

PARTICIPATION OF FIREFIGHTERS IN INTERVENTIONS TO MENTAL DISORDERS AS SUPPORT TO MEDICAL TEAMS: A REVIEW OF THE LITERATURE

Krzysztof Maczulski^{1(A,B,C,F)}, Łukasz Dudziński^{2(A,B,F)}, Filip Jaśkiewicz^{3(C,D)}, Łukasz Czyżewski^{4(D,E,F)}

¹Department of Emergency Medicine, University of Warmia and Mazury, Olsztyn, Poland

²Medical Rescue Department, Medical University of Warsaw, Poland

³Emergency Medicine and Disaster Medicine Department, Medical University of Lodz, Poland

⁴Department of Geriatric Nursing, Medical University of Warsaw, Poland

Authors' contribution:

- A. Study design/planning
- B. Data collection/entry
- C. Data analysis/statistics
- D. Data interpretation
- E. Preparation of manuscript
- F. Literature analysis/search
- G. Funds collection

Summary

Fire service role in supporting medical teams during emergency interventions requiring specialized equipment or additional staff support is important. The purpose of the narrative review is to analyze how firefighting units collaborate with medical teams during interventions related to mental and behavioral disorders. The review also considers the psychological challenges faced by firefighters as a result of repeated exposure to stress. A narrative literature review has been conducted by using resources available in *PubMed*, *Google Scholar* and *ResearchGate* databases, covering publications from 2020-2024. The inclusion criteria were peer-reviewed articles, guidelines, recommendations and expert papers pertinent to the topic under analysis. The material selection process was based upon the *PRISMA* protocol. Twelve publications, divided into two groups, were included in the review, viz.: studies on the psychological effects of chronic stress in firefighters and analyses of joint interventions by firefighters and medical teams in cases of behavioral disorders. The results indicate an important role of firefighters in providing technical support. Cooperation between firefighters and medical teams plays a key role in an effective management of interventions in case of mental and behavioral disorders.

Keywords: public service cooperation, fire service, PTSD, medical interventions, behavioral disorders

Introduction

A fire brigade provides support to medical services in interventions during which specialized equipment, not available in ambulances, is required. Firefighters enter into action when a larger number of people are needed to eliminate a hazard, such as a search for a missing person or because of a mental disorder of the victim if he or she endangers either themselves or others. In practice, firefighters often intervene when it is necessary to force open a room in which an endangered person is staying and the medical team cannot get inside [1,2].

Tables: 1

Figures: 1

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Address for correspondence: Łukasz Dudziński, Medical Rescue Department, Medical University of Warsaw, Żwirki i Wigury 61, 02-091 Warsaw, Poland, e-mail: lukasz.dudzinski@wum.edu.pl, phone: +48 (0-22) 116 92 07.

ORCID: Krzysztof Maczulski <https://orcid.org/0009-0003-4923-238X>, Łukasz Dudziński <https://orcid.org/0000-0002-8255-7608>, Filip Jaśkiewicz <https://orcid.org/0000-0001-9309-6432>, Łukasz Czyżewski <https://orcid.org/0000-0001-9473-9954>

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In the case of people with mental and behavioral disorders, the interventions can be crucial to ensure the safety of both the victims and medical staff. Firefighters, with their specialist skills and equipment, play a particular role in minimizing the risk of conflict escalation and providing access to the patient in situations that entail rapid action.

The rescue techniques used by firefighters, as well as specialized equipment including vehicles, floatation equipment, drones, can influence the location of the casualty, the comfort of the rescuers and the effectiveness of search and rescue operations carried out under time pressure [3,4].

Fire brigades in many countries have at their disposal decision-support technologies, information systems, an extensive radio network for communication which can be used when operations are conducted over a larger area, such as searching for missing people or people with behavioral disorders in vast extra-urban areas [5,6].

Working under time pressure and in a high-stress level environment is a particular challenge in such situations. Exposed to people in mental crisis, firefighters not only have to make operational decisions, but also deal with emotionally difficult scenarios that can affect their own mental health. In addition to providing technical and personnel support to medical teams, firefighters in many countries are dispatched directly to medical incidents. In France, a medical dispatcher can have a firefighting team with basic response training, a family doctor or a specialized emergency medical team enter the scene [7,8].

In Germany, in many federal states, medical services are integrated with fire brigades; the costs of emergency interventions are covered as far as possible from the fire brigade budget, and only those ambulance trips that are not accompanied by a fire brigade trip are paid for by health insurance funds [9,10].

Such models of inter-service cooperation allow for more efficient rescue operations, especially in situations involving patients with mental disorders. The presence of firefighters on the scene not only provides technical support, but also stabilizes a situation that can often be chaotic and unpredictable. Joint interventions performed by multiple services to a victim with a mental disorder have been observed and have increased in many countries after the COVID-19 epidemic, which may be related to the general increased number of disorders in society due to isolation, difficulties in social interaction [11-13].

An increase in the number of such cases highlights the importance of cooperation between fire services and medical services, particularly in the context of the need for training, joint procedures and psychological support for firefighters involved in the types of interventions. From a research perspective, a narrative review of the literature enables a synthesized analysis of the available data and the identification of key knowledge gaps, which can constitute a base for further research. In turn, in practice, the findings of the review can serve as a basis for improving operational procedures, increasing the effectiveness of inter-service collaboration and improving psychological support for firefighters and paramedics.

Aim of the work

A review of the international literature aimed at analyzing cooperation of firefighting units with medical entities during interventions to emergencies with a history of mental disorders, behavioral disorders.

Methods

Inclusion criteria

The analysis included research articles and monographs, as well as expert documents, including recommendations, standards or statistics related to the purpose of the analysis, viz.: mental disorders,

behavioral disorders to which medical services intervened with the support of fire brigade forces and resources. The authors decided to include literature from the last 5 years in order to base it on the most recent literature.

An intermediate objective is to focus upon a possibility of disorders in firefighters, associated with repeated exposure to stressful situations such as interventions in the case of victims with behavioral disorders.

Data collection and search processing

The authors have compiled the database basing upon international literature. The review has been supplemented by the data obtained from searches conducted in literature sources in the resources such as: *PubMed*, *Google Scholar* and *Research Gate*. Due to the narrative nature of the review, the selection of articles to be included into the study was based on an assessment of their relevance to the topic, made independently by two or three experts from among the authors. The search focused upon research articles, important legislation, guidelines, recommendations that addressed exposure trends of firefighters during interventions consistent with the main focus of the study – psychiatric/behavioral disorders of victims. The emphasis is laid upon resources available in online sources between 2020 and 2024 as well as upon recent sources.

The three researchers independently checked all titles and abstracts corresponding to the purpose of the study for the repetition of titles, grey literature (non-peer-reviewed material) and synonyms in English. The search series was conducted from December 5th to December 12th, 2024. The following words and keywords were used in English: “firefighter interventions”, “inter-service cooperation”, “firefighter’s emergency medical support”, “suicide attempt”, “psychological support”, “suicidal thoughts”, “firefighters – first rescuers”, “opening a room with casualties”, “behavioral disorders in service interventions”.

The methodology for inclusion of search results into the study was based upon the *PRISMA* (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol so as to ensure the quality of the review of reports, and the transparency of the report [14]. The search results and study inclusion together with the rejection criteria are presented in Figure 1.

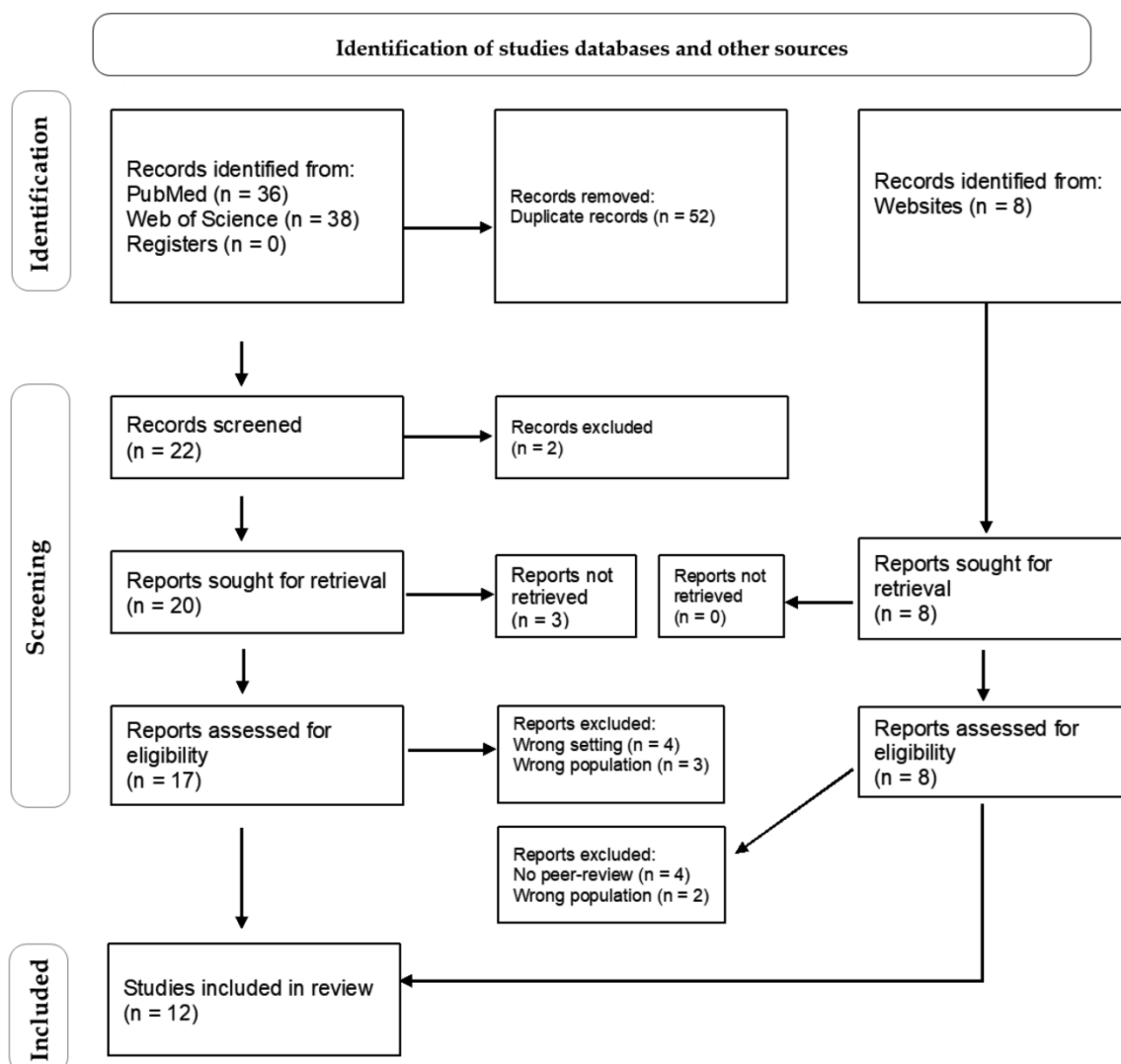


Figure 1. PRISMA based flow diagram

Notes: Own elaboration based on Page et al. [14].

Literature review results

In order to ensure a better transparency of the selection of material from research sources in this systematic review, a PRISMA-based flowchart was introduced in Figure 1. As a result of searching online sources (databases) and applying inclusion and exclusion criteria (date range, topic range, type of references, repetition in English, 12 articles were selected; they were consistent with the aim of the study. A significant number of sources found by the search engine algorithm by using our keywords relate directly to firefighters’ mental health, mental disorders related to professional duties, occupational burnout and the effects of post-traumatic stress disorder (PTSD). The included literature items were divided into 2 groups, viz.:

- G I – 5 items of literature on stress that can cause psychological distress in firefighters [15-19],
- G II – 7 items on interventions for behavioral disorders in firefighters during interventions [20-26].

The publications useful for the purpose of the study were found in *PubMed* and *Web of Science* databases. Twelve studies were covered by observation.

Description of the level of knowledge

The papers included in the study, based upon the *PRISMA* protocol (Figure 1), are summarized in Table 1 taking also into consideration all relevant sociometric data.

Table 1. Main characteristic of meta-analysis included in the studies

Study	Journal/Publication year	Analysis population/ review article	Inclusion type	Research aim
Kyung et al. [15]	Journal of Health Informatics and Statistics / 2024	Review	G I	Firefighters PTSD
Wolffe et al. [16]	Scientific Reports / 2023	Survey research	G I	Firefighters mental health
Sarabia et al. [17]	Journal of Trauma Stress / 2024	Survey research	G I	Firefighters PTSD
Oliveira et al. [18]	Frontiers in Psychology / 2023	139	G I	Firefighters PTSD
Wagner et al. [19]	Disaster Medicine and Public Health Preparedness / 2021	Review	G I	Firefighters PTSD
Jasani et al. [20]	Health Security / 2023	Review	G II	Firefighters intervention
Wróblewski [21]	Safety Fire Technology / 2020	Review	G II	Firefighters intervention
Edgelow et al. [22]	Int Arch Occup Environ Health / 2022	Review	G II	Mental health interventions
Bajeński [23]	Scientific Reports Pro Publico Bono / 2022	Review	G II	Mental health interventions
Damirchi et al. [24]	Iran Journal Public Health / 2022	Review	G II	Mental health interventions
Hedman [25]	Traumatology / 2023	Research	G II	Mental health interventions
Dudziński et al. [26]	Healthcare / 2024	321	G II	Emergency cooperation

Notes: PTSD – post-traumatic stress disorder.

Due to a limited number of studies in the topic under discussion, the authors referred to two types of research. Both types are discussed in the chapter on the methods (GI and GII): cooperation of the services during an intervention to a victim with a behavioral disorder, and firefighters' psychological disorders related to chronic occupational stress. The following items were carefully selected and screened according to the criteria for inclusion in the analysis. Below is a brief description of each included study: 12 items of international literature:

- 7 review articles,
- 5 original papers, including 2 presenting the results of an original survey, and 3 based on a retrospective analysis of fire brigade interventions.

The aim of the 2024 analysis was to determine the current status of PTSD interventions in firefighters. Mental health problems have been noted due to exposure to traumatic events. The work includes a reported significant increase in mental health problems among police and firefighters due to exposure to traumatic life events. 26 studies were selected [15].

Wolffe et al. [16], basing upon an online survey (64 questions about health status), present some risk factors affecting the mental health of firefighters. Sleep problems were reported by 61% of firefighters, but

in the group psychiatric disorders and depression were more frequent than in the case of the firefighters without sleep disorders. Our study did not assess sleep quality among the first responders, but the literature does indicate such health problems [16].

Sarabia et al. [17] discuss stress associated with a critical incident and the effectiveness of firefighters in coping with trauma based on a survey of n=241 officers. The paper discusses Critical Incident Stress Debriefing (CISD), a type of psychological intervention in the fire service that aims at minimizing psychological harm and adverse mental health outcomes following a traumatic service-related incident [17].

According to Oliveira et al. [18], as of 2023, PTSD in firefighters is an ongoing problem requiring special attention for taking up appropriate steps. A study was performed on a sample of 283 Portuguese firefighters, 130 of whom had explicitly experienced a potentially traumatic event at work. 9.2% individuals from the subgroup of firefighters are likely to suffer from PTSD and in 13.8% there is the possibility of global psychopathology [18].

Based on a literature review, Wagner et al. [19] describe firefighters' exposure to disasters, which increases the prevalence of post-traumatic stress disorder, considerable depression and anxiety disorders among firefighters, as compared to rates observed in the general population. The paper describes psychological disorders related to trauma – PTSD, and additionally distinguishes between factors of routine exposure related to work duties and exposure to a large-scale disaster, sources of depressive disorders and anxiety disorders. The severity of the event and the time of exposure are variables that affect mental state [19].

Firefighters have a great capacity to make use of resources, rescue techniques and equipment so as to eliminate negative effects of the type of hazard. Among the articles found that met our assumptions were various psychological disorders of people subject to interventions. Research by Jasani et al. [20] deals with firefighters' intervention in terrorist situations (the attackers are not necessarily mentally ill, but the behavior of the individuals is altered and inappropriate to the social behavior model). The *Global Terrorism Database* identified a total of 42 attacks involving firefighters, resulting in 26 deaths and 95 injuries. 12 attacks (28.6%) out of 42 were secondary attacks targeted at the firefighters themselves in response to the first attack [20].

The publication by Wróblewski [21] constitutes an analysis of the literature on the subject, available documents, as well as legal acts. The author describes the State Fire Service's counter-terrorism training system. Frequently, such training sessions also involve police officers and soldiers who work hand in hand. Firefighters should receive theoretical and practical training as they may either be called to terrorist incidents or witness terrorism in locations unrelated to their service [21].

A study by Edgelow et al. [22] constitutes a review of the literature on coping with stress during police and fire service interventions. 89 citations published within the last decade met the inclusion criteria. Stress management and resilience depend on the implementation strategy of multi-session group training. A continuous evaluation of the quality of the strategy is recommended [22].

Bajeński [23] describes making a potential use of police negotiators. Negotiation as a tool leading to a peaceful resolution of the most difficult situations, often in joint operations with firefighters. The author points out that firefighters often have to negotiate independently with a perpetrator or a victim of a crisis situation before a police expert arrives on the scene. The article cites some examples from real interventions, also emphasizing some relevant provisions of the legislation [23].

A descriptive-analytical study by Damirchi et al. [24] gives a closer look at interventions in a population who experienced suicide attempts during one year in Teheran. Conclusions of the study are interesting: men are more likely to make suicide attempts than women, and the number of people rescued by firefighters

exceeds the number of people who die by suicide, indicating that firefighters are satisfactorily effective in rescue operations [24].

Hedman [25] describes suicide prevention interventions coordinated by the fire service. Three fire brigade units in Sweden were subject to monitoring. The fire brigade formation arrived at the scene of suicide attempts faster than the ambulance and police, which saved human lives [25].

The 2024 analysis from regions of Poland relates to the cooperation in line with the objective of the review. Between 2020 and 2022, firefighters in Poland were dispatched 321 times to interventions related to a victim with behavioral disorders. Interventions were most often related to mental disorders (23%) and least often to suicide attempts (8%) ($p=0.033$). Intervention times were shown to be statistically significantly longer in the 3rd quarter of the year (autumn). During the observation, attention was paid to the following variables: time of day, season of year, type of disturbance, gender, duration of intervention and the participation of specialist entities: rescue dogs, drones. Intervention time was significantly longer in the case of interventions carried out between 7:00 a.m. and 7:00 p.m. ($p=0.017$) and searches with the use of dogs ($p<0.030$). The type of intervention ($p=0.792$) and age had no statistically significant effect on the observed intervention time. Higher age of searched persons determined longer interventions ($p=0.057$) [26].

Limitations

The study has several limitations:

- firstly, there is no clear definition in the accumulated literature of an intervention to a patient with behavioral disorder;
- secondly, most of the studies associated with the keywords concerned disturbances in the psychological sphere of firefighters themselves as a result of exposure to repeated stress, or the effect of PTSD;
- thirdly, due to the small number of studies matching our assumption in the specified time interval, and the English-only search, data collection may have been incomplete and omitted studies in other language versions;
- fourthly, the fire service is not a leading service in many countries in terms of emergency medical services, and the actual participation in incidents matching the analysis may have been marginalized by the medical services that handled the incident, so that no traces were found in the literature (analyses available).

More analyses from emergency service interventions, including the collaborating entities, are thus needed so as to confirm our findings and demonstrate the relevance of inter-service collaboration, as well as to discern the potential for firefighters to be used in medical team interventions. All included studies were retrospective and there was a risk of bias in the data collected.

Conclusions

The conducted review demonstrates the crucial role of the fire service as supportive to medical teams in interventions to patients with mental and behavioral disorders. The use of specialized equipment and technology, such as drones or communication systems, enhances the effectiveness of interventions and the safety of intervention participants. Both the literature analysis and observed trends indicate an increasing number of such interventions, highlighting the need for further integration and standardization of the cooperation of services. Another important aspect is the mental health of firefighters, which requires a systemic support due to exposure to stress and the risk of PTSD. Further research is needed to optimize

cooperation between firefighters and medical teams as well as to implement solutions to minimize the psychological burden on rescuers.

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The cases described are entirely anonymous; the analysis complies with the principles of the Helsinki Declaration and did not require an approval from a bioethics committee.

Artificial intelligence (AI) was not used in the creation of the manuscript.

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