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Challenges Faced by Medical Rescue Teams During Disaster Response: A Systematic Review Study

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Abstract

This study was conducted to identify the challenges faced by medical rescue teams during the response phase of sudden-onset disasters and provide a comprehensive understanding of these challenges. Peer-reviewed, English-language articles published until January 2023 that described the challenges faced by medical rescue teams during disaster response were searched in the Web of Science, Scopus, Cochrane, PubMed, and Science Direct databases. The articles were assessed using the Mixed Methods Appraisal Tool (MMAT) version 2018, a quality evaluation tool, and a qualitative thematic synthesis approach was adopted. A total of 353 publications were identified, and 18 of these met the inclusion criteria. Of the 18 included studies, 8 were review articles, 4 were special reports, 3 were cross-sectional studies, 1 was a mixed methods study, 1 was a qualitative study, and 1 was a short communication. Through qualitative analysis, the challenges faced by medical rescue teams during disaster response were categorized into 6 factors: organizational, individual, environmental and health, logistical, communication and information, and other factors. These factors are significant in terms of issues such as delayed access to disaster victims, disruptions in response processes, and an increase in morbidity and mortality rates. Therefore, the findings in our study shed light on future research in the field of disasters and offer opportunities to develop a roadmap for improving the conditions of medical rescue teams.

Disasters are events that disrupt the normal functioning capacity of society and result in numerous economic and physical losses that are difficult to cope with using local resources.[1] The recent disaster events have increased global awareness about the need to be prepared for disasters. However, no matter how well-prepared a country may be, it is still possible for large-scale disasters to necessitate disaster medical assistance and humanitarian aid. In the case of natural or technological disasters, there can be an immediate need for significant destruction and urgent intervention requirements. This, in turn, will require the prompt mobilization of national and international resources.[2]

The response phase of a disaster, especially a sudden-onset one, includes saving lives, treating the injured or ill, meeting basic humanitarian needs, and addressing the immediate needs of the affected community.[3] During the intervention phase, the first priority is the evacuation and rescue of individuals stranded in hazardous areas. It is essential for injured or ill individuals to receive medical assistance, which can include basic first aid measures or, in the case of severe injuries, the transfer to medical facilities. Both scenarios are typically carried out by local or national rescue teams. Medical rescue teams are specialized teams tasked with providing medical assistance in disaster areas and coordinating emergency medical services. These teams take on responsibilities such as addressing patients' medical needs, implementing urgent medical procedures, and directing medical resources.[4]

Globally, a wide range of tools and intervention mechanisms are used to save lives and alleviate the pain caused by natural disasters.[5] Regardless of which country a disaster occurs in, it will exceed local capacity, so National Disaster Medical Systems have been established in many countries and Disaster Medical Teams have been formed under this scope. Various medical rescue teams, both national and local, are involved in many countries. Examples of medical rescue teams include DMAT (Disaster Medical Assistance Teams) and TCCT (Trauma and Critical Care Teams) in the United States, IMSURT (International Medical Surgical Response Teams); DART (Disaster Assistance Response Team) in Canada, J-DMAT (Japan-Disaster Medical Assistance Teams) in Japan, AUS-MAT (Australian Medical Assistance Teams) in Australia, and NMRT (National Medical Rescue Teams) in Turkey.[6,7]

In overcoming the chaotic environments caused by disasters, medical rescue teams play a vital role. However, these rescue teams face various challenges in the process of reaching disaster areas, coordinating medical interventions, and providing assistance to victims. Especially during the response phase, there may be deficiencies in search and rescue operations and medical services. These problems can result in an increase in functional damage and a decrease in buffering capacity during the response phase of a disaster. Additionally, response teams may experience significant stress and suffer from physical and mental health problems as a result of the challenges encountered during disaster situations. Failure to identify and address these issues can even lead to personnel loss.[8]

Identifying the problems faced by medical rescue teams can be a highly effective and important method in determining ways to increase their intervention levels. Conducting a literature review is the first step in achieving this goal. In the literature, various studies have been conducted focusing on lessons learned from disasters and challenges faced in disasters. However, it has been observed that these studies mainly address management issues and do not provide a comprehensive perspective on the problems. Therefore, in this study, distinct from previous research, the challenges encountered by medical rescue teams in disaster response have been thoroughly analyzed with a specific focus and a systematic review approach, aiming to provide a different perspective to the existing literature in this field. The findings provide information to academics for future disaster research, especially in the response phase, and offer opportunities to develop a roadmap for medical rescue teams.

Methods

In this study, a systematic review of articles related to the challenges faced by medical rescue teams during response in sudden-onset disasters caused by natural, human, or technological factors has been conducted. An integrative review methodology, which is considered the most comprehensive form of research review due to its ability to bring together different perspectives on the subject, was used in this study.[9] The review process includes defining the problem, conducting a literature search, selecting and collecting data, analyzing the quality of evidence, and presenting the data. Although no protocol and record were established regarding the inclusion criteria and analysis methods of this study, this study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[10]

Definitional Concepts

To ensure conformity with the established criteria, the PICOS framework was used. The participants of this study consist of medical rescue teams involved in disaster response (Participants). The challenges affecting the response of medical rescue teams were examined (Intervention). A comparative analysis of medical rescue teams' challenges was carried out (Comparison). Descriptions stated by different authors also constitute outcomes (Outcomes). In this research, all studies published in English were included (Study designs).

Databases and Search Strategy

Database searching was conducted with the combination of the following keywords: (disaster* OR catastrophe*) AND (medical rescue* OR assistance* OR first responder* OR worker*) AND (team*) AND (response* OR intervention*) AND (problem* OR obstacle* OR challenge*). For the selection of key terms, experts in the disaster management field were consulted and the consensus of 4 researchers was taken into consideration. An extensive search was performed for relevant articles. Articles published on PubMed, Scopus, Web of Science, and Cochrane until January 2023 were received. The references of the publications obtained within the scope of the research related to the research question were accessed through the Google scholar database.

Eligibility Criteria

Inclusion Criteria

(1) Articles focusing on at least 1 challenge faced by medical rescue teams during the response phase of sudden-onset disasters caused by natural, human, or technological factors; (2) Articles that are accessible and free of charge; and (3) Articles written in English.

Exclusion Criteria

(1) Articles that do not focus on the challenges faced by medical rescue teams during the response phase of sudden-onset disasters but instead focus on slow-onset disasters; (2) Articles not written in English; (3) Articles for which the full text is not available; and (4) Articles with a high risk of bias and that did not meet the inclusion criteria were excluded.

Study Selection and Data Extraction

In the first stage, 2 researchers (A.D.K. and T.Ö.) independently reviewed the articles based on their titles and abstracts to prevent any potential bias. The researchers subsequently engaged in a thorough discussion of the articles and collectively agreed upon the selection and inclusion of studies in the final dataset. EndNote version X20 (Clarivate Analytics, Philadelphia, PA) was used to manage the screened references and eliminate any duplicate entries. In the second stage, the same researchers conducted a full-text analysis of the articles that met the inclusion criteria. In the event of any disagreement between the 2 authors, they read and discussed the articles in detail, and endeavored to reach a consensus. In the cases where they could not reach a consensus, the other researchers (C.C. and K.K.) were the final decision-makers regarding the inclusion of the article. In the last stage, data from the reviewed studies were extracted with a form created by the authors. The following information was recorded from the selected studies to describe the findings: (1) author/year; (2) title; (3) study aims; (4) methods; (5) main findings; (6) suggestions. All extracted data were reviewed by members of the research team to confirm accuracy and completeness.

Quality Appraisal

In this study, The Mixed Methods Appraisal Tool (MMAT) 2018 version was used to evaluate the quality of the included articles. The MMAT is a comprehensive assessment tool that enables the evaluation of various research designs such as quantitative, qualitative, and mixed methods studies. It consists of 5 categories, each with 5 relevant specific criteria, which include a qualitative set, a random set, a non-random set, an observational descriptive set, and a mixed method set. According to the MMAT 2018 version, it is not suggested to score based on category criteria. Instead, the tool requires a description of which criteria have been fulfilled and which have not.[11] During the quality assessment, the 2 researchers (A.D.K. and T.Ö.) analyzed each article according to the MMAT

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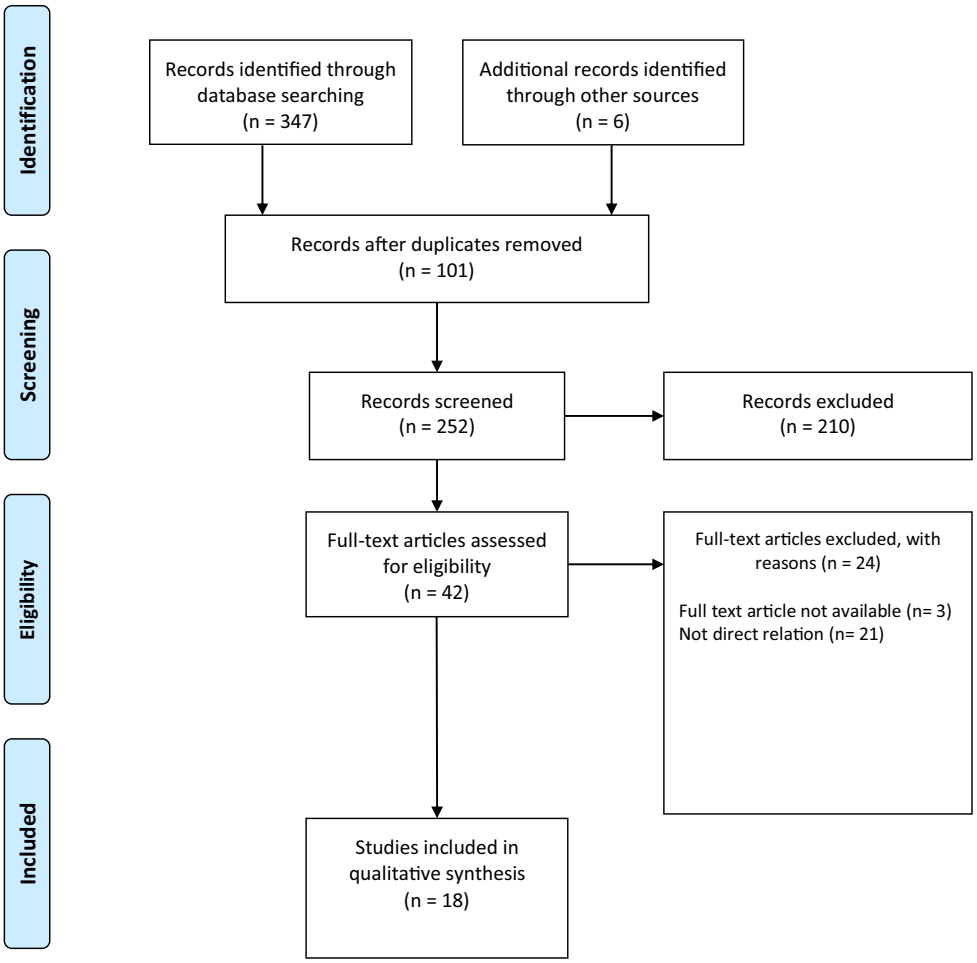

Figure 1. Flow diagram of study identification and selection process.

categories for any potential biases. Any discrepancies were resolved through negotiation or consultation with a third author. The results of the quality assessment conducted using MMAT 2018 in this systematic review included articles that met 3 to 5 (out of 5) criteria.

Data Synthesis and Analysis

Due to the heterogeneity of results and the presence of nonindependent samples, the use of statistical techniques was not feasible for analyzing the data.[12] For this reason, a thematic analysis framework was used to synthesize the findings from the included studies using a deductive approach based on recommendations of Braun and Clarke.[13] The thematic analysis was performed by the 2 authors in 6 stages: (1) familiarizing of data; (2) generating initial codes; (3) searching for themes; (4) reviewing themes; (5) defining and naming themes; and (6) producing the report.

Results

Descriptive Analysis of Documents

As a result of the search, a total of 353 publications were found 347 from the Web of Science, Scopus, Cochrane, and PubMed databases and 6 from the gray literature. After the duplicated articles were removed, 252 publications remained. A total of 252 articles were screened by reviewing their titles and abstracts and 210 articles were deleted, so 42 articles remained. Because 21 of them did not include any challenges faced by medical rescue teams and the full text of 3 of them could not be accessed, 18 of them were included in the findings of the study (Figure 1). The publication dates of the 18 studies included in the research findings range from 1989 to 2021. Eight of these studies are review articles, 4 are special reports, 3 are cross-sectional studies, 1 is a mixed study, 1 is a qualitative study, and 1 is a short communication (Table 1).

Thematic Analysis of Documents

In this study, the challenges faced by disaster response teams are summarized under 6 categories: organizational; individual; environmental and health; logistics; information and communication; and other factors (Figure 2).

Organizational Factors

During the disaster response phase, command structures often lack clarity and stability. Although organizations and governments have the responsibility to create suitable conditions for medical rescue teams to fulfill their duties with minimal difficulty, these teams often encounter organizational challenges when responding to disasters.[14] Coordination problems have emerged as the most common challenge faced by medical rescue teams in the studies included in this research.[15–17] The lack of coordination among

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Table 1. Characteristics of included studies

No.	Author/Year	Title	Study aims	Methods	Main findigns	Suggestions
1	Aitken P (2009)[14]	Health and safety aspects of deployment of Australian disaster medical assistance team members: results of a national survey	To evaluate the Australian DMAT experience in relation to the health and safety aspects of actual deployment.	Cross-sectional survey	• Basic health needs • Personal items • Logistic support • Food, nutrition, and water • Toilet, shower, and hand washing facilities • Illness and injury • Physical and mental fatigue • Shift period and quality sleep • Inadequate information and leadership • Security briefings	• Monitoring environmental and mental stress • Monitoring illness and injuries • Enforcing rest breaks • Providing psychological support • Briefing staff for security issues
2	Akitomi S (2019)[15]	Study on Disaster Medical Response During the Great East Japan Earthquake Disaster Based on Essential Elements of Information - Nine Days at Iwate Prefecture from Hyperacute Phase to Subacute Phase -	To objectively reveal problems of response activities from the viewpoint of information processing by the After Action Review (AAR),	Review Article	• Inadequate staff and materials • Inadequate information • Interrupting communication • Transportation and road blockages • Command and control • Public safety and security • Power outages	• Collecting and sharing information early • Support proportional to the damage
3	Altintas KH (2004)[16]	The problems faced by three government disaster response teams of Ankara city during the Marmara earthquake-1999 response	To determine the organization/system and personal problems faced by the personnel who participated in the 1999 Marmara earthquake.	Cross-sectional survey	• Coordination, organization • Communication problems • Accommodation and food problems • Health and safety problems • Registration (record keeping) • Transportation and logistics difficulties • Relations with the press (media)	• Exploring coordination, health, and safety issues in detail in future studies.
4	Cheng MT (2019)[17]	Review of Medical Response in 2015 TransAsia Airways Flight 235 Aircraft Crash	To review medical response in an aircraft crash	Short Communication	• Lack of proper equipment • Command, cooperation, and communication • Logistics problems • Lack of patient dispatch control • Jurisdiction among competent authorities	• Describing dispatch protocols • Better practical training, staff rostering, and other logistics management.
5	Connelly M (2006)[18]	IMERT deployment to Baton Rouge, Louisiana in response to Hurricane Katrina, September 2005	To identify the challenges and lessons learned from Hurricane Katrina	Special Report	• Basic health needs • Command and communication • Lack of medications and supplies • Inadequate personal items • Injuries and infectious disease • Unclearly staff roles and capabilities • Requiring to show proof of licensure • Physical exhaustion and sleep deprivation	• Strict shift schedules and quiet sleeping quarters. • Establishing traffic flow patterns in a clinical area • Anticipating that special needs patients will arrive • Pretrained, readily deployable medical response teams
6	Cook AD (2018)[19]	An assessment of international emergency disaster response to the 2015 Nepal earthquakes	To contribute to inform future international humanitarian assistance and disaster responses	Review Article	• Coordination and cooperation • Terrain (topography, altitude, landslide) • Incompatible equipment and machinery • Logistics, traffic and congestion • Lack of a common language • Unclear and inaccurate information	• Regulatory and legal frameworks • Providing sensitivity training • Calibrating relief priorities • Crafting context-specific guidelines

Table 1. (*Continued*)

7	Deverell E (2007)[20]	KAMEDO Report No. 87: Bomb Attack in Finnish Shopping Center, 2002	To assess the problems that arise after a bomb attack	Special Report	• Insufficient training and experience • Inadequate communication and communication • Psychological problems • Lack of special markings (affiliation, rank)	• Preparing well all rescue personnel • Practicing communication regularly. • Clarifying the division of responsibilities
8	Djalali A (2014)[21]	Identifying Deficiencies in National and Foreign Medical Team Responses Through Expert Opinion Surveys: Implications for Education and Training	To identify deficiencies in disaster response teams	Cross-sectional survey	• Education and training deficiencies • Failures in coordination • Lack of data • Failure of communication systems	• Professionalization via a competency-based curriculum • Defining command structure
9	Djalali A (2011)[22]	Facilitators and obstacles in pre-hospital medical response to earthquakes: a qualitative study	To explore the medical response to the Bam earthquake with a specific emphasis on prehospital medical management during the first days.	Qualitative Study	• Managerial and technical problems • Shortage of resources and medical personnel • Lack of markers, tags, data forms • Traffic chaos and lack of safety • Operating space (darkness, cold weather, etc.)	• Effective application of available resources • Giving priorities for immediate treatment and evacuation • Developing a comprehensive and integrated disaster management plan
10	Lee VJ (2005)[23]	Disaster relief and initial response to the earthquake and tsunami in Meulaboh, Indonesia	Detaling the difficulties and lessons learned by the team, including the lack of important resources for health-care delivery.	Review Article	• Insufficient sanitation and hygiene • Epidemics and outbreaks • Lack of food and Water • Security, logistics, and communication • Damaged transportation routes • Shortage of staff and supplies • Data collection	• Increasing the number of health facilities and staff • Performing thorough studies of specific local health needs • Rationalization of public health measures in emergencies
11	Motamedi MH (2009)[24]	A reassessment and review of the Bam earthquake five years onward: what was done wrong?	To highlight flaws in management in the various aspects of the Bam earthquake in order to assess what was done, and what should be done to overcome these shortcomings in future disasters.	Special Report	• Management and coordination • Failure of power and communication • Inadequate food and water • Lack of trained personnel and medical supplies • Mental health and psychological distress	• A comprehensive disaster management plan • Continuing education and training for the general population • Exercise drills and tabletop exercises
12	Nohara M (2011)[25]	Impact of the Great East Japan Earthquake and tsunami on health, medical care and public health systems in Iwate Prefecture, Japan, 2011	Reporting on the damage and the impact of the damage to describe the health consequences among disaster victims in Iwate Prefecture.	Special Report	• Disruption of communication • Safety of medical and food supplies • Power outages	• Reviewing laws and health insurance plans • Making prior agreements with suppliers • Further examination of overall coordination of functions in the field.
13	Redmond AD (1989)[26]	The Response of the South Manchester Accident Rescue Team (SMART) to the	To emphasize the inadequacy of the perspective that projections only the	Review Article	• Lack of organization and transportation • Absence of a central plan • Waiting and late intervention due to official procedures	• A clear line of command • Establishing identification system for all staff

(*Continued*)

Table 1. (*Continued*)

No.	Author/Year	Title	Study aims	Methods	Main findigns	Suggestions
		Armenian Earthquake and Lockerbie Air Disaster: A Report to the Prime Minister's Office	intervention of local units in disaster response		• Food, shelter, and logistics problems • Lack of tools to identify the status of staff	
14	Shen WF (2015)[27]	Practical experiences and lessons of medical response to major disasters in China	To summarize and analyze emergency medical rescue efforts after major disasters in China in recent years.	Review Article	• Geographical location • Communication interruptions • Security and traffic congestion • Lack of tent, water, food, and equipment	• Establish a systematic framework of emergency response forces for disasters
15	Skryabina E (2021)[28]	UK health-care staff experiences and perceptions of a mass casualty terrorist incident response: a mixed-methods study	To understand the experiences of health staff involved in the response to MCIs, identify practices that worked well, and determine limitations in the system response that, if addressed, may improve responses to MCIs in the future.	Mixed Method	• Lack of communication • Patient follow-up and documentation • Psychological and physical needs • Lack of training an experience	• Keeping the contact information of the staff up to date • Staff briefing and experience sharing • Psychosocial support • Identifying and promoting the use of clinical protocols
16	Tatham P (2016)[29]	Cracking the humanitarian logistic coordination challenge: lessons from the urban search and rescue community	To analyze the USAR model and explore how the resultant challenges might be addressed in a humanitarian logistic context.	Review Article	• Lack of coordination • Inconsistent logistics activities	• Guidelines, • Training curriculum, • Certification
17	van Hoving DJ (2010)[30]	Haiti: The South African perspective	To describe the fragmented response and some of the problems experienced while in Haiti.	Review Article	• Lack of briefing • Psychological problems • Inadequate nutrition and hydration • Local weather conditions • Failure to identify responsible persons • Inappropriate clothing	• Health checks of team members before response • Acting in accordance with the INSARAG guidelines
18	Waganew W (2021)[31]	Disaster medical assistant team establishment and the disaster response experience of Ethiopia	To describe the establishment, operation, and challenges of the disaster medical assistance team in The Minister of Health-Ethiopia.	Review Article	• Lack of update training • Lack of budget and logistics	• Refreshing the institutional structure of DMAT system • Providing advanced training • Establishing a permanent budget

various organizations involved in disaster response poses significant challenges in terms of the overall effectiveness of medical rescue and is evident at different operational levels, spanning from local to national and international contexts.[18] The absence of a centralized plan and the inflexibility of emergency plans prevent the establishment of a unified organizational structure. Without a unified organizational structure, emergency plans cannot be smoothly executed across various departments and different administrative areas.[19,20] This situation presents itself as a significant problem among rescue teams and leads to disruptions in the intervention process. Other organizational problems include conflicts of authority between central and local authorities and the absence of clear definitions for the roles and abilities of medical rescue personnel.[21,22] The presence of diverse leadership structures hinders the successful integration of response activities, resulting in failure.[23] Last, both a review and a cross-sectional study have reported that inadequate leadership and delays in obtaining permission for the deployment of medical rescue teams significantly diminish the overall effectiveness of interventions.[15,19]

Individual Factors

In the analysis of the articles, it has been emphasized that individual challenges faced by medical rescue teams during disaster intervention include not only the hardships related to pain, death, and destruction but also taxing issues such as long working hours and insufficient sleep.[14] Having education and experience in disaster response is crucial for medical rescue teams to effectively carry out their tasks during emergencies.[23,24] However, some medical rescue teams lack experience and education due to inadequate training exercises, insufficient experience, and the absence of advanced and refresher training sessions following basic training.[25–27] It is also noteworthy that some medical rescue teams cannot meet their basic needs such as food, water, and shelter in disaster situations.[19,20,28,29] Furthermore, the absence of essential personal belongings, proper clothing, and personal protective equipment (PPE) accompanies these challenges. Some studies have indicated that medical rescue teams lack PPE, including helmets and work gloves, and do not have minimum personal equipment kits.[14,30] Last, being away from home and lacking sufficient information about their families are considered significant issues during disaster response for medical rescue teams, greatly impacting their morale.[14,31]

Environmental and Health Factors

Following a disaster, both the affected community and the disaster responders themselves suffer from health effects. The medical rescue teams, in particular, endure prolonged periods of work in the disaster-stricken area and are more susceptible due to close contact with numerous individuals. The challenges that arise, particularly in areas such as water, sanitation, hygiene, and vector control, pose a risk for medical rescue teams in conjunction with the existing limited resources.[14–16,32] Inadequate toilets, washing and bathing facilities, adverse weather conditions such as darkness and cold, and improper waste disposal are other issues affecting the health of medical rescue teams.[22,30,32] Moreover, medical rescue teams are hindered by the stressful, dusty, and noisy conditions in their rest areas. At this point, the importance of providing psychosocial support for intervention and support personnel has been recognized.[14,24]

Logistics Factors

It is reported that there is a shortage of personnel and resources among rescue teams worldwide that respond to various types of disasters.[18,23,32,33] Especially, the shortage of medical resources during the early phase of a disaster is an important obstacle for medical rescue teams.[18,23] The lack of compatibility among the types of equipment and machinery brought for disaster response, unfamiliarity with the use of the equipment by medical rescue teams, and clothing and equipment that do not align with the field conditions lead to disruptions in intervention activities.[20,22,28,33] The arrival and unloading of vehicles filled with aid supplies without any prior notification regarding the nature of the materials, their necessity, and who will collect and distribute them further burdens the already fragile and overwhelmed rescue teams.[17,28] Additionally, inadequate capacity for air evacuations and severe damage to airports and highways result in rescue teams transporting patients through nonstandard methods, leading to higher mortality rates.[18,20,26,32]

Information and Communication Factors

During a disaster, effective information and communication play an important role in providing essential information to the staff and public. Although good communication can help to ensure an effective intervention, poor communication can disrupt or prevent an effective intervention.[24] During any disaster, there are significant communication challenges among medical rescue teams, and these challenges increase in magnitude with the scale of the disaster.[19] During a disaster, all regular communication channels can be lost and the mobile phone network may become unavailable.[25,29] Inadequate communication can lead to intervention teams entering dangerous areas, an increase in security risks at the operation site, and consequently, psychological effects such as stress, anxiety, and feelings of exhaustion. Inadequate communication can lead to the rapid spread of misinformation or rumors. This can create panic in the public, further complicate the crisis, and consequently increase the workload of rescue teams. The lack of reliable information and integrated information management systems has also been identified as another significant issue.[23,28] The disruption of information networks and the absence of a system that can collect information as expected lead to further delays in the efforts of rescue teams.[15] In addition, the disruption of information networks can also limit access to a patient's medical history or treatment requirements. When considering the importance of data collection in disaster situations, information management and communication become crucial. In some studies, the emergence and accessibility of digital technologies have introduced a new challenge in the midst of various debated difficulties, which is the remote management of disaster relief operations.[24,28]

Other Factors

In addition to the mentioned factors above, there are other significant issues, such as a lack of a common language and a shortage of interpreters, which can create difficulties in communicating with patients among medical rescue teams. In disaster situations, along with power, water, and gas outages, a shortage of gasoline can also disrupt the work of these teams.[29] The inability to rescue medical facilities and restore power to hospitals can lead to a heavy workload among the medical rescue teams.[28] The terrain of the affected region poses a significant challenge both in terms of

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Figure 2. Categories of challenges faced by medical rescue teams.

logistics and secondary disasters.[20] As a result of challenging terrain, the physical infrastructure is often inadequate for accessing the disaster-affected areas. Many rescue teams are unfamiliar and unprepared regarding the natural environment, geography, and in some cases, altitude.[28] Cultural and local norms, relations with the press, and lack of safety and security briefings were other challenges faced by rescue teams.[14,34] Several instances of intrusion and disrespect to local communities by the media were reported.[28]

Discussion

In this study, the results of our screening diagram showed that 18 documents included challenges faced by medical rescue teams. All the studies included in the final analysis were published in the year 1989 and onward, and over 50% of them were carried out from 2011 to 2021. The challenges faced by medical rescue teams during the response phase of sudden-onset disasters are investigated at 6 levels: organizational, individual, environment and health, logistics, information and communication, and other factors.

The emergence of administrative problems in a situation requiring management is indeed inevitable. Dealing with unpredictability and unexpected outcomes during disaster situations makes administrative issues a significant challenge.[35,36] At the organizational dimension, coordination, inadequate leadership, and clear delineation of personnel roles and responsibilities play a crucial role. Failure to achieve effective coordination and lack of clear authority lead to confusion among medical rescue teams, resulting in delays in response actions. Therefore, it is necessary to make various improvements regarding the organizational issues encountered by medical rescue teams. In this regard, it is recommended to address aspects such as crafting context-specific guidelines,[22] clarifying the division of responsibilities,[28] and defining a command structure.[25,29]

Hugelius et al., in one of their studies, has outlined the challenges encountered in disaster management in 5 categories: Identifying the situation and dealing with uncertainty, balancing the mismatch between the disaster contingency plan and the reality, establishing a functional crisis organization, adapting the medical response to the actual and overall situation, and ensuring a resilient response.[37] However, unlike Hugelius et al., we believe that it is not accurate to solely consider the challenges in disaster management from an operational perspective. Although our study has also identified coordination issues as the most frequently encountered problem, this is related to other factors identified in our research. Indeed, if problems in environmental and health control are overlooked, if communication and information issues are not addressed, and if deficiencies in logistics activities are not prevented, these coordination problems will persist. Therefore, taking a broader perspective when looking at the problems encountered in disaster response would be more accurate.

In the individual dimension, nutrition, hydration, accommodation, training and experience, and shift period constitute the most important factors that merit special attention. In a study conducted by Ghodsi et al., it was also revealed that having appropriate training and skills, self-care, adequate sleep and rest, and proper nutrition are factors that influence resilience among volunteers.[8] While Ghodsi et al. evaluated physical and mental health under the individual factor, this study has assessed them under the environmental and health factor. Sanitation, hygiene, protection from vectors, immunization, weather conditions, disease, injury, and psychosocial support are other important aspects that fall under the environmental and health factors. If the

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health of medical rescue teams is not good, they cannot respond adequately to the disaster. Therefore, addressing the individual shortcomings of medical rescue teams, resolving personal issues, maintaining health, completing training, and meeting basic needs are crucial for effective disaster response. Especially in this regard, conducting health checks of team members before response,[17] monitoring environmental and mental stress, monitoring illness and injuries, enforcing rest breaks,[14] and providing psychological support[20] can alleviate the burden on the medical rescue teams to some extent.

Although medical rescue teams have the best intentions to intervene in disasters, in some cases, they may lack the necessary logistical support. Delays in the delivery of aid can occur due to logistical challenges. The main causes of these logistical problems are inadequate equipment and materials, incompatible machinery, insufficient vehicles and staff, and transportation issues such as traffic and congestion. In a study describing the initial response to a tsunami, it was reported that the roads leading to airports and other major cities were significantly damaged, and there was a shortage of medical supplies for medical rescue teams during the critical period after the disaster.[32] A study describing Ethiopia's experience in disaster response highlights that, despite the lack of budgetary resources, teams continued to be deployed in various emergency situations. The study emphasizes that the challenges faced were not only limited to budgetary constraints but also the absence of an organized logistics depot.[30] In this context, it is recommended to calibrate relief priorities,[22] effectively use available resources,[23] increase the staff number of medical rescue teams,[18] and establish prior agreements with suppliers[33] to address logistical challenges.

The factors of considerable significance in the information and communication dimension are data collection, accurate information sharing, and network interruptions. Proper planning and intervention are possible through accurate data collection, rapid dissemination of information, and the availability of functional communication tools. While a small glitch in communication and information can create a risk for the safety of medical rescue teams, effective communication and information flow can mitigate adverse medical outcomes. To prevent information and communication issues, it is recommended to keep the contact information of the staff up to date,[20] regularly practice communication,[28] and collect and share information early.[14]

Finally, other factors such as power outages, cultural and local norms, media relations, terrain, safety and security briefings that are not mentioned in the above dimensions, also include significant challenges faced by medical rescue teams. Aitken et al. highlighted that security issues, including briefings, evacuation plans, and exit strategies are major issues for deployed team members and need to be addressed in mission planning.[14]

Limitations

The absence of a standardized method for reporting and evaluating crisis management, coupled with the reliance on lessons learned and shared experiences to formulate disaster response recommendations, underscores the need for a comprehensive synthesis in evidence development.[38,39] Therefore, this study was inspired by the integrative review methodology. Like most reviews, the lack of access to all potentially related documents, including those that have not been published yet, was one of the limitations of the study. In addition, the inclusion of only English language articles led to missing some resources in other languages. Furthermore, this study did not encompass articles concerning slow-onset disasters, such as pandemics. Examining articles that tackle the difficulties encountered in slow-onset disasters will enhance our current understanding of disaster medical management.

Conclusions

The literature review revealed a limited number of studies addressing the challenges faced by medical rescue teams, and these studies were found to be insufficient in addressing the encountered difficulties comprehensively. Some studies focused only on organizational problems, while others only addressed health issues. In order for medical rescue teams to provide better care to disaster victims and effectively manage disaster events, there is a need for studies that are conducted on various factors and provide an integrated perspective on these problems. The findings of this review categorize the challenges faced by medical rescue teams into 6 factors and provide evidence that can be used by institutions, organizations, and governments.

Among the studies included in the findings, organizational challenges have been identified as the most prevalent factor that medical rescue teams encounter. Despite the frequent incidence of disasters, the persistence of organizational problems indicates a failure to learn from these disasters. To effectively manage disasters, it is necessary to ensure uninterrupted and continuous organization. However, when an organizational problem arises, it leads to the emergence of other challenges.[36] These organizational factors contribute to medical rescue teams encountering individual and health-related issues, disruptions in logistical activities, and communication and other problems. Additionally, these issues are also evaluated as factors that medical rescue teams encounter.

Failure to acknowledge or address the challenges and problems faced by medical rescue teams can hinder institutions and organizations from achieving their pre-established objectives, ultimately leading to inadequate services for those affected by the disaster. Additionally, medical rescue teams themselves may encounter various complications and may opt to prioritize their own physical and mental well-being by stepping away from their responsibilities.

In this study, each of the 6 categorized difficulty factors is likened to a gear in a mechanism where 1 problem triggers other problems. For example, a problem in the logistics of aid supplies can further disrupt coordination, burden medical rescue teams with heavy workloads, cause fatigue among medical rescue teams due to the heavy workload, and lead to errors in information sharing due to mental exhaustion. Therefore, we argue that taking a comprehensive approach by using the 'ECOLIO' (Environmental and health; Communication and information, Organizational, Logistics, Individual, and Other factors) approach to address the challenges faced by medical rescue teams in disaster response can help prevent the problems caused by these factors in the future.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/dmp.2023.217

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References

1. **Born CT, Briggs SM, Ciraulo DL, *et al.*** Disasters and mass casualties: I. General principles of response and management. *J Am Acad Orthop Surg.* 2007;15(7):388-396.
2. **Russbach R.** International assistance operations in disaster situations. *Prehosp Disaster Med.* 1990;5(3):247-249. doi: 10.1017/S1049023X0002690X
3. **Hay K, Pascoe KM.** Engaging social workers in disaster management: case studies from New Zealand. *Int J Disaster Risk Reduct.* 2022;74:102941. doi: 10.1016/j.ijdrr.2022.102941
4. **McEntire DA.** Balancing international approaches to disaster: rethinking prevention instead of relief. *Aust J Emerg Manag.* 1998;13(2):50-55. doi: 10.3316/ielapa.394515307663034
5. **Dara SI, Ashton RW, Farmer JC, *et al.*** Worldwide disaster medical response: an historical perspective. *Crit Care Med.* 2005;33(1 Suppl):S2-S6. doi: 10.1097/01.ccm.0000151062.00501.60
6. **Shahrestanaki YA, Khankeh H, Masoumi G, *et al.*** Organization and preparedness of emergency and disaster medical response teams: obstacles and challenges. *Health Emerg Disasters Q.* 2020;5(4):169-182. doi: 10.32598/hdq.5.4.155.1
7. **Zafeirakis A, Efstathiou P.** Health care challenges at mass gatherings. *J Clin Med Kazakhstan.* 2020;6(60):23-28. doi: 10.23950/jcmk/9257
8. **Ghodsi H, Sohrabizadeh S, Khani Jazani R, *et al.*** Factors affecting resiliency among volunteers in disasters: a systematic literature review. *Disaster Med Public Health Prep.* 2022;16(1):398-404. doi: 10.1017/dmp.2020.283
9. **Whittemore R, Knafl K.** The ıntegrative review: updated methodology. *J Adv Nurs.* 2005;52(5):546-553. doi: 10.1111/j.1365-2648.2005.03621.x
10. **Moher D, Liberati A, Tetzlaff J, *et al.*** Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ.* 2009;339:b2335. doi: 10.1136/bmj.b2535
11. **Hong QN, Fàbregues S, Bartlett G, *et al.*** The Mixed Methods Appraisal Tool (MMAT) version 2018 for information professionals and researchers. *Educ İnf.* 2018;34(4):285-291. doi: 10.3233/EFI-180221
12. **Thomas J, Harden A.** Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol.* 2008;8:45 doi: 10.1186/1471-2288-8-45
13. **Braun V, Clarke V.** Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77-101. doi: 10.1191/1478088706qp063oa
14. **Aitken P, Leggat P, Robertson A, *et al.*** Health and safety aspects of deployment of Australian disaster medical assistance team members: results of a national survey. *Travel Med Infect Dis.* 2009;7(5):284-290. doi: 10.1016/j.tmaid.2009.03.005
15. **Akitomi S, Kokogawa T, Kosaka N, *et al.*** Study on disaster medical response during the great east Japan earthquake disaster based on essential elements of information – nine days at iwate prefecture from hyperacute phase to subacute phase. *J Disaster Res.* 2019;14(8):1115-1126. doi: 10.20965/jdr.2019.p1115
16. **Altntaş KH, Delooz H.** The problems faced by three government disaster response teams of Ankara city during the Marmara earthquake - 1999 response. *Eur J Emerg Med.* 2004;11(2):95-101. doi: 10.1097/00063110-200404000-00008
17. **Tatham P, Spens K.** Cracking the humanitarian logistic coordination challenge: lessons from the urban search and rescue community. *Disasters.* 2016;40(2):246-261. doi: 10.1111/disa.12139
18. **Djalali A, Khankeh H, Öhlén G, *et al.*** Facilitators and obstacles in pre-hospital medical response to earthquakes: a qualitative study. *Scand J Trauma Resusc Emerg Med.* 2011;19:30. doi: 10.1186/1757-7241-19-30
19. **Redmond AD.** The response of the South Manchester Accident Rescue Team (SMART) to the Armenian earthquake and Lockerbie air disaster: a report to the Prime Minister's Office. *Disasters.* 1989;13(2):165-174. doi: 10.1111/j.1467-7717.1989.tb00706.x
20. **Shen WF, Jiang LB, Zhang M, *et al.*** Practical experiences and lessons of medical response to major disasters in China. *Hong Kong J Emerg Med.* 2015;22(5):270-280. doi: 10.1177/102490791502200503
21. **Cheng M-T, Lin C-H, Chou W-K, *et al.*** Review of medical response in 2015 TransAsia Airways Flight 235 aircraft crash. *J Acute Med.* 2019;9(3):145-148. doi: 10.6705/j.jacme.201909_9(3).0006
22. **Connelly M.** IMERT deployment to Baton Rouge, Louisiana in response to Hurricane Katrina, September 2005. *Disaster Manag Response.* 2006;4(1):4-11. doi: 10.1016/j.dmr.2005.10.005.
23. **Djalali A, Ingrassia PL, Corte FD, *et al.*** Identifying deficiencies in national and foreign medical team responses through expert opinion surveys: implications for education and training. *Prehosp Disaster Med.* 2014;29(4):364-368. doi: 10.1017/S1049023X14000600
24. **Skryabina E, Betts N, Reedy G, *et al.*** UK healthcare staff experiences and perceptions of a mass casualty terrorist incident response: a mixed-methods study. *Emerg Med J.* 2021;38(10):756-764. doi: 10.1136/emermed-2019-208966
25. **Deverell E, Ortenwall P, Almgren O, *et al.*** KAMEDO Report No. 87: Bomb Attack in Finnish Shopping Center, 2002. *Prehosp Disaster Med.* 2007;22(1):86-88. doi: 10.1017/S1049023X00004404
26. **Waganew W, Azazh A.** Disaster medical assistant team establishment and the disaster response experience of Ethiopia. *Ethiop J Health Dev.* 2021;35(4):S1-S4.
27. **Sengezer B, Koç E.** A critical analysis of earthquakes and urban planning in Turkey. *Disasters.* 2005;29(2):171-194. doi: 10.1111/j.0361-3666.2005.00279.x
28. **Cook ADB, Shrestha M, Htet ZB.** An assessment of international emergency disaster response to the 2015 Nepal earthquakes. *Int J Disaster Risk Reduct.* 2018;31:535-547. doi: 10.1016/j.ijdrr.2018.05.014
29. **Nohara M.** Impact of the Great East Japan Earthquake and tsunami on health, medical care and public health systems in Iwate Prefecture, Japan, 2011. *Western Pac Surveill Response J.* 2012;2(4):24-30. doi: 10.5365/WPSAR.2011.2.4.002
30. **Van Hoving DJ, Smith WP, Kramer EB, *et al.*** Haiti: the South African perspective. *S Afr Med J.* 2010;100(8):513-515. doi: 10.7196/samj.4258
31. **Nocera A.** Prior planning to avoid responders becoming "victims" during disasters. *Prehosp Disaster Med.* 2000;15(1):46-48.
32. **Lee VJ, Low E, Ng YY, *et al.*** Disaster relief and initial response to the earthquake and tsunami in Meulaboh, Indonesia. *Ann Acad Med Singap.* 2005;34(9):586-590.
33. **Motamedi MHK, Saghafinia M, Bafarani AH, *et al.*** A reassessment and review of the Bam earthquake five years onward: what was done wrong? *Prehosp Disaster Med.* 2009;24(5):453-460. doi: 10.1017/S1049023X00007317
34. **Leggat PA.** Ensuring the health and safety of humanitarian aid workers. *Travel Med Infect Dis.* 2005;3(3):119-122
35. **Massalou D, Ichai C, Mariage D, *et al.*** Terrorist attack in Nice - the expereince of general surgeons. *J Visc Surg.* 2019;156(1):17-22. doi: 10.1016/j.jviscsurg.2018.04.004
36. **El Sayed M, Chami AF, Hitti E.** Developing a hospital disaster preparedness plan for mass casualty ıncidents: lessons learned from the downtown Beirut bombing. *Disaster Med Public Health Prep.* 2018;12(3):379-385. doi: 10.1017/dmp.2017.83.
37. **Hugelius K, Becker J, Adolfsson A.** Five challenges when managing mass casualty or disaster situations: a review study. *Int J Environ Res Public Health.* 2020;17(9):3068. doi: 10.3390/ijerph17093068
38. **Gerdin M, Clarke M, Allen C, *et al.*** Optimal evidence in difficult settings: ımproving health ınterventions and decision making in disasters. *PLoS Med.* 2014;11(4):e1001632.
39. **Steigenberger N.** Organizing for the big one: a review of case studies and a research agenda for multi-agency disaster response. *J Contin Crisis Manag.* 2016;24(2):60-72.

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