough, hazardous field of work. I have practiced in various hospital units, such as the ER, burn ward, and intensive care unit (ICU). Nevertheless, none of them compares to aerial emergency in terms of anxiety, difficulty, and stress. Every aerial mission makes us feel several years older and accelerates the onset of burnout" (participant 11).

Injuries from changes in air pressure and barotrauma

One of the factors that adversely affect the performance of paramedics in aerial emergency services—and, by extension, patient management—are job-related injuries caused by changes in air pressure and barotrauma. From the perspective of 16 participants, the occupational health of emergency care personnel must be regularly monitored, and staff must be evaluated by health professionals. Unfortunately, there are currently no established protocols or policies for assessing occupational health in aerial emergency services. Furthermore, there is a lack of educational and protective programs designed to safeguard paramedics from such injuries. As a result, paramedics are often deployed on aerial emergency missions without undergoing any prior medical evaluations.

One of the participants stated:

"During a mission, one of the personnel who couldn't tolerate the sudden changes in air pressure at high altitudes suffered barotrauma: he developed a severe headache, became dizzy, and experienced nausea. He could barely stand, let alone assist the patient. After the mission, he was referred to the hospital for evaluation and was diagnosed with middle ear trauma due to barotrauma" (participant 17).

Discussion

Today, air ambulances have become an integral component of advanced emergency medical services, playing a crucial role in delivering timely care to patients requiring urgent medical attention or facing life-threatening situations (19). Air ambulances are also essential for reaching patients in remote or inaccessible areas where ground ambulances

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are ineffective (20). However, emergency care personnel involved in air medical services encounter significant challenges in caregiving and patient management, which adversely affect their performance. The findings of the present study revealed that inefficient management of human and organizational resources, lack of professional capabilities, and job-related stress and injuries constitute the major barriers to effective patient management in aerial emergency medical services.

Identified as a primary obstacle by participants, inefficient management of human and organizational resources encompasses the lack of personnel development initiatives, shortage of specialized equipment, and absence of clinical guidelines specific to patient management in aerial emergency settings. The concerns expressed by paramedics include the failure of management to implement ongoing education programs for personnel development, inadequate access to essential equipment, and the lack of specific and comprehensive clinical protocols for aerial emergency practice.

According to a study by Jafari et al. (2022), one of the key criteria for evaluating the effectiveness of aerial emergency services is the availability of specialized equipment and adequately trained personnel (21). A study by Sorani et al. (2018), which examined challenges in aerial emergency services in Iran, found that insufficient infrastructure, equipment shortages, and lack of human resources were major obstacles encountered by emergency care personnel. Although Sorani's study addressed challenges in aerial emergency services in Iran, it did not specifically focus on identifying barriers to patient management from the perspective of paramedics. Instead, it emphasized infrastructural deficiencies and inadequate resource management (22).

The results of studies by Mohammadi et al. (2022) and Mohammadi et al. (2021) indicated that the absence of clinical guidelines and lack of continuous education aimed at personnel empowerment are critical obstacles to effective clinical decision-making and caregiving among emergency care providers (23, 24). Given the complexity of the working environment in aerial emergency services, senior emergency care administrators must prioritize the ongoing professional development of paramedics, establish evidence-based clinical protocols, and conduct regular assessments of personnel competencies. They should also ensure the deployment of specialized equipment and qualified personnel in aerial emergency medical services.

Lack of professional capabilities—another major theme identified in this study—includes deficits in clinical knowledge, clinical skills, and clinical decision-making. Participants' experiences revealed that the unique conditions in aerial emergency services demand that personnel possess advanced competencies in all three areas to implement rapid and effective clinical interventions that can save patients' lives. Even a minor error or lapse in judgment can jeopardize the lives of both patients and crew.

According to Bijani et al. (2021), a lack of professional capabilities, particularly in clinical knowledge and skills, is the primary cause of incorrect clinical decisions made by emergency care personnel when managing patients in critical condition. The study recommends that emergency care administrators take decisive steps to enhance clinical decision-making, reasoning, and critical thinking skills among personnel. This includes routine evaluations of clinical competence and the implementation of targeted interventions to address areas of weakness, thereby enhancing the overall capacity of emergency care staff (25).

Another theme identified from the participants' experiences is job stress and injuries, which include fear and anxiety caused by heights, job burnout, and injuries from barotrauma. In aerial emergency services, the incidence of job stress and injuries is so high that it not only adversely

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affects the health and safety of the personnel, but also leads them to leave their jobs. In their study exploring the stressors in pre-hospital emergency services, Afshari et al. (2021) concluded that the highly stressful working conditions in emergency medical services cause the personnel to experience high levels of stress and anxiety (26). Similarly, the results of studies by Thielmann et al. (2022) and Hruska et al. (2021) showed that job stress and work overload in pre-hospital emergency services are the main causes of burnout among personnel. Therefore, emergency medical care managers should take steps to improve their personnel's psychological health and stress management skills, and also conduct regular evaluations of their mental well-being (27, 28). In a related vein, studies by Soravia et al. (2020) and Crowe et al. (2018) showed that stress, depression, PTSD, and burnout are the most common job-related injuries among emergency care personnel, negatively impacting their professional performance (29, 30).

Limitations

The present study investigated the obstacles to patient management solely from the perspective of paramedics involved in aerial emergency medical services. It is suggested that future studies address the views of patients and senior emergency care managers as well. Moreover, the differences in the economic climate and the structure of emergency medical care between Iran and other countries may limit the transferability of the findings of the present study. Therefore, it is suggested that similar studies be conducted in international contexts.

Strengths

The present study is one of the few research efforts that used a qualitative approach to investigate the barriers to patient management in aerial emergency medical services. Although a few qualitative studies have addressed issues in air medical services in Iran, the present study is the first to comprehensively and specifically identify the barriers to patient management in this area.

Conclusion

Inefficient management of human and organizational resources, lack of professional capabilities, and job stress and injuries are the major barriers to effective patient management and caregiving in aerial emergency medical services. Senior emergency care managers are encouraged to use the findings of the present study to identify challenges in patient management, develop strategies to remove these obstacles, and enhance the performance of personnel, thereby contributing to patient safety and the quality of care provided in aerial emergency medical services.

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Conflicts of Interest

The authors declare no conflicts of interest.

Funding

No funding from any organization or institution was received for this study.

Abbreviations

EMS: Emergency Medical Services, COREQ: Criteria for Reporting Qualitative Research, COVID-19: Coronavirus disease 2019, ICU: intensive care unit, PTSD: post-traumatic stress disorder, CPR: cardiopulmonary resuscitation.

Data Availability Statement

The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy and ethical restrictions.

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Ethical Considerations

All participants provided written informed consent to participate in the study. They were assured of their anonymity and the confidentiality of their information. Moreover, the study was approved by the Institutional Research Ethics Committee of Fasa University of Medical Sciences, Fasa, Iran. All methods were conducted in accordance with relevant guidelines and regulations, and the research adhered to the ethical principles outlined in the Declaration of Helsinki.

Code of Ethics

Ethical code: IR.FUMS.REC.1401.073

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