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Human resource management in health care under martial law

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Abstract. The mobilisation and management of medical personnel in active combat zones constitute one of the principal challenges of contemporary armed conflicts, directly affecting the continuity of medical care and the preservation of patients' lives. This study aimed to synthesise existing scientific and practical evidence concerning the organisation of medical staff workflows, approaches to psychological support, and safety measures under conditions of martial law. The methodology involved a literature search in international databases covering publications from 2014 to 2025. The analysis focused on cases from Ukraine, Syria, Israel, and Sudan. The findings indicated that the implementation of Hospital Emergency and Contingency Planning enhances the resilience of health care systems through the formation of mobile teams, clear coordination mechanisms, and personnel reserves, while the 10-1-2 doctrine reduced battlefield mortality from 13% to 3%. The use of mathematical models for staff rotation demonstrated effectiveness in ensuring continuity of medical services. In the field of psychological support, cognitive-behavioural interventions and Eye Movement Desensitisation and Reprocessing therapy, along with group and individual programmes, proved the most effective, reducing distress levels by an average of 23%. Online platforms and international initiatives provided additional opportunities for remote assistance and knowledge exchange. In the domain of physical security, protocols for marking medical facilities, the establishment of protected zones, and training in tactical medicine play a decisive role. The analysis confirmed that the integration of staff mobilisation strategies, psychological support, and legal safeguards is essential for maintaining the functionality of the medical system during armed conflict. The practical significance of the findings lies in their applicability for public administration bodies, medical institutions, and humanitarian organisations seeking to optimise personnel policies, implement support programmes, and strengthen staff safety

Keywords: adaptive staffing strategies; psychological resilience of medical personnel; international safety protocols; rotational work models; traumatic stress in conflict zones; humanitarian resource coordination

Introduction

In contemporary armed conflicts, medical personnel encounter heightened risks, resource shortages, and substantial psychological burdens, which underscores the necessity of studying effective strategies for workforce mobilisation and management. Systematic psychological support, including cognitive-behavioural interventions, group therapy, and online platforms, has become a pivotal factor in preserving staff performance and adaptive capacity. At the same time, there is a need for a comprehensive assessment of the interrelation between staffing, organisational, and legal mechanisms for protecting medical workers, as violations of international humanitarian law and exposure to physical danger continue to pose serious challenges to the continuity of medical care.

Issues of medical personnel management in conflict zones have increasingly attracted scholarly attention due to rising incidents of violence and restrictions on access to patients. G.C. Shen *et al.* [1] conducted an analysis of the historical experience and evolution of medical personnel management in wartime, identifying a trade-off between safety and access, the shifting of risk to local specialists, and the commercialisation of humanitarian

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assistance. These factors consequently lead to the fragmentation of assistance and constrain the practical application of high-reliability principles. The absence of coordination and standardised procedures in humanitarian initiatives further diminishes the quality of medical care in conflict settings. N. Markou-Pappas *et al.* [2] identified a lack of unified operational vision, weak command structures, and limited interagency coordination, as well as challenges in patient routing, staff training, and pharmaceutical logistics. The findings indicated the need for integrated planning and a systemic approach to managing medical resources. Staff preparation and retention emerge as critical determinants of health-system stability in conflictaffected regions. B. Bogale *et al.* [3] demonstrated that effective functioning requires the integration of displaced specialists, upskilling of local personnel, the use of telemedicine, and community support. The results emphasised the importance of comprehensive training and capacitybuilding strategies for strengthening the resilience of medical systems.

The impact of military operations on the health-care system is reflected in a sharp decrease in the overall number of medical consultations and a shift in patient priorities. N.V. Horach *et al.* [4] showed that in 2022, the total number of medical visits in Ukraine declined by nearly 53%, while the demand for specialised care increased. This indicated a transformation in the structure of medical services and a marked reduction in preventive examinations in subsequent years. The economic and social consequences of war directly affect the health-care infrastructure and personnel. M. Dzhus & I. Golovach [5] demonstrated that during the first months of the invasion (February-May 2022), 672 medical facilities in Ukraine were damaged or destroyed, including 115 hospitals that were completely demolished. During the same period, at least 295 attacks on health workers and medical facilities were recorded, resulting in 59 injured and 76 killed. These events severely restricted public access to medical services and interrupted the treatment of individuals with chronic conditions.

The escalation of attacks on medical personnel violates the principles of international humanitarian law and medical neutrality. D. Norcliffe-Brown & A. Green [6] found that since 2010, the number of conflicts and assaults on health workers has risen sharply, leading to more than 900 deaths of medical personnel in 2024. The scale of workforce outflow in Syria and Myanmar illustrated the critical consequences for the availability and quality of medical care. Existing regulatory mechanisms for protecting medical personnel have proved insufficient during wartime. T. Mykhailichenko *et al.* [7] showed that international humanitarian law contains provisions for safeguarding medical workers, but their enforcement is not guaranteed, while martial law enables states to restrict citizens' rights. This creates additional challenges for ensuring the quality control of medicines, managing humanitarian assistance, and administering the healthcare system. Medical professionals also face ethical dilemmas that exacerbate stress and increase the risk of error. G.D. Muhammad *et al.* [8] found that medical personnel are compelled to balance professional duty with personal safety, work beyond their formal qualifications, overcome cultural and gender barriers, and make critical choices between treating the wounded and assisting those who are severely injured. These challenges underscore the importance of preparing staff for both psychological and professional resilience.

In the body of research reviewed, attention has largely focused on broad trends in the management of medical personnel, whereas the effectiveness of specific staffing strategies, rotation models, and integrated coordination protocols has been assessed only to a limited extent. The impact of psychological support on staff resilience in conditions of direct combat has also been examined only fragmentarily, and the long-term consequences for professional and psychological adaptation remain insufficiently investigated. Furthermore, previous studies have been constrained primarily to cases from particular regions and organisations, which limits the generalisability of the findings to other conflict zones. This study aimed to conduct a comprehensive systematisation and critical assessment of scientific evidence concerning the mobilisation, management, psychological support, and legal aspects of protecting medical personnel in the context of armed conflicts and crisis scenarios.

Materials and Methods

As part of this review study, a systematic search and synthesis of scientific publications and reports addressing the protection of medical infrastructure and the management of medical personnel in armed conflicts were conducted. The search was carried out using academic databases and platforms, including ResearchGate, Wiley Online Library, BioMed Central, MDPI, Emerald Insight, Sciendo, Taylor & Francis Online, Springer Link, Cambridge Core, and The Lancet. In addition, thematic reports by the World Health Organization (WHO) [9, 10], which contain relevant data on attacks on health care and the protection of personnel, were included in the analysis.

The search covered materials published up to 2025, with a primary focus on English-language articles and relevant Ukrainian-language publications. To ensure the quality of the review and assess the reliability of the included sources, a critical appraisal of the methodological soundness of primary studies was carried out. The assessment employed the Joanna Briggs Institute critical appraisal checklist [11], adapted to the design of each publication. The sources were independently evaluated against criteria such as adequacy of sampling, clarity of methodological reporting, and validity of conclusions. The resulting assessments were used to improve understanding of the reliability of the data presented in the sources.

The search queries consisted of combinations of keywords and their synonyms in English and Ukrainian, including: "healthcare workers", "medical personnel", "attacks on health care", "conflict", "war", "psychological support", "migration of health workers", "hospital emergency planning",

"tactical medicine", "medical personnel in war", "attacks on healthcare facilities", "migration of medical workers", and "psychological support for medical workers". The queries were adapted to the syntax of each database, using logical operators (AND, OR) and filters by document type (peer-reviewed original studies, systematic reviews, meta-analyses, and review articles).

This review study also examined the functioning of health-care systems in armed conflict environments using the cases of Ukraine, Syria, Israel, and Sudan. The primary focus was on the impact of war on the mobilisation of medical personnel, the organisation of work under shelling and attacks on medical facilities, and the provision of psychological support, legal safeguards, and physical protection for health workers. The analysis examined mechanisms of large-scale emigration among medical personnel, the application of operational and tactical medical protocols – such as timeframes for tactical, resuscitative, and surgical care – and crisis-response systems, including mobile medical units, vaccination campaigns, and measures to ensure the continuity of medical services across diverse conflict settings. This approach enabled a comprehensive evaluation of adaptive and crisis-management mechanisms within health-care systems in different contexts and highlighted the importance of strategic workforce and resource management. In addition, modelling studies aimed at optimising staff management and logistics for the deployment of a field hospital were considered, using the example of the Spanish Simple Triage and Rapid Treatment (START) team, which allowed the assessment of integrated approaches under crisis conditions. The initial search yielded 127 publications. After removing duplicates and irrelevant materials (based on titles and abstracts), the number of sources was reduced to 94. Subsequent full-text analysis resulted in the selection of 41 publications that fully met the inclusion criteria. The inclusion criteria comprised peer-reviewed studies, literature reviews, systematic reviews, and meta-analyses examining the protection of medical facilities and personnel, staff mobilisation and outflow, organisational models of care delivery, measures for strengthening the resilience of health-care systems in conflict zones, and psychological support interventions for personnel. Editorials, commentaries, letters to the editor, materials without full-text access, and publications lacking primary or synthesised data on the specified topics were excluded.

Results and Discussion

Mobilisation and management of medical personnel during wartime. In wartime conditions, medical personnel operate far beyond conventional professional duties, becoming a frontline force not only in providing emergency care but also in upholding human rights. In conflict settings, they face acute resource shortages and are frequently targeted in attacks, necessitating immediate mobilisation and the redistribution of staff. Health workers increasingly assume additional responsibilities, including training less experienced colleagues, participating in vaccination and sanitation activities, and providing psychosocial support to individuals affected by trauma [12]. Human resource management in the health-care sector during crises, including armed conflict, is regarded as a key factor in mitigating adverse consequences and ensuring the continuity of medical services. The analytical review by T. Stroiko *et al.* [13] indicated that Ukraine lost approximately 30% of its jobs – equivalent to 4.8 million positions – following the onset of the full-scale invasion in 2022. Under a scenario of rapid conflict resolution, the labour market could recover up to 3.4 million jobs, whereas further escalation may result in losses of up to 7 million positions, representing 43.5% of total employment. To address the workforce deficit, three strategic approaches have been identified: encouraging higher birth rates and the return of migrants, implementing technological solutions and enhancing labour productivity, and attracting foreign specialists. A combined approach is considered the most effective; however, in practice, 50% of organisations increased salaries, while 39% froze budgets for staff development.

The concept of Hospital Emergency and Contingency Planning (HECP) be T. Wurmb *et al.* [14] provided the principal framework for adapting human resources in crisis situations. It requires clear operational coordination, including the establishment of mobile teams, specialist rotation, and the deployment of reservists and volunteers to compensate for personnel shortages in critical areas. A central element of effective HECP implementation is the presence of an HECP lead, responsible for organising, structuring, and executing decisions related to workload management, priority setting, and the legal protection of staff. Research indicates that the availability of trained personnel reserves and systematic staff rotation substantially enhances the capacity of medical institutions to maintain stable operations, even under conditions of mass casualty influx. This confirms that effective workforce management, supported by regular drills and strategic planning, constitutes a cornerstone of healthsystem resilience. Figure 1 presented consolidated data illustrating attacks on the health-care system and their consequences for life and health.

As shown in Figure 1, the distribution of attacks on health-care facilities across different types of infrastructure, as analysed by H.J. Kim *et al.* [15], highlights key aspects of workforce adaptation within the health-care system during armed conflict and substantiates the need for a comprehensive approach to medical personnel management. The highest rate of injuries occurred among health-care transport vehicles (10.5% of all recorded incidents), highlighting a critical need for rotation of ambulance teams and mobile medical units. Prolonged deployment of the same personnel in high-risk zones leads to cumulative losses, necessitating the mobilisation of additional human resources, including volunteers and reservists, to maintain uninterrupted emergency medical services. Simultaneously, medical supply storage facilities showed the highest mortality rate among staff (10.3%), indicating the need to

redistribute logistical functions across a larger workforce and to establish reserve storage capacities with rotational service teams. Medical institutions, despite representing the largest sample (n = 1,301), exhibit relatively stable injury (3.8%) and mortality rates (1.5%), making them suitable bases for the training and retraining of medical personnel, mobilisation of reserve staff, and coordination of rotation schemes across different segments of the healthcare system. These statistics support the implementation of HECP strategies and active personnel rotation as primary mechanisms for preserving human resources: differentiated risk profiles by facility type allow for optimal allocation of experienced staff, new recruits, and volunteers, ensuring both the maintenance of critical healthcare functions and the minimisation of personnel losses through systematic rotation between zones of varying risk.

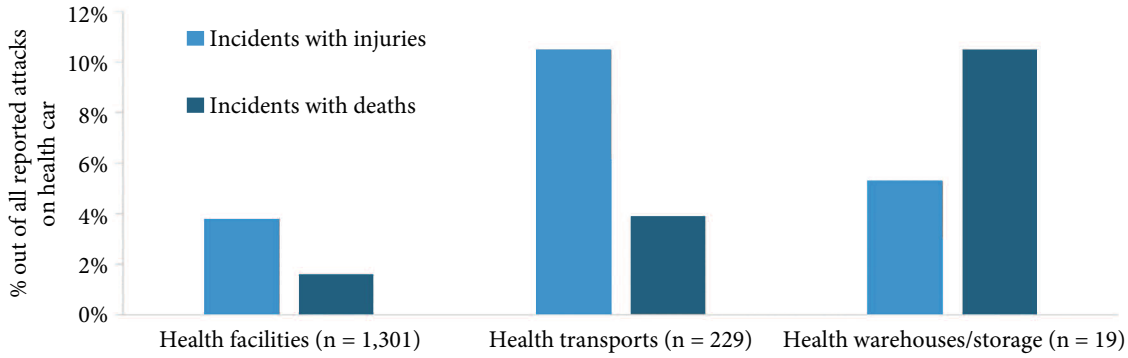

Figure 1. Attacks on medical infrastructure resulting in injury and loss of life, by affected facility type
Source: H.J. Kim *et al.* [15]

According to a review by O. Onvlee *et al.* [16] on human resources for health in conflict settings, armed conflict precipitates an acute shortage of personnel due to both migration and withdrawal from the profession. This is illustrated by the case of Syria, where, since the onset of conflict in 2011, over 70% of healthcare workers were forced to leave the country, and by April 2020, more than 900 healthcare personnel had died, leaving the system understaffed and fragmented. Specifically, in Aleppo and the north-western regions, the number of physicians per 1,000 population fell from 1.5 in 2010 to 0.3 in 2018, while the number of nurses and midwives declined from 1.4 to 0.6 per 1,000 population. In the north-western areas, home to approximately 4.17 million people, only around 1,000 doctors, 1,693 nurses, 358 midwives, and 709 primary care workers remained [17]. Such attrition places immense pressure on those who remain, forcing them to operate under resource constraints and direct threats to their lives. Consequently, new private training institutions have emerged in several countries to address workforce gaps, although the quality of education in these institutions is often low, contributing further to the shortage of qualified personnel. In addition, irregular and inadequate remuneration, coupled with widespread corruption and nepotism, demotivates staff, while a lack of coordination between Ministries of Health and Education limits the capacity for effective training and allocation of professionals [16]. This indicates that armed conflicts generate a critical shortage of medical personnel, placing severe strain on those who remain and increasing the risks associated with delivering effective healthcare. Workforce instability consequently diminishes the healthcare system's capacity to respond to population needs in crisis situations.

In response to these challenges, a range of organisational measures has been implemented. Experience from conflicts in Ukraine, analysed in a descriptive study by H. Tien & A. Beckett [18], demonstrated that the 10-1-2 doctrine (10 minutes for tactical care, 1 hour for resuscitation, 2 hours for surgical intervention) imposes stringent demands on personnel management, requiring high readiness for rapid mobilisation and rotation of medical staff. Implementation of this approach involves the creation of mobile surgical teams and emergency workload redistribution systems, which, for example, reduced battlefield mortality from 13% to 3%. Simultaneously, the loss of guaranteed air superiority complicates the movement of specialists, emphasising the need for a dispersed allocation of human resources, including mobile surgical units. Predicted patient loads, ranging from 24,000 to 51,000 wounded over three weeks of combat, require not only full engagement of military medical personnel but also integration of specialists from civilian hospitals [18]. Thus, military medical support systems demonstrate the necessity not only for technical adaptation but also for comprehensive personnel management capable of ensuring effective coordination, rotation, and mobilisation of medical resources during large-scale conflicts.

The further development of tactical medicine approaches, as illustrated in a study by A. Mohylnyk *et al.* [19] in Israel – where surgical points are located within 200 metres of the front line – enables resuscitation to commence within the first minutes after injury, reducing the average evacuation time from 90 to 40-60 minutes. According to a descriptive study by N. Movlyanova *et al.* [20], similar measures were implemented in Ukraine to enhance the effectiveness of medical care, including the redistribution of

medical personnel and the establishment of mobile surgical points closer to the front line, which shortened average evacuation times. Expanding the scope of pre-hospital care provided by both medical personnel and trained military personnel, alongside the integration of civilian specialists into military medical structures, stabilises wounded patients and supports system functioning under high operational loads. This strategy emphasises the importance of controlled personnel placement, rapid mobilisation, and staff training to stabilise casualties, demonstrating that human resource management in extreme conditions is a decisive factor in the effectiveness of military medical support.

The modelling described by F.J. Martin-Campo *et al.* [21], which focused on optimising personnel management and logistics for the deployment of a field hospital using the example of the Spanish START team in Turkey, demonstrated the efficiency of a flexible approach to staff rotation planning. A mathematical model was developed to select volunteers from an existing list and schedule their rotation according to three key criteria: minimising financial costs, maximising staff availability, and enhancing personnel qualifications. The model enabled the evaluation of different rotation scenarios and their impact on costs and staff availability. For instance, for 160-165 participants, total costs ranged from EUR 288,535 to EUR 296,701, depending on the selected priorities. The application of this model during the mission in Turkey ensured the uninterrupted operation of the field hospital throughout the first three weeks, even under high workload conditions: optimised rotation reduced the average shift duration by 12% and cut flight costs by nearly 8%. The use of a multi-criteria approach allows for simultaneous financial efficiency (through reduced travel costs), consideration of staff availability, and improved quality of medical services by deploying the most qualified personnel. The modelling results emphasise that flexible staff rotation planning is critically important for effective mobilisation and management of human resources in crisis situations, enabling optimal resource allocation and continuity of healthcare delivery.

Ukraine serves as an example of healthcare system adaptation under full-scale war, demonstrated through the mobilisation, rotation, and engagement of medical personnel [22]. By early 2023, significant demographic changes – over 7.7 million people became refugees or internally displaced – led to a redistribution of medical staff: 30,000 healthcare workers joined the Armed Forces of Ukraine or volunteered, 4,500 were internally displaced, and 2,500 left the country. To compensate for the destruction of infrastructure – over 1,200 damaged and 160 completely destroyed medical facilities – hospitals were relocated, and mobile clinics and field hospitals were established. This demonstrates that war compels the healthcare system to adapt rapidly, optimising the allocation and mobilisation of medical personnel to ensure continuity of care. Significant demographic and infrastructural challenges further increase the need for flexible staffing strategies and rapid operational responses.

The organisation of personnel management in conflict settings requires particular attention to psychological and organisational factors [23]. For example, during rocket attacks in Israel in May 2021, 77.4% of medical personnel continued to perform their duties. High work readiness correlated with higher resilience (mean score 28.9 on the Connor-Davidson Resilience Scale, CD-RISC 10), as well as with age (41.7 years) and absence of children under two years old. Attendance was highest among specialist physicians (93.8%) and nurses (81.7%), whereas pharmacy staff reported to work in only 40% of cases. Managerial positions increased the likelihood of attendance by 2.4 times, while limited access to childcare and a high perceived level of danger reduced it. This underscores the importance of organisational measures – such as ensuring security, developing childcare services, and providing psychological support – in retaining human resources.

The example of Sudan demonstrated that mobile medical teams, frequently deployed by the WHO, are capable of delivering high-quality medical care rapidly during emergencies or following significant infrastructure damage. According to M. Ahmed *et al.* [24], they respond to large-scale disease outbreaks, such as cholera and measles, reaching nearly 321,000 people through mobile units. Additionally, they trained 550 local healthcare workers, enhancing community capacity to respond effectively to medical crises, while vaccination programmes contributed to reduced overall mortality and saved the lives of thousands of children. Similarly, in humanitarian and conflict-related crises, healthcare systems must mobilise personnel – including volunteers and reservists – and implement measures to protect and support their wellbeing, given the elevated risks to life and health [25]. Strategic management of medical personnel through mobilisation, training, rational resource allocation, and deployment of mobile teams is therefore essential to maintain continuity of care and strengthen the resilience of healthcare systems in crisis settings.

Existing data reveal substantial variation in the scale of medical workforce attrition during armed conflicts. For instance, T. Gutor *et al.* [22] found that in Ukraine, 30,000 healthcare workers joined the Armed Forces, 4,500 became internally displaced, and 2,500 left the country. In contrast, Y. Bdaiwi *et al.* [17] reported that 50% of healthcare personnel and 95% of doctors in Aleppo had left Syria since 2011. Thus, in contrast to the Ukrainian context, where a substantial proportion of personnel were integrated into internal structures, the conflict in Syria led to mass emigration of staff, highlighting the difference in how war impacts internal mobilisation versus external migration.

Data on the effectiveness of battlefield medical care also reveal varying outcomes depending on organisational measures. A study by A. Mohylnyk *et al.* [19] demonstrated that 60% of deaths from combat injuries occur within three hours of trauma, with up to 50% occurring within the first 60 minutes, and that staff redistribution and the establishment of mobile treatment points reduced the average evacuation time for the wounded from 90 to 40-60 minutes. Similarly,

Y. Bdaiwi *et al.* [17] showed that implementing emergency workload redistribution systems, forming mobile teams, and supporting tactical medicine reduced battlefield mortality from 13% to 3%. This evidence indicated that comprehensive organisational measures combined with tactical medicine significantly improve survival rates and emphasises the importance of a systemic approach integrating rapid response with optimisation of human resources.

In the management of medical personnel during crises, strategies show considerable variation. T. Stroiko *et al.* [13] proposed measures to stimulate birth rates and encourage the return of migrants to replenish the workforce, whereas T. Wurmb *et al.* [14] focused on the HECP programme, which is based on mobilising, rotating, and deploying reserves to ensure the continuity of healthcare services. F.J. Martin-Campo *et al.* [21] demonstrated that flexible staff scheduling optimises costs and maximises personnel availability, delivering better outcomes than rigidly structured operations. In a study by M. Ahmed *et al.* [24] examining Sudan, mobile medical teams, which combine multidisciplinary expertise with rapid deployment, were shown to enhance the efficiency of healthcare delivery in crisis conditions by addressing largescale disease outbreaks and training local healthcare workers. This illustrated the effectiveness of a comprehensive management approach to mobilisation, resource allocation, and strengthening the resilience of healthcare systems in emergency settings. H. Tien & A. Beckett [18] examined the 10-1-2 doctrine, which prioritises tactical, resuscitative, and surgical care within specified timeframes. The evidence indicates that medical personnel management in crisis situations requires adaptive, integrated strategies combining motivation, efficient allocation of labour resources, and organisational innovation.

The highest effectiveness is achieved through integrated approaches that incorporate staff rotation, shift planning, incentives for additional personnel engagement, and the prioritisation of key areas of medical care. Such systematic organisation enables the continuity of healthcare services, optimises the use of available resources, and enhances the overall productivity of medical facilities during emergencies. This approach promotes effective resource management, ensuring maximum adaptability and resilience of healthcare facilities to the challenges arising in crisis situations.

Psychological support for medical personnel in conflict zones. Providing psychological support to medical personnel in conflict zones is critically important, as they face unique challenges that impose a heightened psychological burden. According to an analytical review by O.S. Chaban & O.O. Khaustova [26], up to 30% of individuals in conflict zones experience post-traumatic stress disorder (PTSD), and 90% of these cases involve comorbid conditions. These findings indicated that healthcare workers operating under such conditions require particular attention, as they themselves are at elevated risk. To prevent PTSD and burnout, the World Health Organization has developed the Mental Health Gap Action Programme [27], which includes early diagnosis and intervention. An effective "cognitive blockade" strategy involves engaging in visuospatial tasks, such as playing a 25-minute session of Tetris in the hours immediately following a traumatic event, which has been shown to reduce intrusive memories. Additionally, psychoeducation and stress management training constitute important organisational measures that support staff adaptation to extreme conditions.

Psychological and emotional challenges among healthcare personnel arise from sustained exposure to traumatic events. A study by A.A. Faraj *et al.* [28] found that medical staff working with mass casualties exhibit high levels of anxiety (up to 73%), depression (78%), and stress (68%). The greatest burden was observed among mortuary specialists, who, in addition to constant exposure to death, face added pressures from the emotional responses of relatives, political factors, and strict deadlines for medico-legal procedures. A review of the scientific literature by M.V. Krasnoselskyi *et al.* [29] indicated that chronic stress and personal risk factors contribute to psychological trauma, manifesting as depression (11-47%) and anxiety disorders. One key aspect is the concept of a "shared traumatic reality", in which healthcare workers simultaneously experience trauma while providing care to patients.

Additionally, a study by L. Hamama *et al.* [30], which analysed of 200 nurses at a large public hospital in southern Israel, identified two stress-response profiles: "resilient" (n = 156), characterised by high positive affect, resilience, and a sense of social support, and "reactive" (n = 44), who exhibited significantly higher levels of psychological distress and a greater prevalence of adjustment disorders. Nurses in the reactive group were more likely to have experienced the abduction of a family member (18% vs 4%), were younger on average (M = 38.9 years vs 43.7 years), and rated their own health more poorly (M = 3.01 vs 3.30). Notably, the frequency of providing care to victims of mass-casualty events or active combat zones did not statistically influence the distribution of nurses across profiles, emphasising the importance of individual and family factors in shaping psychological resilience. In a review by V.A. Dobiesz *et al.* [31], interventions aimed at reducing these risks include group therapy, which restores a sense of belonging and mutual support; individual psychological support, focused on processing traumatic experiences; and strengthening social connections both within the team and with external support networks. Despite the limited availability of systemic programmes, there is growing recognition of the importance of healthcare worker wellbeing and the need for targeted preventive measures. This underscored the necessity of comprehensive approaches that integrate psychotherapeutic methods with organisational support and training in stress-resilience skills.

To mitigate such consequences, the importance of systematic monitoring of staff mental health and the implementation of psychological support strategies is emphasised. These strategies include regular psychodiagnostic

assessments, targeted programmes for the prevention of post-traumatic stress disorder and burnout, and the use of resilience-enhancing methods, such as group supervision, access to specialised psychological services, and supportive resources that ensure timely intervention and promote the restoration of professional and emotional wellbeing [28]. Among psychological support and burnout-prevention strategies, cognitive-behavioural therapy, Eye Movement Desensitisation and Reprocessing (EMDR), and stress-management and relaxation programmes are particularly effective. The quality of team functioning and training is also a crucial factor influencing mental health, acting as a protective element [29]. These measures are considered essential for minimising distress and maintaining the capacity of healthcare professionals during prolonged conflict.

The effectiveness of support programmes is supported by the outcomes of implemented initiatives. In Ukraine, the Ukraine Advanced Clinical Trauma Training (ACTT) programme, which combines a series of training sessions, has contributed to increased professional confidence among participants. Such approaches demonstrated a positive impact on healthcare workers' readiness to operate in extreme conditions [32]. In another psychodiagnostic study by O.O. Kyrylova *et al.* [33], which included 88 healthcare professionals (41 doctors and 47 nurses) in Kharkiv, the critical situation in 2022 necessitated systemic psychological interventions, leading to the establishment of a dedicated support office that year. Its activities encompassed organisational and psychological interventions, psychoeducational self-help and burnout-prevention modules (weekly 30-minute mini-seminars), as well as individual and group consultations aimed at developing resilient stress-coping skills. A follow-up assessment of staff in 2023 revealed a statistically significant 23% reduction in distress levels, alongside a marked decrease in the prevalence of anxiety symptoms (from 78% to 54% among doctors and from 81% to 60% among nurses), fear, and depression. These findings indicated the effectiveness of the implemented psychological support strategies, demonstrating that regular counselling, psychoeducation, and organisational assistance can substantially reduce psychological strain and enhance the resilience of healthcare workers in conflict settings. In this context, practices implemented in Ukraine and Sudan were compared, as summarised in Table 1, since both countries faced protracted crises that severely restricted access to conventional healthcare resources. This comparison allows for an analysis of how training programmes and educational initiatives can support healthcare personnel across different socio-cultural and political contexts, ensuring the continuity and stability of healthcare systems during emergencies.

Table 1. Psychological support strategies for healthcare workers in conflict zones (Ukraine vs Sudan)

Parameter	Ukraine (ACTT, 2023)	Sudan (Emergency ECHO, 2023)
Target audience	238 unique participants: 42.5% nurses/NP/PA; 32.1% feldshers/paramedics; 13.1% doctors; 5.8% mental health staff; remainder – laboratory, educational, and administrative personnel.	>5,000 healthcare workers (doctors, nurses, students) in Clinical Management Response Team Telegram group; audience grew to >14,000 after programme launch.
Format	16 webinars (twice weekly, 9 June – 2 August 2023); live and asynchronous access via YouTube.	43 interactive online sessions (Telegram+Zoom), April-October 2023; combination of basic emergency care materials and locally adapted content.
Language and lecturers	International instructors; English.	Sudanese experts and diaspora; Arabic (culturally relevant content).
Number of visits	758 (repeat visits).	2,697 (average attendance 65.8 per session).
Knowledge assessment	"Very competent" increased from 24.9% to 52.6%; "Extremely competent" from 5.4% to 11.3% (N = 708).	58.6% of participants reported acquiring new knowledge and readiness to apply it in practice (N = 986).
Confidence in applying knowledge	27.7% rated the training as "extremely relevant", 50.5% as "very relevant" (N = 708).	59.9% felt "extremely confident", 26.4% "moderately confident" in applying the material (N = 1,104).
Strengths	Involvement of the Ministry of Health, availability of recordings, minimisation of safety risks.	Utilisation of existing networks, low internet requirements, cultural relevance, rapid content adaptation.
Challenges	Low participant interaction (webinar format), recruitment difficulties during wartime.	Limited use of the consultation group, infrastructure and security challenges.

Note: NP/PA – Nurse Practitioner/Physician Assistant, healthcare professionals with extended clinical responsibilities; Emergency ECHO – educational initiative for Sudanese healthcare workers using the ECHO (Extension for Community Healthcare Outcomes) model for remote training and consultations
Source: compiled by the author based on S.M. D'Andrea *et al.* [32]

As shown in Table 1, the comparative analysis of psychological support strategies for healthcare workers in conflict zones in Ukraine and Sudan highlights the scale and complexity of the psychological challenges faced by medical personnel during armed conflict. It also demonstrated the critical importance of a systematic approach to mental health management as a foundation for preserving the healthcare workforce. Following training in Ukraine, among 238 participants, the proportion rating their knowledge as "very competent" increased from 24.93% to 52.60%, more than doubling, which indicates a systemic lack of preparedness among healthcare workers

to manage traumatic cases and their own psychological responses under sustained stress. The "extremely competent" category also doubled from 5.4% to 11.3%, showing significant progress in the development of specialised skills. The diversity of the target audience (42.5% nurses/NP/PAs, 32.1% feldshers and paramedics, 13.1% doctors) emphasises that psychological challenges affect all categories of healthcare personnel, not only those in direct patient contact. High programme engagement (758 repeat visits in Ukraine; 2,697 in Sudan) and substantial audience growth (from >5,000 to >14,000 participants in Sudan) underscore the critical need for psychological support and strategies for preventing burnout and PTSD. Overall, the training results indicate that systematic programmes effectively enhance the psychological competence of healthcare workers and strengthen their readiness to operate under crisis conditions.

The effectiveness of these programmes is reflected in participants' confidence in applying acquired knowledge: 78.2% of Ukrainian participants rated the training as very or extremely relevant, while 86.3% of Sudanese participants reported feeling moderately or extremely confident in the practical application of the skills gained [32]. At the same time, identified challenges, such as low participant interaction due to security constraints and difficulties in recruiting personnel during active hostilities, highlight the need for adaptive approaches to psychological support that account for the specific conditions of conflict. These findings substantiate psychological support as a critical component of workforce management in conflict zones, since without systematic prevention of burnout and PTSD, healthcare systems risk losing a significant proportion of qualified personnel – not through physical casualties, but through psychological exhaustion and professional impairment.

Such challenges were compounded by the lack of academic programmes training healthcare workers to cope with PTSD and burnout [34]. While international organisations such as Médecins Sans Frontières and the International Committee of the Red Cross (ICRC) develop safety protocols and train staff in negotiation with armed actors, formal academic preparation remains insufficient. Nurses are particularly vulnerable, constituting up to 70% of humanitarian personnel and often being the first to receive the flow of casualties, thereby increasing their risk of burnout and PTSD. Threats, abductions, and attacks remain widespread: in the first six months of 2017 alone, attacks on healthcare workers were recorded in 23 countries. Specialised programmes such as HELP and international humanitarian medicine training play a crucial role in mitigating these risks, emphasising triage, psychoprevention, and the ethical dimensions of working under conditions of violence [34]. In A.Y. Sydorenko's *et al.* [35] study, an analysis of the psychological state and needs of 1,442 healthcare workers in Ukraine found that 70% reported a negative impact of the war on their work, while 13.1% experienced bullying from colleagues or management. Regarding support strategies, 79.3% of participants highlighted the need for improved financial conditions, moral and emotional support, increased staffing, and adequate rest. Despite these challenges, job satisfaction remained high, although awareness of personal stress is low, indicating the presence of resilience mechanisms alongside a need for targeted psychological support. This underscored the importance of systematic training, including stress-management education and prevention of emotional exhaustion, as only a comprehensive approach to protection and resilience development can preserve professional effectiveness and reduce the risk of long-term psychological consequences.

A descriptive analysis of an online support programme for Israeli nurses facing the emotional and psychological challenges of war by V. Segev *et al.* [36] explored the difficulties encountered by healthcare workers. In December 2023, 30 volunteer nurses trained in cognitive-behavioural therapy offered up to three anonymous 30-minute online sessions. The findings revealed that nurses experience stress both in everyday professional duties and in the context of armed conflict. Among the key findings was a reduction in psychological isolation through access to anonymous support, an increase in confidence in the ability to manage professional challenges, and the development of a sense of support and solidarity within the team. These results highlighted the importance of flexible and accessible formats of psychological support for maintaining professional resilience among healthcare personnel in contexts of armed conflict.

A literature review by K. Goniewicz *et al.* [37] on the impact of the war on Ukraine's healthcare system revealed that, in response to rising demands, part of the financial aid was allocated to establishing mobile clinics that provide psychological support directly in combat zones. Concurrently, additional specialists were trained to work with trauma and stress-related disorders. These measures targeted not only civilians and military personnel but also healthcare workers, who face high levels of psychological pressure daily and require specialised support to preserve professional resilience. According to an analytical commentary by A.S. Niven *et al.* [38], the influx of 6.9 million internally displaced persons created an immense demand for basic healthcare services. To alleviate this pressure and support Ukrainian healthcare workers, an international team was established to provide online training in trauma care, supply access to clinical guidelines, and create a private messenger group comprising 946 participants. In addition to professional support, this initiative also served a psychological function: healthcare workers were given the opportunity to share experiences, discuss personal challenges, and receive emotional support from colleagues and international experts. This proved to be a crucial factor in preserving their mental health under conditions of war. Existing data reveal substantial differences in the prevalence of psychological disorders among healthcare personnel working in crisis situations. For instance, A.A. Faraj *et al.* [28] found anxiety in 73% of surgeons and 54% of mortuary staff, whereas M.V. Krasnoselskyi *et al.* [29] reported depression rates among doctors ranging from 11% to 47%.

Unlike the comparatively moderate levels of depression, anxiety among surgeons reaches critical levels, emphasising the need for a differentiated approach to psychological support across staff categories.

Divergent approaches are also evident in strategies for psychological support. O.S. Chaban & O.O. Khaustova [28] demonstrated the effectiveness of game-based therapy (Tetris) for cognitive blockade of traumatic imagery, which reduces intrusive memories during the first hours after trauma. This indicated the potential of rapid interventions in the acute phase of traumatic stress. In contrast to short-term interventions, M.V. Krasnoselskyi *et al.* [29] highlighted the importance of prolonged professional therapy, including cognitive-behavioural therapy and EMDR, as effective tools for burnout prevention. They also emphasised the importance of regular monitoring of therapeutic outcomes to ensure a stable and sustained effect. In addition, A.A. Faraj *et al.* [28] emphasised the role of group supervision in the systematic monitoring of mental health. Regular supervision facilitates the early identification of professional burnout. Meanwhile, O.O. Kyrylova *et al.* [33] demonstrated the effectiveness of weekly mini-seminars, psychoeducational modules, and individual consultations in developing resilient coping skills. These interventions resulted in a 23% reduction in distress among participants, highlighting the practical value of regular psychoeducational activities for enhancing staff psychological resilience. Similarly, A.S. Niven *et al.* [38] showed that international online groups via messaging platforms provide access to clinical guidelines and support Ukrainian healthcare workers remotely. Such online communities also promote experience-sharing and rapid problem-solving in crisis conditions. Thus, regardless of the specific method – whether game-based therapy, cognitive-behavioural interventions, EMDR, group supervision, or online consultations – the presence of structured psychological support is critically important for healthcare personnel working in conflict zones. Any organised form of assistance contributes to stress reduction, burnout prevention, and increased resilience to psychological strain.

Data on the effectiveness of psychological support demonstrated positive outcomes when comprehensive programmes are implemented. For example, S.M. D'Andrea *et al. [*32] found that an online programme increased the proportion of healthcare workers rating their knowledge as "very competent" from 24.93% to 52.60%. This indicated that remote training interventions can effectively enhance healthcare personnel's self-assessment of professional competence. At the same time, O.O. Kyrylova *et al.* [33] recorded a 23% reduction in distress levels and a decrease in the prevalence of anxiety symptoms among physicians from 78% to 54% following the establishment of a psychological support unit in Kharkiv. Thus, in contrast to individual morbidity indicators, organised psychological support programmes can substantially improve the psycho-emotional well-being of staff, particularly when combining online tools with local consultations.

The reviewed evidence suggests that effective management of healthcare personnel's mental health requires a systematic, multi-level approach encompassing early intervention, regular monitoring, individual and group interventions, and the use of modern digital platforms for support and education. In particular, the implementation of comprehensive programmes combining various psychotherapy methods helps to reduce the level of professional burnout and improve the psychological well-being of healthcare workers. Such an approach not only reduces anxiety and depression but also strengthens psychological resilience, thereby enhancing overall medical service effectiveness during crises.

Legal status and physical safety of healthcare personnel. The legal status of healthcare personnel and medical units in armed conflicts is defined by international humanitarian law, which guarantees their physical inviolability and neutrality. Legal protection for healthcare workers and medical facilities in international conflicts is further ensured by the provisions of the Geneva Conventions [39]. Protection extends not only to doctors and nurses but also to support staff and transport used exclusively for medical purposes. Mandatory requirements include the display of identifying symbols and the possession of proper credentials, as well as adherence to the principles of humanity and medical ethics. Such legal regulation provides the foundation for carrying out humanitarian missions and delivering effective aid to those affected in conflict zones [39]. The provisions guarantee the inviolability of personnel, prohibit attacks on hospitals and medical transport, and require the neutrality of humanitarian organisations such as the ICRC. Practical implementation involves the use of Red Cross and Red Crescent symbols, the establishment of protected zones, and the training of personnel in conduct under combat conditions. However, political factors – particularly the veto power within the UN Security Council – significantly complicate accountability for attacks on medical facilities [40]. This highlights that while international humanitarian law ensures the inviolability and neutrality of medical personnel, the effectiveness of this protection largely depends on political will and compliance by all parties to the conflict.

Analysis of the physical security of healthcare personnel and facilities by E.J. Breeze [41] indicated that international humanitarian law recognises their inviolability and obliges conflict parties to facilitate the evacuation of the wounded and access to humanitarian assistance. In practice, adherence to these norms is hindered by the intensity of hostilities, the actions of non-state armed groups, and the use of unconventional weapons. This necessitates careful evacuation planning, clear marking of medical facilities, and personnel training in safety procedures. At the same time, the enforcement of these protections is heavily dependent on the goodwill of the parties involved, emphasising the need for effective monitoring and legal enforcement.

M.A. Mamun [42] in a critical analysis highlighted those gaps in international humanitarian law allow perpetrators to evade accountability for systematic attacks on

medical personnel and facilities. Cases from Syria and Sudan illustrate extensive violations resulting in significant human losses: in Syria, government forces carried out 92% of attacks leading to fatalities among healthcare workers, while in Sudan, rebel groups targeted 52 medical facilities. The lack of precise definitions of "attack" and the concept of "dual-use" creates legal loopholes for aggressors. Proposed measures to strengthen protection include the decolonisation of international humanitarian law, training military personnel in legal norms, and the more decisive application of sanctions and diplomatic pressure on violators. Despite the existence of legal protections, attacks on medical infrastructure in conflict zones continue to rise [43]. In 2022, the number of documented incidents increased by 45% compared with the previous year, and in 2023, they exceeded 2,500. In Ukraine, between 24 February and 31 December 2022, 707 attacks on the healthcare system were recorded, including the bombing of a maternity hospital in Mariupol. Analysis indicated that international law alone is insufficient to ensure the safety of medical personnel, highlighting the need for professional associations and individual physicians to actively engage in public advocacy and demand protection from governments.

Additional evidence highlighted multiple forms of threats, including assault, arrest, intimidation, obstruction of facility operations, and armed attacks [44]. In some cases, medical facilities were physically destroyed, as occurred in eastern Ukraine in 2014, while demands from opposing parties for differentiated or complete denial of care placed personnel in direct conflict with the principles of international humanitarian law. Beyond physical risks, a significant threat arises from the development of post-traumatic stress disorder: up to 25% of nurses in some samples reported symptoms years after experiencing explosions, and rates of chronic PTSD among military medical personnel are comparable to those of combat troops.

In Ukraine, during the first year of the full-scale war, 106 civilian medical personnel were killed, 33 of them at their workplaces and the most affected regions were Kherson and Donetsk, where over 50% of medical facilities were damaged [45]. An analysis focusing on the protection of the rights and physical safety of medical workers in Ukraine during hostilities by O.G. Strelchenko *et al.* [46] showed that by 2024, Russian troops had damaged 1,468 medical facilities and completely destroyed 193, as well as destroying or capturing 481 ambulances. In addition, the main factors affecting the work of these facilities were staff shortages (51%), security issues (31%) and damage to buildings. Despite these challenges, the number of healthcare workers increased from 288,000 on 1 January 2022 to 345,000 on 1 January 2024, while the number of medical facilities grew from 7,393 to 8,444, demonstrating the healthcare system's capacity to adapt and recover even under conditions of armed conflict. These figures underscore the high vulnerability of medical personnel and infrastructure, highlighting the need for rigorous planning of safe evacuation routes, proper marking and protection of medical facilities, and strategic coordination with state and humanitarian organisations to minimise risks to the health and lives of both medical staff and patients. The distribution of the operational status of medical facilities in the most affected regions is illustrated in Figure 2.

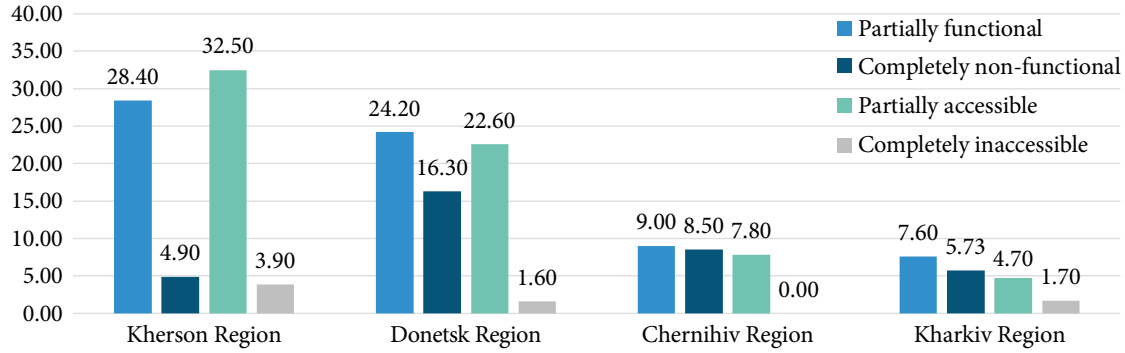

Figure 2. Percentage of medical facilities and their structural units experiencing partial or complete loss of functionality and accessibility in the most affected regions of Ukraine
Note: comparative analysis of reports from January 2023 and January 2024
Source: compiled by the author based on R.P. Brukhno *et al.* [45]

As shown in Figure 2, the distribution of operational capacity across medical facilities in the four most affected regions highlights the critical challenges in ensuring physical security and the continuity of healthcare services during armed conflict, emphasising the need for comprehensive strategies to protect medical infrastructure. Kherson Region presents the most dramatic picture of the destruction of the healthcare system, with only 28.40% of facilities partially operational, reflecting extensive infrastructure damage from direct attacks and the need to evacuate a substantial proportion of medical personnel from the zone of active hostilities. Donetsk Region shows similarly critical figures, with 24.20% of facilities partially operational and a high proportion of completely nonfunctional institutions (16.90%), indicating the chronic impact of the conflict on the healthcare system and the need for continuous

adaptation of operational modes under heightened risk conditions. In contrast, Chernihiv and Kharkiv regions display significantly better outcomes, with 9.00% and 7.60% of facilities partially operational, respectively. This may reflect the effectiveness of recovery and protection measures, the importance of geographical location, and the efficacy of air defence systems in preserving medical infrastructure. The sharp contrast between regions underscores that proximity to the frontline and the intensity of hostilities are decisive factors in maintaining the functionality of medical facilities. These data highlighted the critical need for differentiated strategies for the physical protection of healthcare institutions, including the establishment of underground medical complexes, emergency evacuation plans for patients and staff, and flexible protocols for transitioning between full and partial operational modes depending on the level of threat. The loss of operational capacity in medical facilities directly affects the provision of healthcare to the population and places additional strain on facilities that remain functional in less affected regions. To ensure the physical safety of medical personnel and reduce the risk of trauma, a range of strategies is employed. Analysis by R. Mugavero & M. Alkuhali [47] identified prevention of attacks, evacuation, and the organisation of operations in high-risk zones as key priorities. Practical measures included protocols for behaviour in dangerous areas during shelling, airstrikes, and explosions; safe movement by vehicle and on foot; procedures for encountering suspicious objects; and handling of bodies within a 50 m radius. Data indicated that up to 80% of injuries in buildings during explosions are caused by glass fragments, emphasising the critical importance of adhering to safety procedures.

Strict protocols – such as Confirm, Clear, Call, Cordon, Control (5 C) – combined with ongoing training, incident documentation, GPS navigation, and clear route marking, enhance operational effectiveness and coordination with humanitarian and engineering teams. Coordinates of bodies or unexploded ordnance are recorded in decimal degrees for subsequent work by bomb disposal specialists, safe zones and transit routes are marked with tape or indicators, and hazardous areas are delineated with warning signs and cordons. Compliance with protective measures and awaiting specialised assistance minimises the risk of injury and contamination: personnel use personal protective equipment including gloves, boots, waterproof suits, masks, and goggles, avoid contact with biological fluids, and follow the 5 C procedure when encountering hazardous items, prioritising team safety while awaiting explosive ordnance disposal or specialist intervention. International humanitarian law recognises medical personnel and healthcare facilities as protected entities, making adherence to safety procedures critically important in conflict zones [48]. This underscores that comprehensive compliance with physical safety protocols, strict operational procedures, and international norms is essential to minimise the risk of injury to medical staff. The effectiveness of these measures, however, depends heavily on adequate training, coordinated action, and timely access to support in extreme conditions. The performance of medical teams is also contingent on their level of preparedness. Surgical teams, including those deployed by the ICRC and Médecins Sans Frontières, conduct emergency operations amid unpredictable combat intensity, combining patient care with the training of local specialists. Specialised courses, such as Definitive Surgical Trauma Care and Emergency War Surgery, equip surgeons with the skills necessary for managing military trauma [48]. To anticipate resource requirements and plan safe operations for medical teams, the Red Cross Wound Score [49] has been developed. This scoring system is independent of vital signs and is particularly useful in resource-limited settings.

Despite the high risks, healthcare systems have demonstrated a remarkable capacity to adapt and maintain continuity of services. In Ukraine, even amid extensive destruction and ongoing hostilities, the number of medical personnel and healthcare facilities increased between 2022 and 2024, reflecting the system's flexibility and intrinsic resilience [46]. However, according to World Health Organization [9] analysis focused on the functioning of primary healthcare in Ukraine under conditions of armed conflict, a survey of 500 medical facilities revealed that 10% were forced to temporarily suspend operations, while 43% altered their service schedules for the population, highlighting the need for adaptive planning. Staff shortages remain a serious concern: 74% of facilities experienced personnel attrition or absence, with 41% of cases resulting from forced relocation of employees. Direct threats to staff were also significant, with 22 workers injured and one fatality reported due to hostilities. To enhance preparedness and reduce risks, 73% of facilities organised additional staff training, encompassing psychological support, emergency response for combat-related injuries, and procedures for radiation threats. Despite limited funding – only 16% of facilities received supplementary resources – 97% of employees continued to receive their salaries on time, and 47% received additional compensation for overtime work, demonstrating the system's ability to maintain basic economic stability under crisis conditions [9]. These findings underscored that the Ukrainian healthcare system continues to function and deliver services despite the destructive impacts of armed conflict. Nevertheless, the high levels of personnel loss and limited resources indicate a pressing need to strengthen training and support strategies to ensure the stability and effectiveness of medical care. Similar challenges in protecting medical personnel are observed in Syria, where the ongoing conflict since 2011 has precipitated a catastrophic collapse of the healthcare system. Despite the existence of international norms, such as the Geneva Conventions [50] and Resolution 2286 [51], healthcare workers remain highly vulnerable to attacks, and most hospitals and ambulances are unable to operate fully [52]. This underscores the urgent need for strategic measures to ensure the physical safety of medical personnel, healthcare facilities, and transport in order to maintain basic health services and protect civilian lives.

In the context of the conflict in Sudan, the legal status and physical safety of medical personnel remain critically compromised. Over the course of a conflict lasting more than eight months, the healthcare system has come under severe strain due to mass displacement, disease outbreaks, combatrelated injuries, and inadequate medical care for pregnant women and children. According to World Health Organization [10] data, 60 attacks on healthcare facilities were recorded, resulting in 34 deaths and 38 injuries among medical personnel, while approximately 70% of healthcare facilities in conflict zones were either partially operational or completely non-functional. A significant proportion of medical personnel have not received salaries for up to eight months, and access to medicines and medical supplies – including treatments for chronic diseases, laboratory reagents, and dialysis equipment – is severely limited. In response to these challenges, the WHO coordinates the national healthcare system, conducts staff training, deploys mobile clinics, and implements electronic early warning and response systems for disease outbreaks, thereby enhancing the safety and effectiveness of healthcare delivery in conflict settings.

Available data reveal substantial differences in the scale of attacks on medical facilities and personnel across countries and conflicts. For example, I. Bilgrami *et al.* [43] reported 707 attacks in Ukraine between February and December 2022, while O.G. Strelchenko *et al.* [46] recorded that, from the onset of the full-scale war until 2024, 1,468 healthcare facilities in Ukraine were damaged and 193 completely destroyed. By comparison, in Sudan, rebel groups carried out 52 attacks, according to M.A. Mamun [42], and A. Martin *et al.* [52] documented numerous attacks on healthcare facilities and personnel in Syria. These incidented severely impede the provision of medical care to civilians and place healthcare workers' lives at risk. This evidence indicates that, although threats to medical infrastructure represent a global challenge, their scale and intensity vary considerably depending on the region and the nature of the conflict. At the same time, data on injuries reveal variations according to weapon type and environmental context. M. Muhrbeck [49] reported that in urban areas, 42% of injuries were caused by firearms, whereas in rural settings, 70% of injuries resulted from explosions. R. Mugavero & M. Alkuhali [47] further clarified that 80% of injuries sustained in explosions within buildings were caused by glass shards, highlighting the context-specific nature of trauma in conflict zones.

Organisational and adaptive measures have demonstrated diverse approaches to ensuring the safety of medical personnel and enhancing the effectiveness of healthcare delivery. R. Mugavero & M. Alkuhali [47] emphasised the use of personal protective equipment and strict safety protocols, such as the 5 C system, whereas L. Yustitianingtyas & L.R. Habibah [40] highlighted the importance of specialised identification signs and credentials to protect personnel and vehicles used exclusively for medical purposes. Meanwhile, C. Ferreira & M. Correia [48] underscored the necessity of specialised training for surgeons and medical staff, including courses such as Definitive Surgical Trauma Care and Emergency War Surgery, to adapt standard surgical protocols to the conditions of war and the specific nature of combat-related injuries.

Thus, unlike isolated assessments of the number of attacks or the characteristics of injuries, the integration of organisational measures, personnel training, and adherence to international safety standards enables effective risk reduction for medical facilities and staff, ensures the provision of timely medical care, and increases the survival of the injured across diverse conflict environments. In addition, systematic monitoring and evaluation of the effectiveness of measures taken allow for prompt adjustments to strategies and procedures, ensuring continuous improvement in the safety and quality of medical services. Thanks to this comprehensive approach to the organisation of medical facilities, significant improvements have been achieved in the efficiency and accuracy of care provision in high-risk situations.

Conclusions

This review systematically compiled and analysed contemporary scientific evidence on the mobilisation, management, and psychological support of medical personnel in armed conflict settings. The study's objectives were achieved through an examination of international experience, organisational models, and legal frameworks. The analysis revealed that, in wartime conditions, medical personnel face resource shortages, elevated risks, and significant psychological strain, underscoring the critical importance of the timely implementation of integrated strategies. The use of HECP ensures clear operational coordination, mobility, and readiness of healthcare systems for crisis scenarios. The 10-1-2 doctrine demonstrated a marked ability to reduce mortality among battlefield casualties. Flexible staff rotation models also enable the continued functionality of medical facilities in active conflict zones. Regarding psychological support, cognitive-behavioural interventions, EMDR, group therapy, regular psychoeducational modules, and international online platforms proved effective in reducing stress levels and fostering adaptive coping strategies. Nevertheless, the legal and physical protection of medical personnel remains a complex challenge. Although international humanitarian law guarantees the inviolability of healthcare staff and facilities, numerous violations indicate the need for strengthened monitoring and enforcement of these norms.

The findings confirmed that maintaining the functionality of healthcare systems during armed conflict is achievable only through the integration of three key components: effective workforce mobilisation, systematic psychological support, and enhanced legal and physical protection. Only the comprehensive coordination of these strategies can minimise losses and ensure the continuity of medical care, even under the most extreme conditions. For workforce management, the implementation of flexible staff rotation

systems, the establishment of mobile medical teams, and training programmes for reservists were advisable. In the sphere of psychological support, systematic monitoring of mental health, the introduction of comprehensive PTSD prevention programmes, and access to online support platforms were recommended. For physical safety, protocols for marking facilities and transport should be improved, staff trained in emergency procedures, and the infrastructure of protected medical zones developed. Future directions include the development of unified protocols for medical personnel mobilisation, evaluation of the effectiveness of digital platforms for psychological support, study of the long-term impacts of conflict on the mental health of medical staff, and exploration of ways to enhance mechanisms of international legal protection. An important area of focus is also the analysis of adaptive strategies employed by healthcare facilities during the post-conflict period.

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References
[1] Shen GC, Martelli PF, Clarke PK, Roberts KH. Health care in times of war. Academ Manage Perspect. 2022;36(2). DOI: 10.5465/amp.2019.0037
[2] Markou-Pappas N, Ragazzoni L, Truppa C, Salio F, Barone-Adesi F, Lamine H. Navigating challenges, solutions and requirements in the provision of trauma care in conflict settings by humanitarian actors: A scoping literature review. Conf Health. 2025;19:3. DOI: 10.1186/s13031-025-00643-7
[3] Bogale B, Scambler S, Khairuddin ANM, Gallagher J. Health system strengthening in fragile and conflict-affected states: A review of systematic reviews. PLoS ONE. 2024;19(6):e0305234. DOI: 10.1371/journal.pone.0305234
[4] Horach NV, Yaremenko LM, Shevchenko OO, Lekhnitska SI, Kaminsky RF, Sakhanda I. The impact of the martial law on the rates and structure of outpatient's morbidity. Med Adv. 2025;5:993–8. DOI: 10.36740/wlek/205356
[5] Dzhus M, Golovach I. Impact of Ukrainian-Russian war on health care and humanitarian crisis. Disaster Med Public Health Prep. 2023;17:e340. DOI: 10.1017/dmp.2022.265
[6] Norcliffe-Brown D, Green A. The protections for healthcare enshrined in international humanitarian law are under severe strain in an increasingly war-torn world. BMJ. 2025;390:r1242. DOI: 10.1136/bmj.R1242
[7] Mykhailichenko T, Zabuha Y, Babanina V, Syiploki M. Protection of the right to health during the period of armed conflict: The experience of Ukraine. Access Justice East Eur. 2022;4–2(17):66–81. DOI: 10.33327/ajee-18-5.4-A000434
[8] Muhammad GD, Zohre V, Hamid P, Soleyman H. Ethical challenges for healthcare providers in war: An integrative review. Roman J Milit Med. 2024;127(2):117–25. DOI: 10.55453/rjmm.2024.127.2.5
[9] World Health Organization. Continuity of essential health services during the war in Ukraine [Internet]. 2023 October 5 [cited 2025 April 25]. Available from: https://www.who.int/docs/librariesprovider2/default-document-library/factsheet_ukraine_final_2-oct-2023.pdf
[10] World Health Organization. Sudan health emergency situation report [Internet]. 2023 December 15 [cited 2025 April 25]. Available from: https://www.emro.who.int/images/stories/sudan/WHO-Sudan-conflict-situation-report-15-December_2023.pdf
[11] Hilton M. JBI critical appraisal checklist for systematic reviews and research syntheses. J Can Health Libr Assoc. 2024;45(3):180–3. DOI: 10.29173/jchla29801
[12] Kumar YS, Kamath JS. Healthcare workers on the frontlines of war: Essential roles and responsibilities. Am J Med Open. 2024;11:100064. DOI: 10.1016/j.ajmo.2024.100064
[13] Stroiko T, Burkun V, Medvedov R. Strategic aspects of human resources management in the context of military operations: Ukrainian experience. Three Seas Econ J. 2024;5(1):91–5. DOI: 10.30525/2661-5150/2024-5-14
[14] Wurmb T, Kolibay F, Heller AR, Franke A. Hospital emergency and contingency planning as central element of the structuring of robust hospitals for coping with disasters and crises. Trauma Surg. 2025;128:654–9. DOI: 10.1007/s00113-025-01609-3
[15] Kim HJ, Bruni E, Gorodetska G, den Bergh RV, Bezer L, Artykutsa S, et al. Typology and implications of verified attacks on health care in Ukraine in the first 18 months of war. PLOS Glob Public Health. 2024;4(5):e0003064. DOI: 10.1371/journal.pgph.0003064
[16] Onvlee O, Kok M, Buchan J, Dieleman M, Hamza M, Herbst C. Human resources for health in conflict affected settings: A scoping review of primary peer reviewed publications 2016-2022. Int J Health Policy Manag. 2023;12(1):7306. DOI: 10.34172/ijhpm.2023.7306
[17] Bdaiwi Y, Rayes D, Sabouni A, Murad L, Fouad F, Zakaria W, et al. Challenges of providing healthcare worker education in protracted conflict: A focus on Syria. Conf Health. 2020;14:42. DOI: 10.1186/s13031-020-00287-9
[18] Tien H, Beckett A. Medical support for future large-scale combat operations. J Mil Veteran Fam Health. 2022;8(2):18–28. DOI: 10.3138/jmvfh-2022-0006

[19] Mohylnyk A, Tarasenko K, Adamchuk N, Sonnik Y, Arkhipovets O. Organization of medical support of military units during combat operations on the basis of the principle of "Golden Hour". Actual Prob Mod Med Bul Ukrain Med Stom Acad. 2023;23(1):184–9. DOI: 10.31718/2077-1096.23.1.184
[20] Movlyanova N, Kuzyk PV, Komyshan IV. Preparation of future medical professionals in Ukraine during martial law. Sci Per Innov. 2025;50(4):2382–98. DOI: 10.52058/2786-4952-2025-4(50)-2382-2398
[21] Martin-Campo FJ, Sánchez MTO, Ruiz-Gonzalez B. Medical staff planning for field hospital deployments: The START hospital. J Humanitarian Log Supply Chain Manage. 2025;15(1):4–17. DOI: 10.1108/jhlscm-03-2024-0043
[22] Gutor T, Kovalska O, Zaremba N, Herasymovych I, Diachyschyn V, Mysak Z, et al. The influence of military actions on the work of the healthcare system. Curr Issues Pharm Med Sci. 2024;37(3):143–7. DOI: 10.2478/cipms-2024-0023
[23] Sberro-Cohen S, Amit I, Barenboim E, Roitman A. Resilience, sense of danger, and reporting in wartime: A cross-sectional study of healthcare personnel in a general hospital. Hum Res Health. 2023;21:81. DOI: 10.1186/s12960-023-00866-w
[24] Ahmed M, Adnan H, Oduoye MO, Salomon I. Beyond the battlefield: Strategies for revitalizing Sudan's healthcare system amidst war. Ann Med Surg. 2025;87(4):1804–7. DOI: 10.1097/MS9.0000000000003171
[25] Langlois EV, Dey T, Shah MG. More than honour, humanitarian health-care workers need life-saving protection. Lancet. 2021;398(10302):729–30. DOI: 10.1016/S0140-6736(21)01892-4
[26] Chaban OS, Khaustova OO. Medical and psychological consequences of war distress in Ukraine: What do we expect and what should be taken into account when providing medical aid? Neurol Psych. 2022;4(150):1–11. DOI: 10.32471/umj.1680-3051.150.232297
[27] World Health Organization. Mental Health Gap Action Programme (mhGAP) guideline for mental, neurological and substance use disorders [Internet]. 2023 November 20 [cited 2025 April 25]. Available from: https://www.who.int/publications/i/item/9789240084278
[28] Faraj AA, Abbas AK, Lavado-Perez R. The psychological impact of war on health professionals: A preliminary study. Sri Lanka J Psych. 2014;5(1):7–9. DOI: 10.4038/sljpsyc.v5I1.6506
[29] Krasnoselskyi MV, Kyrylova OO, Dubenko OYe, Rublova TV, Pavlichenko YuV. Risks of psychological traumatization and stress adaptation of medical staff working under war conditions. Med Perspekt. 2023;28(4):23–30. DOI: 10.26641/2307-0404.2023.4.293979
[30] Hamama L, Amit I, Itzhaki M. Nurses during war: Profiles-based risk and protective factors. J Nurs Schol. 2024;57(2):228–38. DOI: 10.1111/jnu.13019
[31] Dobiesz VA, Schwid M, Dias RD, Aiwonodagbon B, Tayeb B, Fricke A, et al. Maintaining health professional education during war: A scoping review. Med Educ. 2022;56(8):793–804. DOI: 10.1111/medu.14808
[32] D'Andrea SM, Fadul N, Dery M, Brim WL, Israel AM, Struminger BB. Healthcare capacity strengthening in conflict settings through virtual emergency medical training and outreach: Ukraine and Sudan case studies. Front Public Health. 2024;12:1441322. DOI: 10.3389/fpubh.2024.1441322
[33] Kyrylova OO, Shestopalova LF, Rublova TV, Zolotarova TG. Changes in the level of psychological traumatization of medical personnel working in Kharkiv under war conditions over the period from 2022 to 2023. Ukrain J Rad Onc. 2024;32(1):78–90. DOI: 10.46879/ukroj.1.2024.78-90
[34] Burkle FM, Kushner AL, Giannou C, Paterson MA, Wren SM, Burnham G. Health care providers in war and armed conflict: Operational and educational challenges in international humanitarian law and the Geneva Conventions, part II. Educational and training initiatives. Disaster Med Public Health Prep. 2019;13(3):383–96. DOI: 10.1017/dmp.2018.42
[35] Sydorenko AY, Kiel L, Spindler H. Psychosocial challenges of Ukrainian healthcare professionals in wartime: Addressing the need for management support. Soc Sci Med. 2025;364:117504. DOI: 10.1016/j.socscimed.2024.117504
[36] Segev R, Levi G, Segalovich J. Nurses supporting nurses: A model for providing mental health services during war. Int J Ment Health Nur. 2024;33(6):2326–35. DOI: 10.1111/inm.13409
[37] Goniewicz K, Burkle FM, Dzhus M, Khorram-Manesh A. Ukraine's healthcare crisis: Sustainable strategies for navigating conflict and rebuilding for a resilient future. Sustainability. 2023;15(15):11602. DOI: 10.3390/su151511602
[38] Niven AS, Skomro RP, Dziuba D, Gajic O. Supporting health care workers during the armed conflict in Ukraine. Chest. 2023;163(6):1365–7. DOI: 10.1016/j.chest.2023.12.021
[39] Hoar H. Legal protection of medical personnel during armed conflicts. Soc Legal Stud. 2020;3(1):139–45. DOI: 10.32518/2617-4162-2020-1-139-145
[40] Yustitianingtyas L, Habibah LR. Legal protection for medical personnel in international armed conflict: International humanitarian law perspective. In: Proceedings of the 1st UMSurabaya multidisciplinary international conference 2021. Dordrecht: Atlantis Press; 2023. P. 234–42. DOI: 10.2991/978-2-38476-022-0_26
[41] Breeze EJ. Healthcare in conflict: Legally protected, physically at risk. In: Research handbook on patient safety and the law. Birmingham: Edward Elgar Publishing; 2023. P. 90–107. DOI: 10.4337/9781802207064.000012

[42] Mamun MA. How can the protection of medical personnel and facilities under international humanitarian law be strengthened? Med Conf Surv. 2024;40(3):276–84. DOI: 10.1080/13623699.2024.2382833
[43] Bilgrami I, Guy C, Carnegie V, Lussier S. Physician advocacy, international humanitarian law, and the protection of health care workers in conflict zones. Med J Aust. 2025;222(7):331–3. DOI: 10.5694/mja2.52626
[44] Vuorio A, Bor R. Safety of health care workers in a war zone – a European issue. Front Public Health. 2022;10:886394. DOI: 10.3389/fpubh.2022.886394
[45] Brukhno RP, Naumenko OM, Yavorovsky OP, Yavorovska OO, Rygan MM, Ivanko OV. Assessment of resilience and safety of healthcare institutions in Ukraine under emergency conditions. Ukrain J Military Med. 2025;6(1):26–34. DOI: 10.32751/ujmm.2025.1(6)-026
[46] Strelchenko OG, Pastukh ID, Dotsenko OS, Bukhtiyarova IG, Koshova SP. Protection of the rights of healthcare workers in the light of European integration processes. Clin Prev Med. 2024;1:130–9. DOI: 10.31612/2616-4868.1.2024.15
[47] Mugavero R, Alkuhali M. Safety procedures for healthcare professionals in conflict zones: Landmines & ERW awareness. San Marino: AIEP; 2024. 26 P.
[48] Ferreira C, Correia M. Surgical frontiers in war zones: Perspectives and challenges of a humanitarian surgeon in conflict environments. Trauma Surg Acute Care Open. 2024;9(1):e001234. DOI: 10.1136/tsaco-2023-001234
[49] Muhrbeck M. Surgery in armed conflicts: Predicting surgical treatment needs and improving resource use in resource-constrained settings. Stockholm: Expert Group for Aid Studies; 2022. 45 P.
[50] Geneva Conventions [Internet]. 1949 August 12 [cited 2025 April 25]. Available from: https://www.icrc.org/sites/default/files/external/doc/en/assets/files/publications/icrc-002-0173.pdf
[51] United Nations Security Council. Resolution 2286 (2016) [Internet]. 2016 May 3 [cited 2025 October 25]. Available from: https://docs.un.org/en/S/RES/2286(2016)
[52] Martin A, Post N, Martin M. Syria: What should health care professionals do? J Glob Health. 2014;4(1):010302. DOI: 10.7189/jogh.04.010302

Управління персоналом охорони здоров'я в умовах воєнного стану

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Анотація. Мобілізація та управління медичним персоналом у зоні бойових дій є одним із ключових викликів сучасних збройних конфліктів, що напряму впливає на безперервність надання медичної допомоги та збереження життя пацієнтів. Метою дослідження було узагальнити наявні наукові та практичні відомості щодо організації роботи медичного персоналу, методів психологічного супроводу та забезпечення безпеки під час воєного стану. Методологія включала пошук літератури у міжнародних базах даних з охопленням публікацій за період 2014-2025 років. У фокусі аналізу перебували приклади України, Сирії, Ізраїлю та Судану. Отримані результати показали, що впровадження Hospital Emergency and Contingency Planning сприяє підвищенню стійкості системи охорони здоров'я через формування мобільних груп, чітку координацію та кадрові резерви, тоді як доктрина 10-1-2 дозволила знизити смертність на полі бою з 13 % до 3 %. Використання математичних моделей ротації персоналу продемонструвало ефективність у збереженні безперервності медичних послуг. У сфері психологічної підтримки найбільш результативними виявилися когнітивно-поведінкові та Eye Movement Desensitisation and Reprocessing терапія, групові та індивідуальні програми, що знизили рівень дистресу в середньому на 23 %. Онлайн-платформи та міжнародні ініціативи створили додаткові можливості для дистанційної допомоги та обміну досвідом. У сфері фізичної безпеки ключове значення мають протоколи маркування медичних об'єктів, створення захищених зон і навчання персоналу тактичній медицині. Аналіз підтвердив, що інтеграція стратегій мобілізації кадрів, психологічної підтримки та правового захисту є необхідною умовою для збереження функціональності медичної системи у війні. Практична значимість результатів полягає у можливості застосування їх органами державного управління, медичними закладами та гуманітарними організаціями для оптимізації кадрової політики, впровадження програм підтримки та підвищення безпеки персоналу

Ключові слова: адаптивні кадрові стратегії; психологічна резильєнтність медиків; міжнародні протоколи безпеки; ротаційні моделі праці; травматичний стрес у зоні конфлікту; гуманітарна координація ресурсів