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COVID-19 PANDEMIC AND THE CHALLENGES OF PRE-HOSPITAL EMERGENCY SERVICES IN IRAN: A SYSTEMATIC REVIEW

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ABSTRACT

INTRODUCTION: Emergency medical service (EMS) systems faced numerous challenges and issues as the frontline in dealing with the global Coronavirus Disease 2019 (COVID-19) pandemic. This systematic review aimed to prepare a guideline for managing future pandemics by exploring the challenges emergency medical technicians face in providing pre-hospital care during the COVID-19 pandemic.

MATERIAL AND METHODS: This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. PubMed, Web of Science (WOS), Scopus, ProQuest, Embase, Science Direct, and Google Scholar were the primary databases used to search for literature. The keywords used in this review were COVID-19, "Prehospital Emergency", and Iran, and their equivalents, obtained from MeSH, expert opinion, or related articles. From the 787 records identified through database searching in the early stage, after investigating, analysing the characteristics, and content analysis, 11 articles were included in the final stage of this review study to answer the study questions.

RESULTS: Based on the searches, 11 articles were finally evaluated. Challenges extracted from the analysis of studies were classified into 5 main themes, 12 subthemes, and 50 codes. The main themes include Ambiguity in operational protocols, Resource Shortage, Cultural challenges, Burnout, and Physical and Mental health challenges.

CONCLUSIONS: The outbreak of COVID-19 has presented challenges for pre-hospital emergency services (PHES) in Iran, necessitating adaptive strategies and coordinated efforts by authorities to prepare EMS for similar crises in the future.

KEYWORDS: COVID-19; pre-hospital emergency service; Iran

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INTRODUCTION

COVID-19 was first reported in Iran on February 19 and has since spread exponentially. The coronavirus has presented an unprecedented public health crisis, imposing an enormous healthcare burden on society with thousands of cases of illness and death [1]. The COVID-19 disease spread widely in Iran. After China and Italy, Iran had the third highest number of reported cases of COVID-19 at the beginning of the epidemic and was severely affected by the virus [2–4].

The significant rise in COVID-19 patients increased the exposure of pre-hospital emergency staff to the

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virus [4, 5]. Emergency medical services (EMS) personnel are at the forefront of healthcare services and play a crucial role in managing public health crises, such as the spread of infectious diseases like COVID-19. As a result, they are exposed to significant psychological stress [6]. Numerous challenges in managing COVID-19 affect their performance [7].

Fagoni et al. [9] conducted a study in the Lombardy region of Italy and found that between 2019 and early 2022, the duration of missions and the time it took for the first vehicle to arrive at the scene of a stroke for COVID-19 pandemic patients increased. In another study by Stirparo et al. [9] in the same region, the results showed that the transfer duration of patients diagnosed with ST-elevation myocardial infarction from home to the hospital by pre-hospital emergency services during the COVID-19 pandemic also increased.

The PHES has never faced such an extensive disease, so the healthcare system managers and the staff were surprised. At the onset of the disease outbreak, there was often inadequate preparation in the pre-hospital emergency services to accommodate the large number of patients seeking assistance [10]. Numerous centres lacked facilities and equipment. Many emergency workers contracted COVID-19, and others feared passing it to their families. There was no clear process for treating and transferring patients who called the pre-hospital emergency; transfer instructions changed daily [11]. Due to the spread of the disease, all ambulances and pre-hospital emergency staff had to respond to the needs of COVID-19 patients and transfer them to the hospital if necessary, so they were constantly anxious and worried [12, 13]. Numerous studies have been conducted in Iran on PHES challenges during the COVID-19 pandemic. This systematic study was conducted to consolidate the findings and develop a guide for effective planning and enhanced management in future disasters.

METHODS

Design

This study is a systematic review of publications about the COVID-19 pandemic and the challenges of PHES in Iran. Data were collected using a clear process, and the study was conducted based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The quantitative studies were heterogeneous, meaning that some had different designs, others had different participants, and the type of intervention was different or had different outcomes in some studies. Therefore, it was impossible to collect their conclusions and conduct a meta-analysis. The researchers conducted a content analysis to gather descriptive information. Rather than using pre-established categories, the authors identified words and phrases with similar meanings in the studies' texts to create the categories. In the initial analysis phase, they read the text multiple times to identify meaning units related to the study objectives. These meaning units were then condensed and coded [14].

Inclusion Criteria

The systematic review includes papers from various disciplines focusing on or related to the challenges of PHES in Iran. These papers were published from December 2019 to January 2024. This systematic review included studies found in reliable international databases of acceptable quality. The grey literature, including conference papers, research reports, theses, expert opinions, and key journals, was searched for additional studies. Additionally, the retrospective method (*i.e.* the reference lists of the included papers) and searches in Google Scholar were used as supplementary methods.

Exclusion criteria

For this study, book chapters and secondary studies, such as reviews and letters to the editor, and the studies that did not have an acceptable quality level were excluded. The search strategy did not impose any language limitations, but articles in languages other than English were excluded due to inaccessibility.

Search strategy

The valid electronic databases were searched thoroughly to identify relevant studies. The primary databases used to search literature were Scopus, PubMed/Medline, Web of Science (WOS), Science Direct, Embase, and ProQuest. Keywords included COVID-19, "Prehospital emergency", and Iran, and their equivalents, which were obtained from MeSH, Emtree, or extracted from expert opinion and related articles. Other resources, such as grey literature, reference lists of relevant primary studies, Google Scholar, and key journals, were searched for additional studies. Articles published from December 2019 to January 2024 were included. The study

syntax was formed from 3 components. The first component included Corona OR Coronavirus OR Covid-19 OR "novel coronavirus" OR "SARS coronavirus" OR "COVID pandemic" OR "coronavirus disease" OR "coronavirus outbreak" OR "severe acute respiratory syndrome coronavirus 2" OR "SARS-CoV-2" OR "SARSCoV" OR "MERS-CoV" OR "coronavirus disease 2019" OR "COVID-19 pandemic" OR "new coronavirus disease"; the second component included EMS OR 115 OR "pre-hospital emergency" OR "Pre-hospital EMS" OR "Emergency Medical Service" OR "Medical Technician" OR Paramedic* OR "Emergency Paramedic" OR PEMS OR "Emergency Medicine Technician" OR "Emergency Medical Technician" OR "Emergency Prehospital Provider"; and the third component included Iran. The search syntax is shown in Supplemental Material 1.

Data extraction (selection and coding)

First, a thorough literature search was performed using the key terms in databases including PubMed (including Medline), Web of Science, Scopus, ProQuest, Science Direct, Embase, and Google Scholar (P.D, M.B, S.J, and R.A.S), then the title and abstract of the found articles were evaluated to exclude the unrelated ones (P.D, M.H, M.B, and R.A.S.). Then, according to the inclusion and exclusion criteria, the eligibility of the full texts of the remaining articles was assessed by 2 reviewers. Any disagreement was resolved by consensus between the 2 authors (M.H, R.A.S).

Quality assessment

The full texts of the articles were read and checked by 2 authors independently for the quality of the included studies. The Critical Appraisal Skill Program (CASP) and the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) were used to assess and evaluate qualitative and cross-sectional studies. In this review, due to the difference in methodology and the heterogeneity of the articles included in the final stage, it was impossible to perform a meta-analysis. To assess the quality of the studies and determine if they should be included in the final analysis, the authors used the STROBE tool for cross-sectional studies and the CASP tool for qualitative studies. A cutoff point of 60% was set, meaning that studies that met at least 60% of the STROBE or CASP criteria were included in the final analysis, while those that did not meet this threshold were excluded from the study.

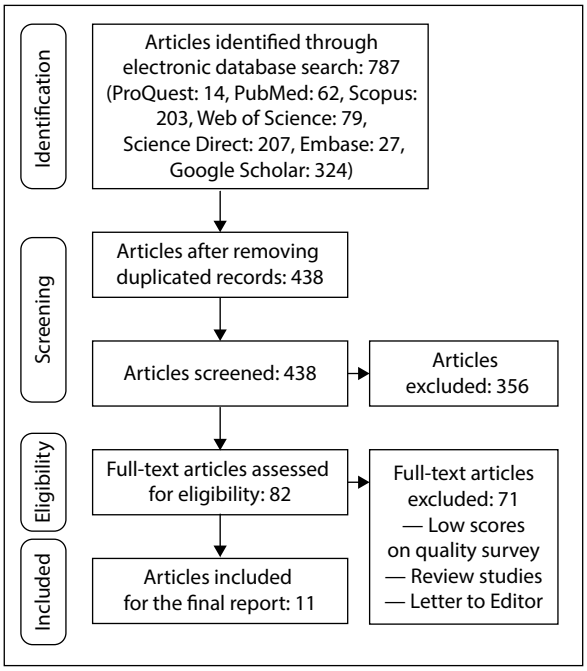

FIGURE 1. Review selection process and results based on the PRISMA guidelines

RESULTS

From the 787 articles identified through the early electronic database search, 11 were selected for this review, followed by an analysis of the characteristics and content of the included studies to answer the study questions (Fig. 1). Of the 11 selected studies in the final round, 5 had a qualitative design, 5 were descriptive cross-sectional, and one was mixed method (Tab. 1).

Implementing quantitative analysis was impossible, so content analysis was done to obtain descriptive information. The articles included in the final stage had various methodologies, and the quantitative data were heterogeneous. The findings of the content analysis were summarised in 5 themes (ambiguity in operational protocols, resource shortage, cultural challenges, burnout, and physical and mental health challenges) (Fig. 2), 12 subthemes, and 50 codes, which are described in order (Tab. 2).

Ambiguity in operational protocols

During the COVID-19 pandemic, the lack of defined protocols and fixed methods caused confusion and ambiguity for pre-hospital emergency services personnel [13, 15, 16]. Due to the newness of COVID-19, there were frequent changes in protocols, guidelines, and medications. This confused pre-hospital emergency personnel as new medicines were

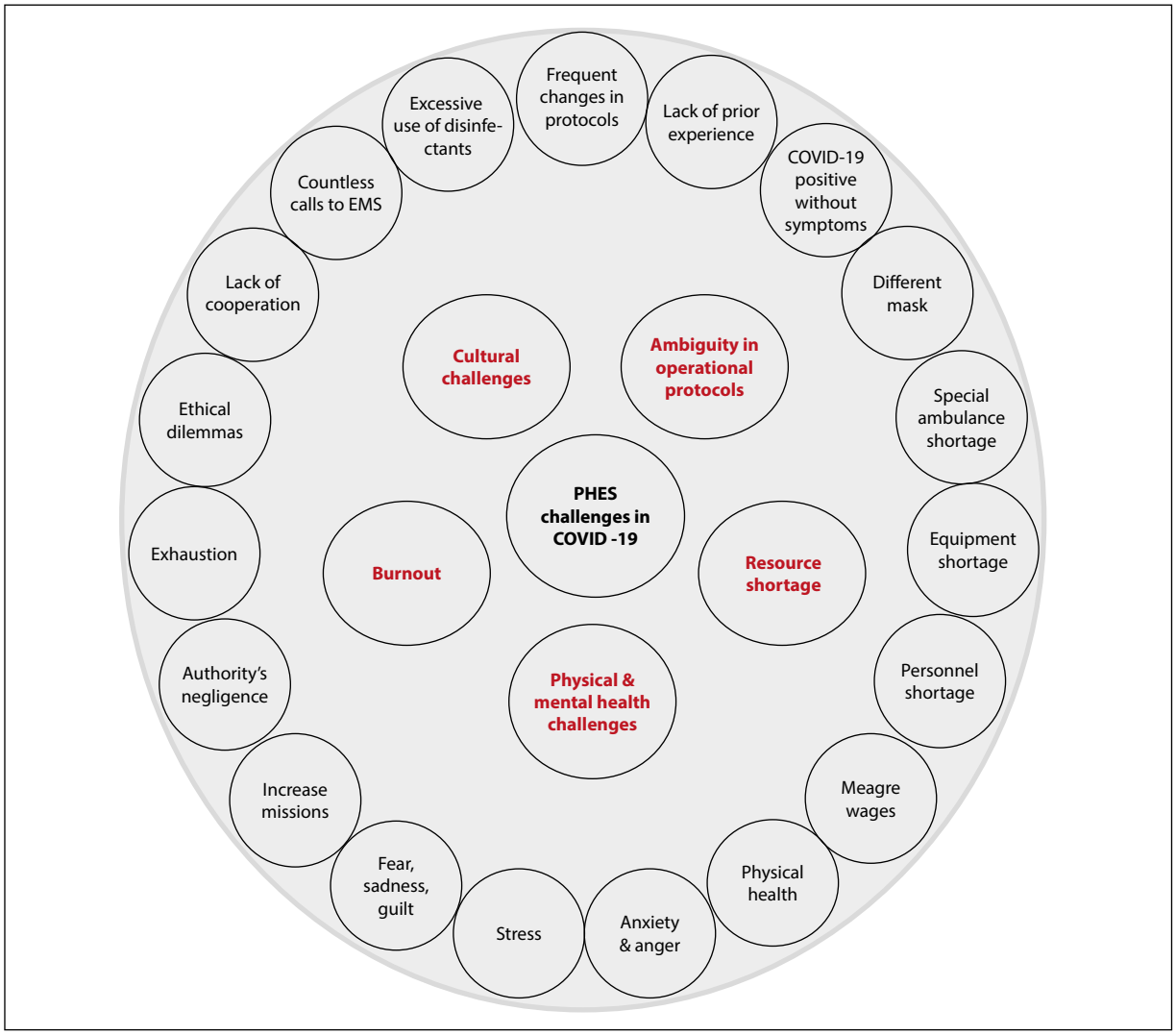

FIGURE 2. The challenges of PHES in COVID-19 pandemic

sought and previous ones were abruptly discontinued. Another challenge was the lack of a referral system for COVID-19 patients [17].

Several challenges need to be addressed in the emergency medical services sector. These include the lack of prior experience among medical staff, uneven distribution of pre-hospital emergency centres in urban and remote areas, and disagreements between hospital and pre-hospital emergency staff over admitting patients with no available beds [17–19].

Resource shortage

Human resources: The shortage of pre-hospital emergency personnel presented a significant challenge during the coronavirus outbreak, while the lack of personnel has consistently been an issue under normal conditions. Due to the rapid spread of COVID-19, the shortage of pre-hospital emergency personnel became a critical issue. Due to the crisis, staff members were not allowed to take absences, and replacements were unavailable due to manpower shortages. As a result, many employees fell ill, putting more pressure on their coworkers to work extra shifts [11, 13, 15].

There were a couple of challenges that arose about personnel management. Firstly, hiring less experienced personnel proved to be a challenge. Secondly, the personnel lacked awareness and preparation for the coronavirus and were unsure how to handle the crisis. Studies also highlighted insufficient training, particularly about proper use of personal protective equipment and disinfecting ambulances [18, 19]. Hiring inexperienced employees during the COVID-19 pandemic, with an uncertain future and a high likelihood of being unemployed again after the virus was under control, posed another challenge for human resources [17]. The lack of support from

Table 1. The characteristic of included studies

No	Author(s)	Year	Aim	Methods	Results
1	Ardebili ME, et al.	2021	To undertake an in-depth exploration of the experiences of healthcare staff working during the COVID-19 crisis.	Qualitative study	Experiencing different emotions in EMS staff, providing mental health aid should thus be an essential part of services for healthcare providers during the pandemic.
2	Hadian M, et al.	2022	To explore pre-hospital emergency challenges in the face of the COVID-19 pandemic.	qualitative content analysis	lack of equipment and job overload, Lack of public awareness and Procedural and infrastructural challenges were the main challenge of EMS staff against covid-19.
3	Heidari M, et al.	2022	To identify the challenges of prehospital emergency system function in the face of COVID-19 pandemic.	Qualitative approach	Four main challenges were extracted: challenges related to facilities and equipment, living with uncertainty, professional and organizational capabilities, and burnout.
4	Salami Z, et al.	2023	To investigate perceived stress and coping strategies among ED nurses and EMS staff.	Descriptive-cross-sectional	The most stressful factors were related to the transmission of the disease to the family and seeing the death of COVID-19 patients in front of their eyes.
5	Asadi H, et al.	2022	To determine depression, anxiety, and stress in prehospital emergency personnel during the COVID-19 epidemic.	Descriptive cross-sectional study	More than half of the staff had moderate to severe depression and anxiety.
6	Sabbaghi M, et al.	2022	To investigate depression, anxiety, and stress levels of the Iranian prehospital emergency personnel during the COVID-19 pandemic.	Descriptive cross-sectional	Prehospital emergency personnel suffer from significant levels of depression, anxiety, and stress during the COVID-19 pandemic.
7	Ghezelbash, S et al.	2022	To investigate the correlation between mental health and corona anxiety among pre-hospital emergency medicine clinicians during the COVID-19.	Cross-sectional study	The anxiety created due to the outbreak of Corona virus among pre-hospital emergency workers has affected their mental health.
8	Parvaresh-masoud M, et al.	2021	To identify the challenges that EMS staff face in their daily work and develop strategies that addresses these challenges.	Qualitative study	The challenges were classified into three main categories including "restless society", "difficult care delivery conditions", and "unprepared organization".
9	Sadeghi M, et al.	2023	Exploring the challenges of EMTs in providing pre-hospital care during the COVID-19 pandemic.	Qualitative research	Challenges among EMTs during the COVID-19 pandemic were categorised under 4 themes including: work factors, unprepared organization, threatened health, restless social.
10	Mohammadi F, et al.	2021	To identify some strategies to manage the COVID-19-related challenges faced by the pre-hospital emergency care personnel.	Qualitative descriptive study	Due to lack of equipment and work overload in the current crisis, emergency medical services personnel are faced with many psychological challenges.
11	Heidari M, et al.	2022	To investigate the level of anxiety and professional competence of pre-hospital emergency medical personnel in the COVID-19 epidemics.	Descriptive-analytical study	The stress and anxiety of the COVID-19 epidemic have adverse effects on the professional competence of pre-hospital emergency medical personnel as well as their mental health.

Table 2. Extracted themes and subthemes

Theme	Subtheme	Codes
Resource shortage	Personnel shortage	Permanent shortage of staff under normal conditions Absence due to increased workload during the COVID-19 pandemic Absence due to coronavirus infection
	Equipment shortage	PPE shortage Disinfectant shortage Multiple uses of disposable items
	Meagre wages	Low salary Unfair salary payment Lack of support from officials
	Special ambulance shortage	Ambulance shortage Shortage of special ambulance for COVID-19 patients Transporting both COVID-19 patients and non-COVID-19 patients in the same ambulance. The fear of non-corona patients being transported in an ambulance that is also carrying a COVID-19 patient. Conflict with emergency personnel because of shared ambulance with COVID-19 patients
Ambiguity in operational protocols	Frequent changes in protocols	Changes in COVID-19 patient management Recommendation to use different masks Change in medications Corona-positive patients without symptoms Symptomatic patients with negative COVID-19 test
	Lack of prior experience	The outbreak of a pandemic for the first time for EMS personnel Use of inexperienced personnel Inadequate training
Cultural challenges	Ethical dilemmas	Making the right decisions in difficult situations Respecting the rights of patients Preferring others over oneself
	Lack of community cooperation	Not wearing mask Failure to follow protocols Increase in EMS calls Unnecessary calls Excessive use of disinfectants and contact with EMS due to their side effects
Burnout	Exhaustion	Increase missions Work in difficult conditions Increase working hours Frequent changes in the work environment due to staff shortage Long-term wearing of PPE Being away from family
	Negligence of the authorities	Not providing enough staff Paying low wages Forced to do overtime
Physical & mental health challenges	Physical health	Body pain Headache, insomnia Itching and skin problems due to PPE and disinfectants
	Mental health disorders	Anxiety about getting infected with COVID-19 Fear of passing the infection to the family Self-quarantine Fear of death Death of patients and colleagues Feeling of guilt if the family gets infected Anger at being quarantined The feeling of hopelessness and despair

authorities during the challenging situation of the coronavirus pandemic was also mentioned as a significant obstacle in several articles [15–18].

Financial resources: During the COVID-19 pandemic, numerous studies highlighted the insufficient financial resources available to pre-hospital emergency personnel. Furthermore, there was little support and attention given to them. In most cases, personnel salaries were reported to be very low and unfair, and equipment shortages have also been a major challenge. The discrepancy in fee payments between pre-hospital emergency workers and hospital workers and the higher salaries in certain privileged provinces compared to disadvantaged provinces led to frustration and low morale among pre-hospital emergency personnel [20, 21].

Equipment: All studies indicated a shortage of personal protective equipment and disinfectants during the COVID-19 crisis and an unfair distribution of masks and clothing [13, 17, 19]. The price of personal protective equipment increased while the quality decreased [13]. Due to equipment shortages, time constraints, and multiple missions, personnel often reused suits and masks and sometimes wore the same mask for extended periods [19, 20]. Furthermore, the ambulances were inadequately equipped, and no ambulances were designated specifically for transporting COVID-19 patients. The lack of dedicated ambulances meant that COVID-19 patients were transported in the same ambulances as other patients. This led to dissatisfaction among some patients, and in some cases, it even resulted in conflicts between the emergency personnel and the patients' companions [21, 22].

Physical and mental well-being

During the COVID-19 pandemic, the physical and mental health of pre-hospital emergency personnel was compromised, leading to the publication of numerous articles addressing these issues [21].

Physical health: Long working hours and using personal protective equipment and masks resulted in body aches, headaches, insomnia, itching, and skin problems among PHES personnel [15].

Mental health: The COVID-19 crisis brought about various psychological challenges for pre-hospital emergency staff, including anxiety, fear, stress, sadness, and guilt [23, 24]. According to a study, EMS staff experienced moderate to severe anxiety during the COVID-19 crisis. Staff members with higher levels of anxiety reported poorer overall general health [11]. Another study found a correlation between higher anxiety levels and EMS personnel who had families affected by COVID-19. This study also noted a connection between anxiety levels and professional competence [13, 25].

During the quarantine and social isolation period, mental health concerns were further exacerbated, leading to increased levels of anger and anxiety among individuals. The heavy workload also caused conflicts within families and changes in personal daily routines. Some studies showed that individuals experienced post-traumatic stress disorder (PTSD) and reduced flexibility [25]. The lack of attention to the psychological well-being of individuals by authorities was also highlighted in articles, and this should be addressed promptly. Anxiety was widespread during that time due to various reasons, including the fear of getting sick, concerns about the severity of the disease, anxiety about death, worries regarding transmitting the illness to loved ones, and the fear of dying without any support [26]. Witnessing others suffer and die from illness can lead to sadness and guilt if unknowingly spread to family members [27].

The COVID-19 pandemic has increased workloads, leading to family conflicts and arguments. Personnel and their families are worried about the changes in their daily routines, which has increased feelings of hopelessness as the pandemic persists. The lack of control over the situation has caused heightened distress, and motivation among personnel has declined over time. Efforts feel futile, and treatments seem inadequate. The exhausting workload has worsened mental and psychological strain, resulting in severe fatigue among personnel [26–28].

Burnout

During the COVID-19 pandemic, there was a significant increase in emergency calls and missions, leading to healthcare workers having a heavy workload and working long hours. The use of personal protective equipment also contributed to the exhaustion experienced by the personnel, especially during hot weather, as it caused sweating and loss of appetite. Additionally, healthcare workers faced the challenge of distinguishing between COVID-19-positive and non-COVID-19 patients [17].

Ethical dilemmas were highlighted during this period, such as making difficult decisions, respecting patient autonomy, prioritising others' well-being,

and risking personal health for patients [15, 28, 29]. Disregarding the guidance of emergency officials and healthcare authorities, low wages, neglect of staff shortages, excessive work pressure on existing personnel, and forcing them to work overtime led to frustration and extreme fatigue among the personnel [15, 28–31].

Cultural challenges

The pre-hospital emergency department encountered several challenges due to the public's lack of understanding of the COVID-19 pandemic, which resulted in a lack of cooperation. Anxiety among the population led to numerous unnecessary phone calls to the pre-hospital emergency department, some of which were cases of harassment. Many individuals did not follow health protocols, such as wearing masks. Additionally, some patients provided incorrect information and lacked proper cooperation, exacerbating the situation. Excessive use of disinfectants led to complications such as skin, eye, and lung problems, coughing, and shortness of breath, which increased the number of phone calls related to these issues [13,14, 29]. During this period, ethical dilemmas were highlighted: making difficult decisions, respecting patient autonomy, prioritising others' well-being, and risking personal health for patients [15].

The results of a systematic study conducted by Eftekhari et al. [32] in 2023 to investigate the challenges of PHES in different countries in the face of COVID-19 showed that the main challenges in this field are lack of equipment, inappropriate management, lack of human resources, lack of protocols and guidelines, weak training of employees, burnout, and weak social-organisational support.

One of the limitations of this study is the lack of sufficient internal and external research in the field of PHES and the COVID-19 pandemic, which can be useful in comparing and matching the results of this research with other national and international research.

CONCLUSIONS

PHES encountered numerous challenges during the COVID-19 pandemic. This unprecedented experience can enhance resilience and help to better prepare for future disasters. Targeted planning, providing appropriate infrastructure, adequate equipment, suitable and sufficient personal protective equipment, ensuring adequate training and deployment of staffing, ongoing in-service training, psychological and financial support for staff, providing assistance to the families of staff during critical situations, promoting public education for community collaboration, and the companionship and empathy of senior officials with employees can form the foundation for creating a resilient PHES in future disasters.

Also, according to the principles of disaster management, in the preparation phase, hazards and vulnerabilities (lack of equipment and staff, burnout, lack of training, *etc.*) should be identified, and efforts should be made to eliminate also, increase capacities, like: specialized training of personnel, equipment, facilities, and have a preparedness plan, *etc.*

Article information and declaration

Author contributions

RAS and MH designed the study. PD, MBK, and SJ collected data. RAS and MH analysed the data. All authors contributed to the analysis and interpretation of data. RAS and MH drafted and revised the article according to the other authors' comments. All authors approved the final version.

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Ethics statement

The present study was approved by Ethical Committee Medical Sciences University of Shahrekord (Ethics code: IR.SKUMS.REC.1402.140).

Conflict of interest

None.

Supplementary material

Suplementary material 1 — The search syntax.

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Suplementary Material 1. The search syntax	
Databases	**Search syntax**
PubMed	(((Coronavirus[tiab] OR "novel coronavirus disease"[tiab] OR "SARS coronavirus"[tiab] OR "severe acute respiratory syndrome coronavirus 2"[tiab] OR "SARS-CoV-2"[tiab] OR "SARSCoV"[tiab] OR "MERS-CoV"[tiab] OR "coronavirus disease 2019"[tiab] OR "COVID-19"[tiab] OR "COVID-19 pandemic"[tiab] OR "coronavirus 2019-nCoV"[tiab] OR "new coronavirus disease"[tiab] OR "coronavirus outbreak"[tiab]) AND (EMS[tiab] OR «Emergency Medical Service"[tiab] OR "Prehospital Emergency Service*"[tiab] OR «Pre-hospital Emergency Medical Service"[tiab] OR "PEMS"[tiab] OR "Pre-hospital EMS"[tiab] OR 115[tiab] OR "Medical Technician"[tiab] OR Paramedic*[tiab] OR "Emergency Paramedic*"[tiab] OR "Emergency Medicine Technician"[tiab] OR "Emergency Medical Technician*"[tiab] OR "Emergency Provider"[tiab]) AND (iran[tiab] OR iran[pl] OR iran[ad]) AND (2019/01/01:2024/01/05[dp])
WOS	(Corona OR Coronavirus OR Covid-19 OR "novel coronavirus" OR "SARS coronavirus" OR "COVID pandemic" OR "coronavirus disease" OR "coronavirus outbreak" OR "severe acute respiratory syndrome coronavirus 2" OR "SARS-CoV-2" OR "SARSCoV" OR "MERS-CoV" OR "coronavirus disease 2019" OR "COVID-19 pandemic" OR "new coronavirus disease") (Topic) and (EMS OR 115 OR "pre-hospital emergency" OR "Pre-hospital EMS" OR "Emergency Medical Service" OR "Medical Technician" OR Paramedic* OR "Emergency Paramedic" OR PEMS OR "Emergency Medicine Technician" OR "Emergency Medical Technician" OR "Emergency Prehospital Provider") (Topic) AND Iran(Address) AND Timespan: 2019-12-31 to 2024-01-04 (Publication Date)
ProQuest	TI, AB(Corona OR Coronavirus OR Covid-19 OR "novel coronavirus" OR "SARS coronavirus" OR "COVID pandemic" OR "coronavirus disease" OR "coronavirus outbreak" OR "severe acute respiratory syndrome coronavirus 2" OR "SARS-CoV-2" OR "SARSCoV" OR "MERS-CoV" OR "coronavirus disease 2019" OR "COVID-19 pandemic" OR "new coronavirus disease") AND TI,AB(EMS OR 115 OR "pre-hospital emergency" OR "Pre-hospital EMS" OR "Emergency Medical Service" OR "Medical Technician" OR Paramedic* OR "Emergency Paramedic" OR PEMS OR "Emergency Medicine Technician" OR "Emergency Medical Technician" OR "Emergency Prehospital Provider") AND location (Iran) AND YR(> 2019)
Scopus	TITLE-ABS-KEY [(coronavirus OR "novel coronavirus disease" OR "SARS coronavirus" OR "severe acute respiratory syndrome coronavirus 2" OR "SARS-CoV-2" OR "SARSCoV" OR "MERS-CoV" OR "coronavirus disease 2019" OR "COVID-19" OR "COVID-19 pandemic" OR "2019-nCoV coronavirus disease" OR "coronavirus 2019-nCoV" OR "new coronavirus disease" OR "coronavirus outbreak")] AND TITLE-ABS-KEY [(ems OR «Emergency Medical Service» OR «Prehospital Emergency Service» OR «Pre-hospital Emergency Medical Service» * OR «PEMS» OR «Pre-hospital EMS» OR 115 OR «Medical Technician*" OR paramedic* OR "Emergency Paramedic*" OR "Emergency Medicine Technician*" OR "Emergency Medical Technician*" OR "Emergency Prehospital Provider*")] AND AFFILCOUNTRY (Iran) AND PUBYEAR > 2019