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UNIVERSALLY APPLICABLE APPROACHES TO THE TACTICAL LEVEL OF AID AND MEDICAL SUPPORT FOR THE PERSONNEL OF THE ARMED FORCES OF UKRAINE

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The article discusses the essence of universally applicable approaches to the tactical level of aid and medical support of the Ukrainian Armed Forces personnel based on the Tactical Combat Casualty Care principles implementation as a factor in reducing the mortality rate among the injured in combat. Universally applicable institutional and methodological approaches to improving and increasing the efficiency of training and medical support of military personnel have been considered. It is proposed to spread the Ukrainian experience of certified centers and the algorithm of three-stage training of the Ukrainian Armed Forces personnel in tactical medicine basics, as well as a unified approach to the procurement of individual tactical first-aid kits according to the BRIG 4x4 rule (approved by the copyright registration certificate dated 05/30/2022 No. 113082, identifier: CR0031300522) which will ensure the clear and efficient use of medical items and the ability to reduce the time of providing pre-medical care.

Key words: Tactical Combat Casualty Care, medical support of the Armed Forces of Ukraine, individual tactical first-aid kits.

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УНІВЕРСАЛЬНІ ПІДХОДИ ЩОДО ТАКТИЧНОГО РІВНЯ ДОПОМОГИ ТА МЕДИЧНОГО ЗАБЕЗПЕЧЕННЯ ОСОБОВОГО СКЛАДУ ЗБРОЙНИХ СИЛ УКРАЇНИ

Розкрито сутність універсальних підходів щодо тактичного рівня допомоги та медичного забезпечення особового складу Збройних Сил України на основі впровадження принципів Tactical Combat Casualty Care, як чинника зниження превентивної смертності на полі бою серед поранених. Обґрунтовано універсальні організаційні та методичні підходи щодо удосконалення та підвищення ефективності підготовки та медичного забезпечення військовослужбовців. Запропоновано поширення українського досвіду діяльності сертифікованих центрів та алгоритм трифазної підготовки особового складу Збройних Сил України з основ тактичної медицини, а також уніфікований підхід до комплектування індивідуальних тактичних аптечок за правилом BRIG 4x4 (підтверджено свідоцтвом про реєстрацію авторського права від 30.05.2022 №113082, ідентифікатор: CR0031300522), що забезпечить чітке та ефективне використання засобів медичного призначення та можливість скоротити час надання домедичної допомоги.

Ключові слова: тактична бойова допомога пораненим, медичне забезпечення Збройних Сил України, комплектація індивідуальної тактичної аптечки.

The work is a fragment of the research project "The mechanisms of civil-military cooperation in organizing and developing the Medical Support System of the Armed Forces of Ukraine according to International Standards within the framework of European Integration", state registration No. 0122U200689.

Tactical medicine is one of the fields of the troops' combat training which is fully standardized and is recognized as a separate branch. It implies taking actions for providing pre-hospital care to the injured on the battlefield, in the shelter area, and during evacuation aimed at preserving the life of military personnel.

Pre-hospital care guidelines (Tactical Combat Casualty Care, TCCC) [9] constitute the standard for providing care to the wounded for the armies of NATO member countries. The guidelines perform measures directly on the battlefield and during the pre-hospital stage of providing aid to the wounded and aim at eliminating life-threatening conditions and maintaining vital functions during evacuation. They are designed to teach basic skills for providing self-care and mutual aid in combat with items in the individual tactical first aid kit.

When considering the military personnel's role in modern medical care provision, one should understand the fact that they are not only objects but also viable and equally important participants and subjects of medical care. They should have practical pre-medical care skills to provide help for themselves and others and pre-doctor care according to international TCCC standards [1, 2].

The widespread implementation of the TCCC principles is one of the main factors in reducing the number of preventable deaths of the injured on the battlefield.

According to Butler FK Jr (2017) [7, 8], TCCC has been documented to ensure an unprecedented reduction in preventable combat deaths in military units trained in appropriate tactical actions.

Transforming the standards of organizing medical aid and support in the Armed Forces of Ukraine based on the institutional foundations of the doctrine on medical support of the armed forces of NATO member countries, namely the JP-4.10 Standard [12], became the foundation for introducing several levels of medical and evacuation support in the medical support system of the Armed Forces of Ukraine [4].

Recommendations for tactical aid to the wounded in combat conditions considering different levels of competence (Guidelines for TCCC), form the basis for providing care at the pre-hospital stage in the armies of NATO member countries, which are regularly updated and made public [9, 10, 11].

Unified clinical protocols of emergency medical care “Pneumothorax, Injury of the Chest Organs”, “Massive Limb Bleeding” and “External Bleeding from the Trunk and Neck” were developed in Ukraine based on “Tactical Emergency Medical Aid” adapted guidelines, which were approved and enforced by the Order of the Ministry of Health of Ukraine dated June 21, 2016 No. 612. New clinical protocols of emergency medical care put into effect by the Order of the Ministry of Health of Ukraine “About approval and implementation of medical and technological documents from standardization of emergency medical care” dated June 5, 2019, No. 1269.

The amended Order of the Ministry of Health of Ukraine dated January 5, 2017, No. 6 approved the list of drugs and medical items for individual first-aid kits of military personnel.

According to the algorithms of combat aid to the wounded under the TCCC standards, the ability to provide aid with medical devices, which should be equipped with individual tactical first-aid kits, should be considered an important part of personnel training.

Because of the above, providing the military personnel of the Armed Forces of Ukraine with high-quality individual tactical first-aid kits should be considered one of the essential medical support issues at the tactical level.

The purpose of the study was to provide the rationale for universally applicable institutional and methodical approaches to improve and increase the effectiveness of training and medical support of the Armed Forces of Ukraine’s personnel at the tactical level in combat operations based on international standards.

Materials and methods. The research used the data of official international standards, guidelines, and protocols (TCCC for All Service Members Course (TCCC ASM), for Combat Lifesavers Course (TCCC CLS), Guidelines for Medical Personnel (TCCC CMC)), obtained using relevant well-known international documents developed by the authoritative international non-governmental organizations and expert-analytical centers (NATO Standardization Office, NSO; National Association of Emergency Technicians, NAEMT; Defense Health Agency Health.Mil, DHA) which operate in the field of TCCC based on their analytical capabilities.

AAP-03 Ed.K. “Directive for the production, maintenance, and management of NATO standardization documents” is used as a methodological basis for developing NATO Standardization Office standards. It describes in detail the process of developing standards and their support.

The Agreement on NATO standardization (Standardization Agreement), the relevant Standards (STANAG), and Standardized Recommendations (STANREC) are the documents used to regulate general rules that set a common procedure, establish a unified terminology and conditions for uniform technical processes and procedures related to and ensuring the training and equipping of the armed forces of NATO and partner countries.

Medical training and equipment requirements for search and rescue (sar) and combat search and rescue (csar) missions are outlined in the aamedp-1.12 standard.

Access to these documents is mostly restricted to public use.

The analysis of the results of implementing international standards, guidelines, and TCCC protocols in the current statutory support of professional medical and tactical training of medical personnel, sanitary instructors for companies (squadrons), and servicemen of the Armed Forces of Ukraine was carried out [5, 6, 13].

To determine the functional alternative target and autonomous groups of tactical aids (with regards to the purpose and placement, respectively), their content, and the optimal ratio of available medical and auxiliary items, there were used generally accepted research methods such as morphological analysis and comparative analysis of competitiveness, and methods for determining the standard and competitive advantages, which were used in two stages.

In the first stage, a morphological analysis was performed, which implied dividing the pre-medical care items provided by the relevant TCCC protocols into functional alternative groups with different and separate characteristics (functional morphological features). Each feature characterized a separate branch of providing aid and the appropriate purpose of tactical medical products with certain characteristics that are defining in solving the problem of providing timely and effective aid to the wounded in combat. After looking for alternative morphological feature options and identifying them in the “morphological toolbox”, we singled out 4 target groups for procuring the appropriate medical items outlined in the research findings.

The second stage of the research deals with defining an optimal set of medical items for each functional class to meet the pre-medical care needs compared with similar items presented on the market of tactical medical products. For this purpose, a comparative analysis of the competitiveness of individual tactical first-aid kits was performed by applying the benchmark method. It was used to assess the competitiveness of various individual tactical first-aid kits to the specified 4 functional areas, which most fully and autonomously cover the spectrum and real scope of providing medical-tactical aid with the help of appropriate medical products.

The method of competitive advantages was used to determine the most efficient medical items to be used for each functional group. It implied recording the properties of the corresponding items that can fully satisfy the users' needs.

The rule for procuring an individual tactical first-aid kit for providing first aid in combat is approved by the copyright registration certificate dated 05/30/2022 No. 113082 for educational and methodological application and has an e-document with the identifier CR0031300522 from the "Ukrainian Institute of Intellectual Property" National Intellectual Property Authority State Enterprise (UKRPATENT) [3].

Results of the study and their discussion. Guidelines for TCCC are designed to ensure, first of all, pre-hospital care to casualties in active conflict areas and their evacuation to a safe zone according to the 4-level principle: 1st level: for military personnel: all military staff – TCCC ASM; 2nd level: for military personnel: a combat lifesaver (department, work unit, crew) – TCCC CLS; 3rd level: for combat healthcare workers: a paramedic (platoon) – TCCC CMC; 4th level: for senior combat healthcare workers: a paramedic, medical instructor (squadron/company) – TCCC CMC.

To find out the potential for optimizing the system of training in the basics of tactical medicine, one should pay attention to the developed courses that have proven their effectiveness.

NAEMT offers two main training courses in TCCC:

TCCC CLS is a 40-hour course for non-medical military personnel engaged in combat. The TCCC CLS course replaces the TCCC All Combatant Course.

TCCC for Medical Personnel is a 16-hour course for military medical personnel, including medical workers, paramedics, and nursing assistants, who accompany combat operations. The TCCC for Medical Personnel curriculum is based on the TCCC Guidelines developed by the Committee on Tactical Combat Casualty Care of the Joint Trauma System.

The American organization DHA offers certified TCCC courses based on international TCCC standards. The combat lifesavers course is a standardized training program of the TCCC CLS, developed by the Joint Trauma System, part of the Health Care Agency. This course is more advanced than the basic TCCC ASM taught to all military personnel.

A current training course for personnel on tactical pre-medical care to the injured in Ukraine is based on the Standard of the TCCC ASM. It consists of three stages and includes theoretical, practical, and tactical training, which involves practical exercises and tactical scenarios of typical situations.

Studying the potential for training the personnel of the Armed Forces in the basics of tactical medicine is grounded in the above-mentioned international experience in the armies of NATO member countries, and their adaptation to the modern Ukrainian context of training in an overt permanent armed conflict allowed us to develop our proposals for such training in Ukraine based on a unified benchmarking approach and taking into account the implementation of international standards, guidelines, and TCCC protocols into current regulatory documents.

As for the training of the Armed Forces of Ukraine personnel in the basics of tactical medicine, we propose to organize it according to the three-stage principle based on the I-CT-3 military personnel tactical medicine training standard (edition 2), and unify based on NAEMT's experience, by supplementing the basic level of TCCC ASM with the competencies of the TCCC CLS level, and algorithmize it as follows (table 1):

Table 1

Tactical medicine training of the Armed Forces of Ukraine personnel

Stage	Types of classes	Duration	Content	The number of trainees (simultaneously)
I	theoretical classes	4x2=8 hours	basics of tactical medicine and principles of providing care	up to 100-120 people (company, division)
II	practical classes	4x2=8 hours	training in medical aid algorithm	10-12 people (small groups)
III	tactical classes	4x2=8 hours (1 – under fire, 2 – tactical shelter, 1 – evacuation)	practicing tactical scenarios in real conditions	25-30 people (platoon, company) (3-4 tactical groups of 6-8 people)

Therefore, the article proposes the unification of tactical and medical training of the Armed Forces of Ukraine personnel for providing aid to the wounded based on the TCCC recommendations and instructions. They serve as the basis for organizing the system of medical military support under martial law. The need to provide appropriate aid to the wounded with the help of high-quality individual medical items, which must be properly equipped to ensure the urgent provision of this aid, is emphasized.

The method of equipping an individual tactical first-aid kit with appropriate items was formed based on identifying the functional alternative groups, their content, and the optimal ratio of available medical and auxiliary items with the help of morphological analysis, and comparative analysis of competitiveness, as well as methods of determining the standard and competitive advantages, which implied performing the research in certain stages.

Based on the conducted research, we offer a unified approach to procuring and supplementing individual tactical first-aid kits with medical items based on a simple and clear proprietary methodology: “The Rule for Procuring an Individual Tactical First-aid Kit for Providing First Aid in Combat” (Abbreviated name: “The BRIG 4x4 Rule”). It enables one to complete an individual tactical first-aid kit, by filling it with first-aid items according to the rule that used a methodical approach to divide the kit into 4 application-based and separately placed groups, each containing 4 names of tactical first-aid means. At the same time, emergency aid items from application-based groups are distributed according to the algorithm abbreviated as BRIG, with each letter characterizing the corresponding groups to ensure easy designation and operational perception, with appropriate marking and autonomous placement in separate subsections of tactical first-aid kits.

“The Rule for Procuring an Individual Tactical First-aid Kit for Providing First Aid in Combat” envisages 4 groups for procuring tactical first-aid items; each group has 4 tactical first-aid items.

The procurement groups of tactical items:

I. Items for stopping and managing massive bleeding are marked with the letter B (blood), which is the first letter of the word “blood” and contains the following items: 1) tourniquet (twist tourniquet), 2) rubber tourniquet, 3) compressive dressing bandage, 4) hemostatic bandage (blood stopper).

II. Items for eliminating breathing disorders and ensuring the patency of the respiratory tract are marked with the letter R (respiration), which is the first letter of the word “respiration”, include the following: 1) occlusive bandage (thoracic sticker), 2) chest decompression needle, 3) nasopharyngeal airway, 4) artificial respiration device (valve).

III. Universally applicable hematopoietic, anti-shock, and antiseptic items are indicated by the letter I (injury), which is the first letter of the word “injury” and contain the following products: 1) sterile and elastic medical bandage, 2) splint, triangular handkerchief, 3) protective pads for eyes and ears, 4) rescue blanket (thermal blanket).

IV. Universally applicable fixing, protective, and atraumatic items are denoted by the letter G (gadget), which is the first letter of the word “gadget” (fr. *gagée*), and contain the following products: 1) spool patch, reinforced tape, English pins, 2) atraumatic tactical scissors, 3) nitrile gloves, 4) permanent marker.

According to the developed method (the BRIG 4x4 rule), a variation of the universal personal tactical first-aid kit is proposed called (UPFAK) according to the relevant list of tactical medical items (except for drugs). In turn, the list can be supplemented with additional drugs and medical products.

The abovementioned “BRIG 4x4 Rule for Procuring an Individual Tactical First-aid Kit for Providing First Aid in Combat” (“BRIG 4x4 Rule”) was tested by the medical personnel and combat medical workers of the Armed Forces units during their events and confirmed by a copyright registration certificate dated May 30. 2022 No. 113082 for educational and methodological work.

When working on the research, we analyzed the contents of individual tactical first-aid kits of various manufacturers, such as IFAK, SIRK 2, AM-31, AMZI MO, Albert Kyivguma, AV Pharma, Paramedic, etc., and their various configurations. During the first half a year after the start of the armed aggression against Ukraine, these kits were used to various extents to cover the needs of the territorial defence forces of the Ukrainian Armed Forces. In particular, the relevant military units got the kits thanks to the volunteer movement.

It should be noted that during the research, typical instructions for individual tactical first-aid kits of various manufacturers, which contain only commonly used medical aid items, were used for information purposes and as analytical materials. These materials are not included in the article and are, therefore not subject to copyright protection.

As for the training of the Armed Forces personnel in the tactical medicine basics, a set of measures for providing medical care to the injured in combat involves performing appropriate interventions of

various complexity levels by different subjects of medical care such as self-help (fire tactical group), mutual aid (fire tactical group), the provision of aid by rescue soldier (department, crew, work unit); combat medical specialist (platoon medical worker in the Armed Forces of Ukraine); senior combat medical worker (paramedic, a sanitary instructor in the Ukrainian Armed Forces' companies).

We propose to organize the algorithm for training the Armed Forces of Ukraine personnel in tactical medicine basics according to the three-stage principle based on the I-CT-3 military personnel tactical medicine training standard (edition 2) [6] and unify based on NAEMT's experience, by supplementing the basic level of TCCC ASM with the competencies of the TCCC CLS level [14].

Prospects for future research may include the further unification of tactical medicine algorithms for senior combat medical workers/sanitary instructors based on the modern Ukrainian armed conflict experience, following the concepts and standards of the TCCC CMC and approved by the relevant Standard training [5].

The training and post-graduate education of specialists for the needs of medical services may also constitute prospects for further research. They are currently researched at the Ukrainian Military Medical Academy under a unified state order, as well as at departments of military training at higher medical education institutions [2]. The TCCC combat trauma care courses can be completed as quickly and efficiently as possible through TCCC-certified servicemen training programs, including with the help of specialized disaster and military medicine departments in higher medical education institutions.

Conclusions

1. The article highlights certain aspects and methodical approaches to solving some challenging issues at the first tactical level, regarding the training of the Ukrainian Armed Forces personnel in the basics of tactical medicine following TCCC standards in combat areas to help themselves and others, as well as regarding the procurement of an individual tactical first-aid kit for providing first aid under hostilities.

2. The proper training system of the Ukrainian Armed Forces personnel in the tactical medicine basics, according to the TCCC instructions, should be comprehensive, standardized, effective, and aimed at avoiding preventable combat deaths. It is proposed to algorithmize the three-stage training of personnel in the tactical medicine basics and to distribute this algorithm in the military units of the Armed Forces of Ukraine for its subsequent implementation.

3. Proving the Armed Forces of Ukraine personnel with high-quality individual tactical first-aid kits deserves special attention. The proposed unified approach to the procurement of individual tactical first-aid kits following the "BRIG 4x4" rule will ensure more accurate and efficient use of medical equipment, which will make it possible to reduce the time for providing pre-medical aid and contribute to a lower mortality rate of servicemen in combat.

The specified problems and organization and medical support of the Armed Forces of Ukraine personnel at the tactical level need an urgent solution since this is where the consequences of unresolved problems are directly felt at strategic and operational levels.

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Стаття надійшла 15.11.2021 р.

DOI 10.26724/2079-8334-2022-4-82-79-84

UDC 611.982.06-023.11-057.875:796

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DETERMINATION OF PROXIMAL THIGH CIRCUMFERENCE IN STUDENTS OF BUKOVINIAN HIGHER EDUCATION INSTITUTIONS DEPENDING ON THE TYPE OF SPORT

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As a result of the anthropometric study of 115 students in the first and second years of higher education institutions in Chernivtsi, aged from 16 to 18 years, it was established that basketball players have the greatest length of the proximal circumference of the right thigh – 54.14±2.0 cm, of which 54.06±2.0 cm for boys and 54.08±2.0 cm for girls and volleyball players – 54.00±2.0 cm, of which 53.10±2.0 cm for boys and 53.90±2.0 cm for girls, slightly smaller in football players – 52.27±2.0 cm, of which 51.80±2.0 cm for boys and 52.47±2.0 cm for girls and the smallest tennis player – 48.80±2.0 cm, of which 48.10±2.0 cm for boys and 48.70±2.0 cm for girls. By comparison, volleyball players have the greatest proximal length of the left thigh circumference – 51.77±2.0 cm, of which 51.57±2.0 cm for boys and 51.20±2.0 cm for girls and basketball players – 50.00±2.0 cm, of which 50.20±2.0 cm for boys and 49.80±2.0 cm for girls, slightly smaller in football players – 48.07±2.0 cm, of which 48.05±2.0 cm for boys and 48.02±2.0 cm for girls and the smallest in tennis players – 45.70±2.0 cm, of which 45.45±2.0 cm for boys and 45.30±2.0 cm for girls.

Key words: students, antropometric parameters, proximal thigh circumference.

С.Ю. Каратєєва, О.М. Слободян, Л.П. Лаврїв, К.В. Слободян, Н.Я. Музика ВИЗНАЧЕННЯ ПРОКСИМАЛЬНОГО ОБХВАТУ СТЕГНА У СТУДЕНТІВ ЗАКЛАДІВ ВИЩОЇ ОСВІТИ БУКОВИНИ ЗАЛЕЖНО ВІД ВИДУ СПОРТУ

В результаті проведеного антропометричного дослідження 115 студентів першого та другого курсів закладів вищої освіти м. Чернівці, віком від 16 до 18 років встановлено, що найбільшу довжину проксимального обхвату стегна справа мають баскетболісти – 54,14±2,0 см, з них 54,06±2,0 см у юнаків та 54,08±2,0 см у дівчат та волейболісти – 54,00±2,0 см, з них 53,10±2,0 см у юнаків та 53,90±2,0 см у дівчат; дещо меншу футболісти – 52,27±2,0 см, з них 51,80±2,0 см у юнаків та 52,47±2,0 см у дівчат та найменшу тенісисти – 48,80±2,0 см, з них 48,10±2,0 см у юнаків та 48,70±2,0 см у дівчат. За порівнянням найбільшу довжину проксимального обхвату стегна зліва мають волейболісти – 51,77±2,0 см, з них 51,57±2,0 см у юнаків та 51,20±2,0 см у дівчат та баскетболісти – 50,00±2,0 см, з них 50,20±2,0 см у юнаків та 49,80±2,0 см у дівчат, дещо меншу футболісти – 48,07±2,0 см, з них 48,05±2,0 см у юнаків та 48,02±2,0 см у дівчат та найменшу тенісисти – 45,70±2,0 см, з них 45,45±2,0 см у юнаків та 45,30±2,0 см у дівчат.

Ключові слова: студенти, антропометричні параметри, проксимальний обхват стегна.

The study is a fragment of the research project “Regularities of gender and age structure and topographical and anatomical transformations of organs and systems of the body at the pre-and postnatal stages of ontogenesis. Features of perinatal anatomy and embryonal topography”, state registration No. 0120U101571.

One of the means of studying the state of human health is the anthropometric assessment of its physical development with the determination of overall and component indicators. The study of age norms and variations of somatic signs should be combined with establishing relative proportional indicators of body parts and somatypological features of their structure [1, 2]. These studies allow us to determine the standards of physical development, considering the periods of puberty and aging processes. In addition, these standards require periodic renewal in connection with the acceleration processes occurring in society [4].

Two main areas of human research differ both in their approach to the problem of determining the norm and the methods that are used in this case – it is a generalizing direction that reveals the general,