Introduction

It’s a well-known fact that during wars, the number of civilian deaths surpasses soldier ones. In Ukraine, the first aid training has been based on an outdated education system that does not teach practical skills. The revision of the formal approach to teaching skills is essential. It should be practically oriented with highly qualified instructors in newly created simulation centers. Only repeated training can save humans’ life in an emergency. Materials and methods. VYSHKIL consists of 2 main parts — theoretical and practical. Time: 2 hours. The theoretical part is provided by a military surgeon and contains an animated lecture with clinical cases (30 min), a practical demonstration (allows to see the practical skill and ask the questions (step 1–2)). The practical part is provided by 6 main trainers, who demonstrate all practical skills similarly to the lection material (step 3) and allow students to try on the MARCH algorithm procedures (step 4). Duration: 1.5 h. All civilians should visit every station, therefore there is a limitation of participants — max 60. Results. Sixty-two training sessions were held. Three thousand and seventy-six Ukrainians were trained with this program. 57 % — people without medical education, 26 % — subjects who work in educational institutions, 13 % — military soldiers, and 4 % — surgeons. The average age was 35.3 years old. The feedback form includes points for theoretical and practical parts. People assess the usefulness of the lecture in 9.6 out of 10 points and memorization of practical skills in 9.4 out of 10 points. That means a high level of interpretation of material. Conclusions. A combination of the adapted algorithm with our own education system VYSHKIL based on advanced teaching by Python helps trainees to memorize, train and repeat the practical skills, thus a civilian will be able to use it in an emergency. VYSHKIL helps to remember the mnemonic algorithm (MARCH) in the extreme situation.

Keywords: simulation; training; MARCH algorithm; civilians

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Introduction

Russia is committing crimes against humanity in Ukraine. This is clear from Article 7 of the Rome Statute of the International Criminal Court, which states that “...any of the following acts, when committed in the course of a widespread or systematic attack against a civilian population with knowledge of the attack: murder, extermination, enslavement, deportation or forcible transfer of population, deprivation of liberty or other serious injury to physical integrity in violation of fundamental rules of international law, torture, rape, sexual slavery, forced prostitution, forced pregnancy, forced sterilization or any other form of sexual violence of comparable gravity” [1].

The war against Ukraine is hybrid in nature and violates Article 3 of the Geneva Conventions (of 12 August 1949) concerning the Protection of Civilian Persons in Time of War, ratified by the Decree of the Praesidium of the Supreme Soviet of the Ukrainian SSR of 3 July 1954, with clarifications in Articles 11 and 45, and by the Law of Ukraine of 8 February 2006 No. 3413-IV [2].

Since 2003, the organization CIVIC [3], which focuses on protecting civilians affected by the wars in Iraq and Afghanistan (founded by Marla Ruzicka [4], a young activist in the humanitarian field), has made a name for itself worldwide. CIVIC produced and published its analytical report [5] on the tragedy unfolding in Ukraine. The aggressor’s military, cyber and missile attacks are aimed at destroying critical infrastructure, which means that the enemy chooses the most immoral actions. It is well known that the number of civilian casualties in modern wars can exceed the number of military casualties [6].
The premise of the total vulnerability of a significant part of the population is that throughout the period of the restoration of independence, training in the basics of civil defense in Ukraine almost entirely copied the methodology of an outdated education system that included training in first aid as part of basic life protection [7]. What is difficult to understand is the definition of the subject: “...a comprehensive system of knowledge on the protection of the life and activities of individuals, society and the living environment from natural and man-made hazards, a field of scientific and applied activities aimed at...the protection of human health and the life and environment of their residence — from hazards, to the development and implementation of appropriate means and measures to create and maintain healthy and safe living and working conditions for people, both in everyday life and in emergency situations”. However, the system is “dead”. Training is usually conducted only formally and does not impart any real knowledge and skills to the different sections of the population. This type of training does not emphasize systematic “automation” of practical skills. Another major problem is the lack of teaching methods and the inconsistency between the different systems of pre-school, school and higher education. In addition, there is an overall lack of a public education and social adaptation system for the population to new, often distressed conditions.

How can one protect oneself? How can one help a person who has no knowledge or skills to survive? Even since the war began in 2014, there have been small changes, mainly thanks to the volunteer movement. However, the approaches of the executive authorities have not changed and there was no universal first aid training in 2022. As a result, the majority of the population is not prepared for new life-threatening challenges.

Today, people understand the importance of the problem, especially when war is ongoing. In our opinion, it is high time for a fundamental overhaul of the formal approach to teaching life safety. The format of teaching and training should be much more practical, with highly qualified trainers in newly created simulation centers. Only repeated practice of survival skills can help a person in an emergency.

The proposed effective survival training systems actually work. The well-known Tactical Combat Casualty Care (TCCC) system, for example, was developed on the basis of evidence-based medicine and contains a strategy for timely and optimal help to save the lives of the wounded. Our defenders are trained according to this system. But what is about civilians? It is not uncommon for situations to arise where help is far away. Yes, do not doubt that it will come. But do not wait. You can only survive if you learn the elements of survival and basic first aid now.

The purpose of the study was to evaluate the effectiveness of the adapted algorithm (MARCH) and develop a method for civilians to acquire first aid skills in emergency situations.

**Material and methods**

Sixty-two training sessions were conducted for 3,078 civilians on first aid in emergency situations, using the author’s teaching method “Professor Sulyma’s Training” (Copyright No. 1113270 [8, 9]). The search for an effective, practical method of teaching basic first aid to civilians performed. We analyzed 78 scientific publications in the electronic bibliographic databases for medical and biological publications MEDLINE and PubMed. We used the combination of the keywords “first aid”, “civilians”, “bleeding”. As a result, it was found that among the variety of algorithms proposed in many countries, the MARCH algorithm for medical aid in combat conditions is the optimal algorithm for teaching due to its simplicity and consistency.

Of course, we have adapted the information found for practical perception by an average person of different age groups. The training, which lasted two hours in total, consisted of two parts — theoretical (part 1) and practical (part 2). The first part consisted of an animated lecture given by an experienced trainer covering virtual clinical cases for 30–60 minutes (Fig. 1).

At each station, two experienced trainers demonstrated each skill, answered detailed questions and each participant practiced manipulation according to the MARCH algorithm with the help of a trainer. The average duration of the exercises at each station was up to 30 minutes, and the total duration of part 2 was 1–1.5 hours on average. The number of participants at each station was limited to 60 (20 at each station) to optimize the acquisition of each skill.

The second part was a practical part where participants were divided into three groups and rotated between three stations — M, AR, CH. Station M is massive hemorrhage. The aim is to teach participants the methods of temporary management of life threatening bleeding. Main points: 1) to define a type of bleeding: limb, nodular, inner, 2) to use proper technique according to algorithm — tourniquet, tamponade or hemostatic bandage. Station AR is airway and respiration. The aim is to study not medical professionals the simplest types of asphyxia prevention (cleansing the mouth, lifting chin upper the nose, jaw-thrust, maintain recovery position). Station CH is circulation and hypothermia. The aim is to make the civilians with dangerous complications of trauma they might never have heart before. Here is the training of keep patient warm by hypothermia blanket (Fig. 2).

**Evaluation of training outcomes**

The conditional effectiveness of skill acquisition was investigated using electronic questionnaires. Participants were offered the opportunity to provide feedback via a Google form with a QR code. They were asked to rate the quality of the training using a questionnaire on a scale of 0 to 10, where 1 means “did not like it at all (not memorable)” and 10 means “liked it very much (memorable)”. Participants were asked to rate the overall impression as well as the theoretical (part 1) and practical (part 2) parts separately and to indicate which was most useful. In addition, the participants could make suggestions.

**Statistical analysis**

The statistical analysis was carried out with the software Statistica 6.0. Theoretical and practical parts’ feedback was examined separately by non-parametrical statistics. Mann-Whitney U-test was used to compare difference between two independent groups.
**Results**

Of the 3,076 civilians who participated, a total of 82 (2.7%) participants (mean age — 35.3 ± 7.3 years) provided feedback via a Google form. These participants were divided into two age groups: group I — subjects between 18 and 35 years of age (n = 44), group II — individuals over 35 years of age (n = 38). Of the participants who gave feedback, 57% were people with no medical training, 26% were teachers, 13% were military personnel and 4% were surgeons. The gender distribution in the groups was homogeneous. Group I had 9 (20.5%) men and 35 (79.5%) women. Group II had 9 (23.7%) men and 29 (76.3%) women.

The overall impression of the training was high in both groups, with a median score of 10 [10–10] in both groups without a significant difference between the comparison groups (p = 0.92). The theoretical part was also rated equally high with a median score of 10 [10–10] in both groups with no significant difference between the groups (p = 0.596).

This shows that the theoretical material (part 1) was accessible regardless of the age of the participants. All feedback and suggestions for improving mastery of each skill (part 2) were grouped into different age groups for material analysis. Participants in group I emphasized the usefulness of the knowledge acquired for stopping critical bleeding and the principles of sorting according to the MARCH algorithm (18 and 25%), while another 18% noted that all the information was useful or drew attention to other aspects (such as hypothermia) that they might have heard for the first time (Fig. 3).

21% of the participants left no comments. Participants in the II group were more active, with only 8% leaving no feedback. They focused on the importance of the information about MARCH/sorting and bleeding control (39 and 11%). Overall, all the information was considered important by 29% of the participants, which is 1.6 times more than in group I. Suggestions for improving the theoretical part were limited to the need for more information in both groups. However, only a few participants indicated which information they were missing (e.g. “information on first aid for burns and chemical contamination”, “explanation of physiological mechanisms of traumatic factors”) (Fig. 4).

The study found that the practical part of the training was rated slightly lower than the theoretical part. Both groups gave a median grade of 10 [9–10], but there was no significant difference be-
tween them. This suggests that practical skills need further improvement, specifically for the different age groups (Fig. 5).

Feedback on the practical part (part 2) was different for the two age groups. The younger participants in group I considered the temporary interruption of a massive haemorrhage (M) to be the most useful skill, with 39% mentioning it. In contrast, 26% of the older participants gave priority to the same skill. The practical part overall was rated better in the II group. 29% of the participants considered it very useful, compared to 18% in group I. In both groups, the opportunity to practice each skill was considered useful by 14–18% of the participants.

Suggestions for improving the practical part were also varied (Fig. 6). Group I participants requested more time to practice skills and structured action algorithms in different virtual situations for self-repetition. The participants of group II suggested, among other things, to train certain extreme situations to overcome panic and fear, to reduce the number of participants and to individualize the work with the trainers in case of questions and mistakes.

Overall, the study suggests that the MARCH algorithm is an effective and practical way to teach basic first aid to civilians. The feedback and suggestions for improvement can be incorporated into future training programs tailored to different age groups and skill levels.

Figure 3. Feedback on the theoretical part (part 1) in both groups

Figure 4. Proposals for improving the theoretical part in both groups


Discussion

Tactical medicine training programs vary widely in content and duration from country to country. There is no universal algorithm for teaching this subject in higher medical education. Self-developed training programs and training for military personnel, medical personnel and paramedics vary considerably in both duration and actual content [10].

There are adapted TCCC protocols for military personnel, such as the TCCC ASM (All Service Members Course) and TCCC-CLS (TCCC Combat Lifesaver) protocols in Ukraine. Clinical guidelines for tactical medicine in Ukraine, based on an adapted translated version of “Tactical Emergency Casualty Care (TECC): Guidelines for the Provision of Prehospital Trauma Care in High Threat Environments”, dated 2016 and were revised by the Ministry of Health of Ukraine in 2023 [12, 13]. However, there is a need for continuous updating and addition of a modern, unified protocol involving relevant medical providers and implementation of the guidelines in the education system.

But what is about the education of civilians? The protocols mentioned only mention the possibility of adapting certain elements of emergency medical care in training for ordinary citizens. The lack of understanding of the gradual provision of emergency care and the role of paramedical assistance leads to time working against the victim (the injured).
And what should be done before qualified help arrives? It takes 15–20 seconds to stop critical external bleeding, while the time it takes for a person to die is 1 minute. EVERYONE can provide effective help regardless of age MEDICAL, but only if the person has the necessary medical knowledge and skills, knows what can be done without causing harm, and performs only basic survival measures until paramedics arrive. This training is the survival school, aimed at an ordinary citizen who has mastered the basic medical skills for emergencies to the point where they are automatic.

The use of the MARCH algorithm from 2014 to 2021 has reduced pre-hospital mortality. It has proven effective in caring for the wounded, including military personnel and civilians [14]. Ongoing research continues to improve and implement new methods to train military [15], law enforcement, paramedics and civilians in pre-hospital hemorrhage care [16, 17].

We support the view of authors who emphasize the need for training and quality control by experienced trainers with modular control of assimilation. For example, a group of authors from Latin America [18] have developed a comprehensive system that includes basic knowledge assessment, teaching materials, practical training and testing. The authors note that the implementation is equally effective with medical students and students of other disciplines.

An analysis of the results by Borgers F., Van Boxstael S., Sabbe M. [19] shows that civilians may not effectively use tourniquets to stop bleeding. However, the authors conclude that even imperfect use significantly improves survival rates and clinical outcomes for trauma patients in mass casualty incidents. Some countries, such as India, are interested in creating centers for mass training in first aid methods for road traffic accidents. Researchers believe that this will help average citizens provide active help at the right time [20]. As the authors note, more research is needed to finalize the training formats and methods.

For our country, the organization and implementation of an inclusive education system using proven quality programs from other countries remains relevant. Establishing a system to train certified teachers is crucial.

The issues related to quality control of education are still unresolved. Some authors stress the importance of self-assessment by participants [21, 22], but this may not be a necessary competency for all professionals. Others insist on the traditional pedagogical methods of tests and module assessments [15]. The disadvantage of these methods is that they focus on organized groups where long-term, step-by-step teaching with adequate quality control and repeated practice of difficult skills is possible.

Our suggestions for quality control in non-organized groups include comprehensive control through checklists that instructors complete during the practical part (part 2). The control is compulsory and is carried out during regular repetition training to ensure a constant level of skill acquisition.

There are organizational difficulties, especially in training conditions similar to ours, where the majority of participants have no professional medical or paramedical knowledge. Feedback from participants emphasizes the need for sufficient duration, repetition and timing of skill execution, as well as detailed analysis of errors. An important aspect is the assessment of the quality of the training and the ability to reproduce skills in emergency situations where participants may be stressed. Step-by-step methods for skill mastery, such as temporarily stopping bleeding, have proven effective and have also been integrated into training for other algorithm skills, such as MARCH.

The interest of civilians shows the relevance of the problem we have highlighted in our research. The level of application of practical survival skills will increase with the repetition of the training. The training we organized on a voluntary basis can be used and improved as a basic experience for organizing a system for training civilians in first aid under war conditions.

Limitations. We wish to receive feedback from all training participants, or at least 50% of them, to enhance our study technique and make it more accessible to non-medical individuals. Furthermore, it is difficult to obtain and analyze data on the length of practical skill retention as most individuals attend training only once.

Conclusions

The algorithm was adapted by the author using “Professor Sulyima’s Training” (Copyright No. 1113270), which follows a step-by-step learning method in Python. This approach facilitates memorization, repeated practice and repetition until the skill is automated and civilians are able to use the skill in an emergency situation. Regardless of age, the training facilitates memorization of the action algorithm using mnemonics (MARCH). To further improve civilian training, we suggest developing standardized protocols based on evidence-based tactical medicine methods and modern pedagogical techniques, as well as establishing centers that simulate emergency conditions for skill practice.

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9. Ukrainian Institute of Intellectual Property. Authors' contribution. Conflicts of interests. Authors declare the absence of any conflicts of interests and own financial interest that might be construed to influence the results or interpretation of the manuscript.
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Вищіл з виживання — новий підхід до засвоєння навичок надання домедичної допомоги цивільним

Резюме. Актуальність. Навчання основам цивільного захисту в Україні за весь період незалежності майже повністю коливало методологію застарілої системи освіти. Такий тип освіти зовсім не робить акцент на систематичному, до автоматизму, відпрацюванні практичної навички. Проте втрати серед мирного населення в сучасних війнах можуть перевищувати кількість загиблих військових. Час кардинального перегляду формального ставлення до викладання безпеки життєдіяльності настав.

Формат викладання й навчання підготовлення висококваліфікованими інструкторами має бути з суттєвим практично орієнтованим ухилом у новостворених симуляційних центрах. Лише неодноразове відпрацювання навички у випадку виникнення екстреної ситуації може втратити людське життя. Основними методами викладання є теоретична і практична частини, які демонструють принципи залишення клінічного випадка, вміння застосовувати теоретико-праксистські загальні принципи. На основі вивчення методик викладання інструктори викладають і випробовують засоби сприяння надання допомоги. Методично вибором інструктора викладаються основи надання допомоги, викладаються основи надання допомоги, у той час як інструктори демонструють практичні навички.

Матеріали та методи. Виклад основних блоків викладачів у високій ступені розкривають основи надання допомоги, викладаються основи надання допомоги, демонструються практичні навички.

Результати. Ми провели 62 виськіли. Серед 3076 учасників безпеки життєдіяльності не мали 57%, викладачів було 26%, військових — 13%, хірургів — 4%. Середній вік становив 35,3 ± 7,3 року. У формі звітності навичку учасники в балах оцінювали теоретичну і практичну частину. Інформативність теоретичного блоку 1 була оцінена в 9,6 з 10 балів, а запам’ятовування практичних навичок — у 9,4 з 10 балів. Це свідчить про достатній рівень проведення виськул.

Висновки. Авторське поєднання адаптованого алгоритму за системою навчання «Вишкіл проф. Сулими» (авторське право № 1113270), що базується на покроковому навчанні за Python, дозволяє легко запам’ятати, неодноразово вибачити та повторити до автоматизму запропоновану навичку, яку цивільний в змозі застосувати в надзвичайній ситуації. Виськл допомагає запам’ятати алгоритм дій (MARCH) в надзвичайній ситуації.

Ключові слова: симуляція; тренування; алгоритм MARCH; цивільний.