ADAPTIVE CHANGES IN THE MEDICAL AND EVACUATION SUPPORT SYSTEM FOR COMBAT OPERATIONS, DEPENDING ON THE OPERATIONAL SITUATION, AS ILLUSTRATED BY THE ACTIVITIES OF THE UKRAINIAN MILITARY HEALTH SERVICE

Zmiany adaptacyjne w systemie zabezpieczenia leczniczo-ewakuacyjnego działań bojowych w zależności od sytuacji operacyjnej na przykładzie działania wojskowej służby zdrowia w Ukrainie

Marek Skalski[1], Marcin Klepczarek[2], Jacek Grębowski[1], Mirosław Soszyński[3]

1. *Military Institute of Medicine – National Research Institute, Department of Organization of Military and Public Healthcare, Poland*
2. *Special Forces Training Center (Col. Wojciech Smoluch), Poland*
3. *Military Institute of Medicine – National Research Institute, Department of Administration and Mobilization, Poland*

Marek Skalski – 0009-0004-2684-3804
Marcin Klepczarek – 0009-0008-3317-8370
Jacek Grębowski – 0000-0001-5407-9533
Mirosław Soszyński – 0009-0002-4663-9099

Abstract

The article presents a brief history of the two-stage conflict that began in February 2014 and continues to this day. By describing four key periods of the first stage of the conflict, we highlight the problems faced by the military health service during this time. The changes in how medical and sanitary losses were managed during the various phases of the first stage of operations laid the groundwork for a unified medical support system in Ukraine during the later stage of the conflict. Modifications of the combat medical support system, aligned with Western standards, significantly enhanced the effectiveness of medical services within the Ukrainian army. Based on the experience of combat participants, necessary logistical and organizational changes that could further improve the medical evacuation system were identified. The aim of this paper was to present the evolution of the treatment and evacuation system during the course of hostilities in Ukraine. The transformations within the Ukrainian army's medical evacuation system during the armed conflict require detailed analysis, with the findings serving to guide the operations of the military health service of the Polish

Streszczenie

Artykuł przedstawia krótką historię dwuetapowego konfliktu zbrojnego, który rozpoczął się w lutym 2014 roku i trwa do chwili obecnej. Autorzy, opisując cztery kluczowe okresy pierwszego etapu działań, zwracają uwagę na problemy, z jakimi borykała się wojskowa służba zdrowia w tym czasie. Zmiany, jakie zaszły w sposobie zabezpieczenia medycznego strat sanitarnych w poszczególnych fazach pierwszego etapu działań, pozwoliły na stworzenie jednolitej przestrzeni zabezpieczenia medycznego w Ukrainie w dalszym etapie konfliktu. Wprowadzone zmiany w systemie zabezpieczenia medycznego działań bojowych, wzorowanych na rozwiązaniach zachodnich, przyczyniły się do zwiększenia skuteczności wsparcia medycznego armii ukraińskiej. Autorzy, bazując na doświadczeniach uczestników walk, wskazują na potrzebę dalszych usprawnień logistyczno-organizacyjnych, które mogą zwiększyć efektywność systemu leczniczo-ewakuacyjnego. Celem pracy jest ukazanie zmian w tym systemie w trakcie trwania działań wojennych w Ukrainie. Zmiany zachodzące w systemie leczniczo-ewakuacyjnym armii ukraińskiej w czasie trwania konfliktu zbrojnego powinny podlegać szczegółowej analizie, a wnioski z niej płynące należy wykorzystać w działalności wojskowej służby zdrowia Sił Zbrojnych Rzeczypospolitej Polskiej.

Keywords: medical treatment and evacuation system; uniform medical support space

Słowa kluczowe: system leczniczo-ewakuacyjny; jednolita przestrzeń zabezpieczenia medycznego

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Corresponding author:
Marek Skalski
Military Institute of Medicine – National Research Institute, Department of Organization of Military and Public Healthcare,
128 Szaserów Str., 04-141 Warsaw
e-mail: marskal@interia.pl

Introduction

February 24, 2024 marks two years since the outbreak of a full-scale armed conflict in Ukraine. A potential scenario for preparing such an operation was outlined already in 1940 by General Georgii Isserson in his book entitled "New Forms of Combat". Analysing German military actions preceding the outbreak of World War II, Isserson emphasized the necessity of preliminary troop deployment, covert mobilization and concentration, followed by rapid, aggressive actions conducted without a formal declaration of war. Isserson developed a concept of delivering strikes across the full depth of the enemy's military formation, aiming to simultaneously engage areas far beyond the front line using all available forces. This concept was further developed by General Valery Gerasimov, the creator of the modern Russian military doctrine (often referred to as the 'theory of chaos'). In contrast to the classical approach proposed by Carl von Clausewitz, Gerasimov views war as an extension of political actions, employing all available means such as hacking, cyberattacks, media manipulation, controlled information leaks, fake news, and hybrid and asymmetric warfare. Political and disinformation campaigns are designed to create the perception of a growing security threat to Russia or its allies within the areas of Russian interest, thereby justifying preventive measures, including military actions [1–3].

Stages of the armed conflict in Ukraine

The armed conflict in Ukraine can be divided into two main stages. The first stage began in February 2014 and lasted until February 24, 2022, although its nature underwent substantial transformation during that period. By shaping the political situation in Ukraine, Russia instigated an internal armed conflict involving separatist movements in the Donetsk and Luhansk regions. Simultaneously, Russia conducted covert military operations, introducing unmarked special forces into Ukrainian territory, which culminated in the annexation of Crimea [4].

Basically, four periods of the first stage of the conflict can be distinguished:

- The initial period of the conflict (from February to September 2014) was marked by a gradual escalation of tensions. By August and September, these tensions evolved into an open, medium-intensity armed conflict. In response, the Security Service, militia, and special forces launched an Anti-Terrorist Operation (ATO) to stabilize the situation. The subsequent signing of an agreement to cease hostilities led to a marked decrease in their intensity;
- The second period (from September 2014 to February 2015) was marked by the full resurgence of military activity, with a significant escalation observed particularly between January and February 2015. This phase concluded with a resolution banning the use of heavy weaponry;
- The third period (from March 2015 to April 2018) was characterized by low-intensity military operations, with occasional escalations, as well as reconnaissance and sabotage activities;
- The fourth period (from April 30, 2018, to February 24, 2022) began with the transformation of the Anti-Terrorist Operation (ATO) into the Joint Forces Operation (JFO). Unlike ATO, JFO was a coordinated military operation aimed to stabilise the situation in the Donetsk and Luhansk regions. With the initiation of JFO, the structure of commanding all military and security units engaged in repelling the armed aggression of the Russian Federation was reorganized. Operational control was transferred to the General Staff of the Armed Forces of Ukraine [5].

Following the period of active hostilities, Ukrainian authorities undertook efforts to reinforce military cooperation with Western partners, focusing on the modernisation of the armed forces, enhancement of operational and command structures, as well as improvement of medical support systems for tactical operations. The time between 2015 and 2022 was used by both conflicting countries (Ukraine and the Russian Federation) to strengthen their positions and prepare for a future conflict. Ukraine recreated its military potential based on the experience and training centres of Western countries, and focused on the construction of fortifications in selected directions. Russia, on the other hand, in line with its doctrinal provisions, undertook political and disinformation activities aimed at creating a favourable environment to justify potential future intervention. In September 2021, Russia, in cooperation with Belarus, conducted the cyclical "Zapad 2021" manoeuvres in the border regions of Poland and Ukraine, leaving military equipment and command centres behind along the Ukrainian border. In early February 2022, Russia and Belarus launched joint military drills code-named "Allied Resolve 2022". Moscow and Minsk claimed that the number of troops involved in these exercises was limited and therefore did not fall under OSCE monitoring requirements. For this reason, it was decided not to invite external observers; unlike in previous years, the communique did not disclose the number of soldiers or equipment involved. According to available data, Russia has amassed approximately 127,000 troops along the border with Ukraine [4, 5].

Since January 2022, in line with Russian military doctrine, provocative actions have escalated in the annexed republics of eastern Ukraine, accompanied by intensified political blackmail and unrealistic demands directed at Western and NATO countries. Such actions, intended to lay the groundwork for justifying a future conflict, were detected by NATO's intelligence services as well as by US and British intelligence agencies, which issued warnings about the potential outbreak of war. However, the exact timing of the possible actions remained uncertain. On February 24, 2022, Russia launched an armed invasion termed a "special military operation".

By initiating a full-scale armed conflict, the Armed Forces of the Russian Federation aimed to conduct high-intensity kinetic operations designed to rapidly seize control of Kyiv and establish a Moscow-dependent provisional government. However, the determined actions of the Armed Forces of Ukraine in the combat zones blocked Russian advances and shifted the combat focus to eastern Ukraine, as well as changed the nature of tactical operations from high-intensity kinetic warfare to positional tactical engagements of varying intensity. Since the onset of aggression, Russian combat operations have been characterized by a high degree of brutality, inclu-

ding deliberate attacks on civilian infrastructure such as commercial, residential, cultural, and medical facilities. During the autumn-winter period of 2023/2024, attacks on Ukraine's energy infrastructure intensified significantly, further affecting the psychological well-being of its citizens. During frontline operations, the Armed Forces of the Russian Federation deliberately target rescuers, battlefield medics, evacuation vehicles, and battlefield medical equipment. Such actions have had a significant impact on the organization of battlefield medical support and the functioning of the treatment and evacuation system of the Armed Forces of Ukraine [5].

Changes in the medical and evacuation system of the Armed Forces of Ukraine in 2014–2024

The combat operations that began in 2014 caught the Armed Forces of Ukraine, including the military health service, in the midst of an organizational reform that was progressing slowly due to significant underfunding, which had led to serious shortcomings in equipment, training, and personnel.

The medical support system of the Armed Forces of Ukraine was structured around phased treatment with evacuation based on medical indications, following a model similar to that used by the Armed Forces of the Russian Federation (Fig. 1) [6]. It encompassed the personnel and resources of the military medical service deployed along evacuation routes, as well as the organization of evacuation and triage of the casualties and sick to successive medical facilities, where increasingly advanced care was provided, from basic first aid, through specialist treatment, to rehabilitation.

However, due to the aforementioned factors, the system failed to function effectively. Already the initial ATO phase, significant problems were faced in terms of medical support, stemming from deficiencies in the following areas:

- standardized personal protective equipment for soldiers, and consequently, insufficient training in its proper use;
- modern IT systems to support medical support management, digital communication, search means for casualty zones, and individual medical data carriers, etc.;
- armoured evacuation vehicles and limited capacity for air evacuation;
- mobile medical modules for establishing stages of medical evacuation and modern equipment for mobile military medical units capable of autonomous operation in field conditions;
- experienced medical personnel;
- stable organisational structures, which had been deformed as a result of personnel reductions.

Financial and organisational neglect significantly affected the implementation of medical support, necessitating the involvement of civilian healthcare system and the establishment of a unified framework for medical care. This situation, in turn, exposed the lack of preparation of civil-

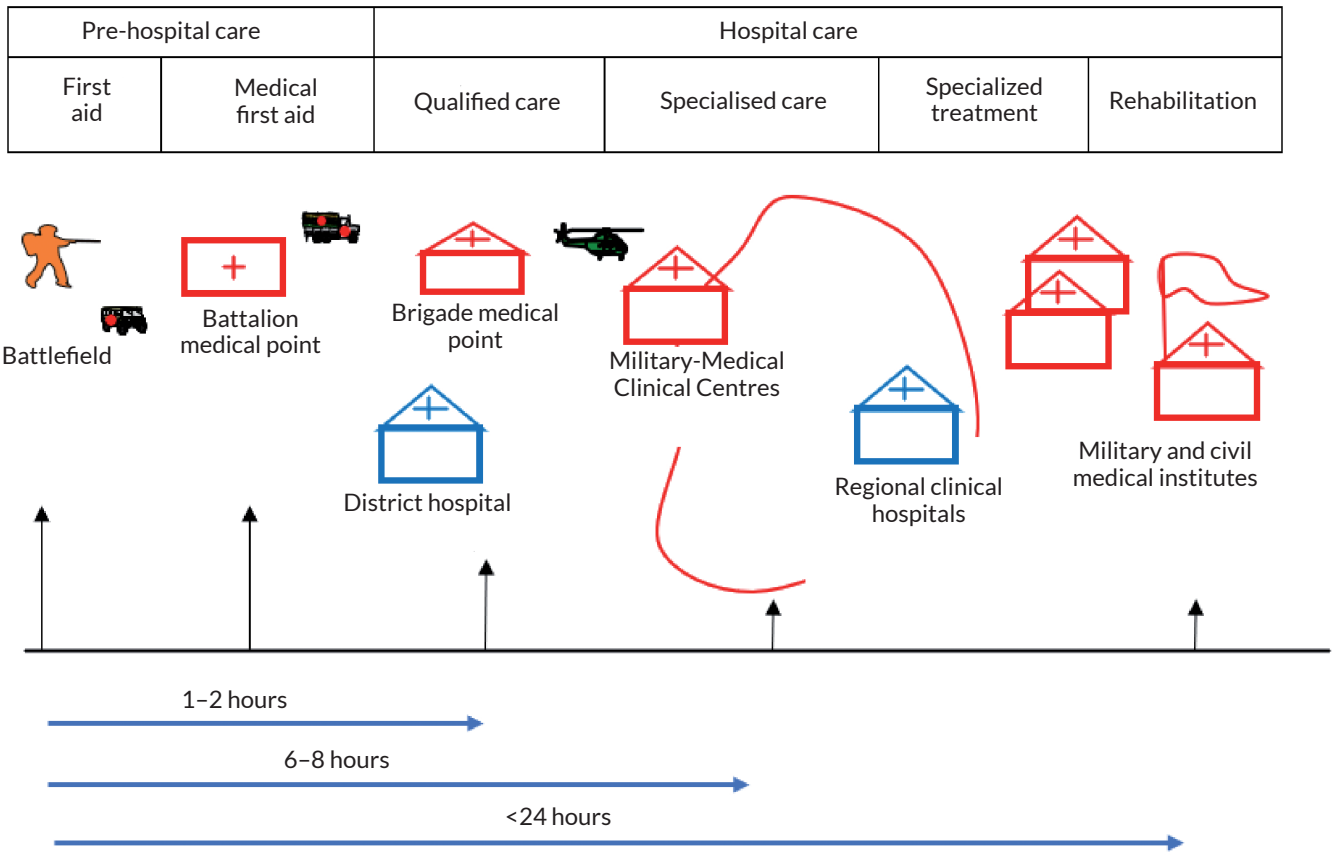

Figure 1. Medical and evacuation system of the Armed Forces of Ukraine [6]

ian healthcare personnel to manage casualties, improper treatment of combat injuries and the need to repeat surgical interventions multiple times.

The medical and evacuation system operated through organic medical units of the Armed Forces of Ukraine, supported by the civilian healthcare service and ad hoc medical and nursing brigades, which provided first aid with elements of qualified medical care in the ATO zone. A significant number of medical companies operating in the area were not fully functional due to personnel and equipment shortages. After rebuilding the medical capacity of military medical units, medical and nursing brigades were gradually withdrawn from the ATO area.

During the ATO phase, clear guidelines for management and collaboration between the military and civilian healthcare systems were missing. Despite designated military health service forces and resources, providing medical care based on post-Soviet standards proved to be a mistake. Therefore, NATO principles for organizing battlefield medical support were adopted, with timeliness, continuity, and continuity of medical care being key elements. Significant emphasis was placed on the timing of medical care: first aid should be available in the form of self aid, buddy aid, and care provided by combat medics, adhering to the principles of the "platinum minutes" (within 10 minutes of injury) and the "golden hour" (stabilization of vital functions). Furthermore, urgent surgical interventions should be performed within 2 hours of the injury. The system allowed for reducing the number of medical evacuation stages by bringing specialist medical care closer to the battlefield.

ATO stationary hospitals were arranged at three levels:

- Level 1 (30–100 km from combat zones): Mobile military and civilian hospitals, as well as designated healthcare facilities within the ATO zone, providing qualified and urgent specialist medical care and arranging further evacuation of casualties;
- Level 2 (150–300 km from combat zones): Located near the ATO zone, represented by the military hospital in Dnipro and the Dnipro Regional Clinical Hospital in the southern evacuation direction, and the Military and Medical Clinical Center of the Northern Region in Kharkiv in the northern evacuation direction. These facilities provided specialist medical care and functioned as evacuation hospitals;
- Level 3 (rear areas of the country) – the vast majority of casualties, having received medical care and having their health condition stabilised, were then transferred to evacuation hospitals in the rear areas of the country. This level was far beyond the ATO zone included the Main Military Medical Center in Kyiv, regional medical centres in Odesa, Vinnytsia, and Lviv, as well as stationary hospitals, multi-specialty hospitals of the Ministry of Health of Ukraine, and clinical institutions of the National Academy of Medical Sciences, which provided advanced specialized treatment and rehabilitation for the wounded and injured.

According to Ukrainian sources, the most severe challenges in the field of medical support faced during the first period of ATO (February–September 2014) included:

- the lack of a uniform medical support system for ATO (this system evolved during tactical operations);
- insufficient training of soldiers in administering first aid, including self-aid and buddy aid;
- insufficient personnel and material support for the military medical service and military units;
- the lack of evacuation vehicles, particularly armoured ones;
- the inability to widely use air evacuation due to the enemy's deployment of anti-aircraft missile systems;
- the lack of knowledge and training among doctors in civilian healthcare facilities and mobilized medical personnel in the conflict zone in the scope of military medicine, particularly in battlefield surgery and the treatment of combat and mine injuries;
- insufficient material support for Military Medical Clinical Centers (MMCCs), as well as stationary and mobile military hospitals, partially offset by volunteer assistance.

In the second period, following the stabilisation of tactical operations and the establishment of the demarcation line, time had come to summarise the analyses of the types and patterns of morbidities (primarily combat-related injuries), and assess medical and organisational needs.

The primary causative factors, types, topography, and severity of injuries were assessed. It was found that artillery and missile strikes accounted for the majority of injuries (56.7%), with 27.4% of the wounds classified as multiple and multi-organ. In terms of injury location, the most commonly affected areas were the limbs (57.1%), followed by the head (26.6%), chest (7.0%), and abdominal cavity (5.5%). Abdominal injuries, although accounting for a relatively low percentage of all trauma cases managed in a hospital setting, accounted for 46% of deaths. Most injuries were mild (47.3%) and moderate (42.3%) cases, while severe injuries accounted for only 10.4%. The collected data were compared with those from other conflicts involving the Armed Forces of the Russian Federation (20% in Afghanistan, 30% in Chechnya), leading to a decision to strengthen the basic level of combat medical support and to strictly enforce tactical standards regarding the timing of first aid. These measures gave rise to an increase in the proportion of seriously injured patients reaching hospitals to approximately 14.5%, which in turn led to a rise in hospital mortality within this group to 1.2%. At the same time, a significant proportion of patients were admitted to hospitals with non-combat injuries and other medical conditions. This situation arose from an inaccurate assessment of the health status of individuals included in combat units and was primarily due to military medical board doctors' insufficient knowledge of health standards required for military service.

During the third and fourth periods, low-intensity military operations were continued.

The military health service command used this time to enhance personnel and supplies, address shortages in armoured medical transport, and continuously monitor the effectiveness of the improved medical and evacuation system. Particular emphasis was placed on implementing procedures for each stage of medical evacuation, while

permitting the omission of certain stages in cases of life-threatening injuries. Given the nature and specificity of combat operations during this period, the forces and resources of brigade medical companies were mechanically allocated among the individual combat battalions.

The company elements were unable to function as a cohesive medical unit or to arrange the delivery of first aid and qualified medical care during emergencies. Second-level medical care was intended to be provided by civilian facilities. The number of beds in selected hospitals was increased, and the capacity to deliver psychological, psychiatric, and rehabilitation support was expanded (Fig. 2) [5].

Much emphasis was placed on adapting legal regulations to facilitate the process of providing medical support for combat operations. The doctrine for medical support for the Armed Forces of Ukraine was also further improved.

Following the outbreak of the full-scale conflict in 2022, the aggressor's brutality became fully apparent, marked by attacks on civilian infrastructure, deportation of children, widespread missile strikes across Ukraine, as well as the use of internationally banned weapons, including phosphorus bombs and various types of mines. Civilian and military medical facilities, medical evacuation transports, and the medics themselves became regular targets [7, 8].

It should be noted that during combat operations in eastern Ukraine, elements of tactical units and brigades are deployed as separate company- and battalion-level combat groups.

Each such combat group, typically consisting of two battalions, is supported by a dedicated stabilisation point. The stabilisation point is an element of a separate medical company, reinforced with additional personnel, including doctors. The care provided corresponds to first-level medical support, with possible extension to include qualified medical procedures. Such points are established approximately 20 to 30 kilometres from the front line, utilizing the available permanent infrastructure. Stabilisation points are rarely relocated, typically about once a month. During this time, depending on its level of readiness, a stabilisation point can receive up to 30 patients in serious condition. After stabilising their vital signs, the patients are transported to hospitals. Each hospital oversees up to six stabilization points, i.e. manages six brigades. Evacuation teams are appropriately assigned to both stabilisation points and hospitals, with evacuation conducted using the "manual drag" method. Pickup-type off-road vehicles are typically used to transport the casualties from the casualty collection point to the stabilisation point, while armoured vehicles are used less frequently due to their limited availability. In contrast, the transport between stabilisation points and hospitals is implemented using multi- or single-stretcher ambulances and buses. So far, the limited mobility of stabilisation

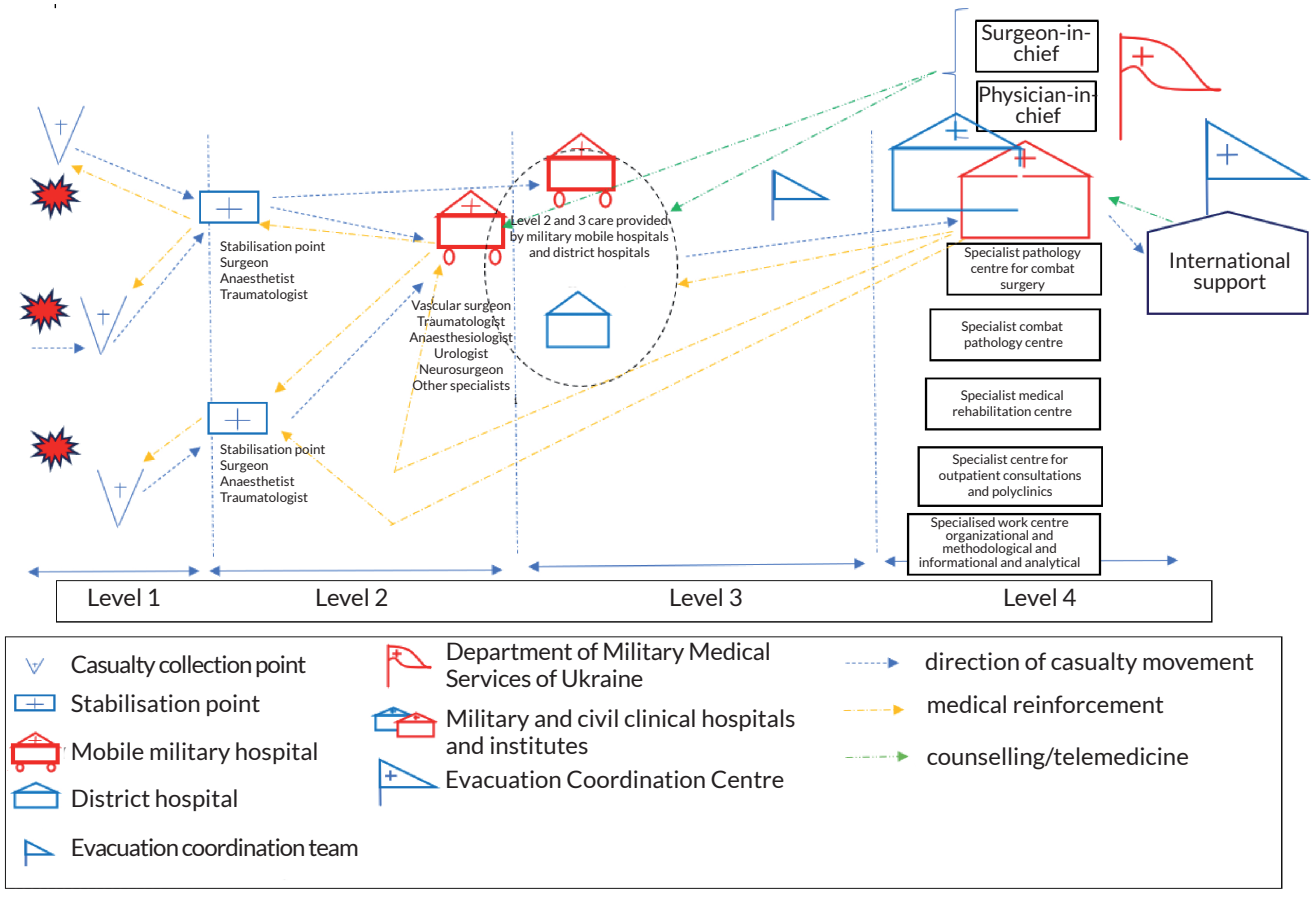

Figure 2. Medical and evacuation support of the Armed Forces of Ukraine after restructuring the medical support system [5]

points has prevented their widespread destruction by the aggressor. This may be attributed to their perceived low strategic value within the Armed Forces of Ukraine's combat structure, according to Russian military doctrine.

According to reserve colonel Viktor Kevlyuk, the head of the Organizational and Mobilization Department of the OK Zahid command (2014–2018), head of the Civil-Military Cooperation Centre at the Joint Forces Command of the Ukrainian Armed Forces (2018–2020), and expert at the Center for Defence Strategies, as well as author of the article "What Should Be Changed in the Armed Forces to Reduce Battlefield Casualties", Ukrainian military medicine has been systematically evolving and continuously improving since 2014. Owing to cooperation with NATO institutions, it is an element of the Armed Forces of Ukraine that holds a clear advantage over the military medicine of the Russian Armed Forces. The improved medical and evacuation system led to a high percentage of casualties returning to combat ranks and relatively short treatment times for those with minor-to-moderate injuries.

Drawing on his observations and experience, Colonel Kevlyuk formulated conclusions and outlined expectations regarding necessary courses of action for the Medical Command of the Armed Forces of Ukraine to enhance the efficiency of the medical support system. As pointed out by Colonel Kevlyuk:

- tactical units must be fully equipped with armoured recovery vehicles;
- given the enemy's disregard for the laws and customs of war, particularly their contempt for the Red Cross symbol, adequate stocks of such equipment should be maintained to allow for the rapid replacement of damaged vehicles;
- a stabilization point should become a full-time unit (unless it already has), fully equipped and staffed with trained personnel;
- all existing legislative restrictions and legal barriers that impede the work of combat tactical medics should be eliminated; nothing should prevent the efforts to save the casualties;
- medical reserves (reserve battalions) should be re-established; all wounded or ill personnel requiring extended convalescence should be registered in these units, assigned a position, and continue to receive full benefits as they did prior to their injury or illness;
- Purchases of medical supplies and equipment should be done under public oversight through open tenders; any quality non-compliance identified upon delivery should be treated as an act of sabotage, with both the supplier and the procuring party held accountable;
- personnel should undergo continuous training in self-aid and buddy aid techniques;
- medical helicopters should become a standard means of medical transport, comparable to routine ambulances;
- each mobile hospital should be assigned a medical aviation squadron as part of a military aviation brigade;
- the casualty evacuation process should be mechanized through the use of robotic, self-propelled, and mechanized stretchers;
- work should be completed to create a unified medical information database for military personnel and a unified DNA database for members of the Defence Forces [9].

Conclusions

The described dynamic changes in the medical and evacuation system of the Armed Forces of Ukraine should serve as the basis for detailed analyses of the activities of military and civilian health services within a unified medical framework to support a potential defence operation on Polish territory.

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