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Education of an anesthesiologist in the conditions of the russian-Ukrainian war and the results of pain treatment in patients with gunshot and mine-explosive wounds during the stages of treatment in the Armed Forces of Ukraine

IURII KUCHYN, VASYL' HOROSHKO. **Education of an anesthesiologist in the conditions of the russian-Ukrainian war and the results of pain treatment in patients with gunshot and mine-explosive wounds during the stages of treatment in the Armed Forces of Ukraine.** *Education of military anesthesiologists is critical to improving outcomes for patients with gunshot and mine-explosive wounds. After all, it is the anesthesiologist who assesses the severity of the patient's condition, plans the tactics of intensive therapy and predicts*

the long-term prospects of treatment. Such components of intensive therapy include pain treatment. Ineffective analgesia or the lack of high-quality countermeasures against pain can cause its chronicity. Unfortunately, chronic pain in patients with gunshot wounds is diagnosed in 70% of cases, and in 83.3% of patients with mine-explosive wounds. That is why studying the results of the impact, stress factors of war on the patient and the education of anesthesiologists in the issues of pain treatment, on the processes of chronic pain are important and can potentially improve the results of treatment of such patients in the long term.

Methods. *The results of treatment of 1166 patients with gunshot and mine-explosive wounds are presented. Pain intensity was diagnosed using a visual analog scale (VAS). The presence of acute stress reaction (ASR) was diagnosed using The hospital anxiety and depression scale (HADS) and medical history, the diagnosis was established by a psychiatrist. Satisfaction with the results of treatment was studied using the Chaban quality of life scale (CQLS). Diagnosis of post-traumatic stress disorders (PTSD) – using the Mississippi Scale for Combat-Related PTSD (M-PTSD). Comparison of groups was carried out according to the Mann-Whitney test and the chi-square test, taking into account the correction for continuity. To analyze the relationship between the risks of receiving a negative treatment result and factor characteristics, the method of building univariate and multivariate logistic regression models was used. The quality of the models was evaluated by the area under the ROC curve (AUC – Area under the ROC curve) To quantify the degree of influence of the factor characteristic, the odds ratio indicator was calculated.*

Result. *A very strong relationship between the chronicity of pain and the presence of ASR in patients, as well as CQLS data at the time of discharge from the medical institution and 1 and 3 months after treatment (AUC>0.9) was revealed. A connection with the presence of PTSD was revealed according to the M-PTSD 1 and 3 months after wounds (AUC=0.65 95% CI 0.62-0.68). Also, a high risk of chronic pain ($\geq 95.6\%$ of patients with chronic pain) is observed in patients with ASR at admission and HADS data >10 points, CQLS at discharge ≤ 75 , CQLS after 1 month ≤ 66 , CQLS after 3 months ≤ 66 .*

Conclusions. *Taking into account the results of the analysis, it is clear that military anesthesiologists planning intensive care and predicting the long-term prospects of pain treatment should have the knowledge and practical skills of related specialties, because the acute stress reaction and quality of life according to the CQLS have a strong relationship with the*

risk of chronic pain, which requires special diagnostics.

Key words: *education, war, anesthesiologist, chronic pain, gunshot wounds, mine-explosive wounds, acute stress reaction, quality of life, stages of treatment*

Trial registration

ClinicalTrials.gov: Retrospectively registered on July 28, 2022 NCT05478642

Introduction. The education of anesthesiologists in a country at war is of paramount importance. After all, war is an extremely strong factor that has a psychological impact on anyone [1, 4, 15]. Mastering by doctors of special knowledge and necessary practical skills is the key to urgent treatment of the patient [2, 5, 16]. However, this is today, and what about “tomorrow”, what distant results of treatment dictate to us and what competencies should be acquired by an anesthesiologist who provides assistance to patients who directly participated in combat operations, received a serious injury and feel unbearable pain?!

All doctors who do not use pain management in their practice will have one thing in common – it is the difficulty of treating pain, which was formed during a wound in war conditions [3, 6, 11]. This has a psychological impact on a person and severe long-term negative consequences of treatment, which include chronic pain. Wounds received in combat are the most severe multidisciplinary pathology [7, 12, 17]. Pain and memories, memories of combat conditions and pain cause the development of conditions with self-destructive behavior [9, 13]. From 11% to 40% of patients in civilian life suffer from chronic pain after severe wounds. The education of military anesthesiologists in the conditions of the russian-Ukrainian war and the results of pain treatment in patients with gunshot and mine-explosive wounds at the stages of treatment in the Armed Forces of Ukraine remain insufficiently studied [8, 14, 17].

Studying the effects of stressors of war on the patient and the education of anesthesiologists in the issues of pain treatment on the processes of chronic pain are important and can potentially improve the results of treatment of such patients in the long term. Considering the fact that 70% of patients with gunshot wounds [7], and 83.3% of patients with mine-explosive wounds cannot achieve a positive treatment result, the data of our study will play an important role in their treatment.

Materials and methods. We performed research at the National military medical clinical center “Main military clinical hospital”. All patients

participated in Operation Joint Forces and received gunshot wounds during combat operations. Medical histories for the period from 2014 to 2021 were retrospectively analyzed. Data collection was carried out at all stages of treatment: medical and nursing brigade, military mobile hospital, military medical clinical center, during rehabilitation, within 12 months of the injury. The assessment of anesthetic risk was carried out according to the scale of the American Society of Anesthesiologists (ASA) [24] – during admission to all stages of treatment. The visual analog scale (VAS) was used to study pain intensity [25]. The intensity of pain according to VAS was studied: 1) before and after anesthesia – at the stage of the medical and nursing brigade, military mobile hospital, military medical clinical center; 2) at the stage of the medical and nursing team – within 2 days; 3) at the stage of the military mobile hospital – within 5 days; 4) at the stage of the military medical clinical center – within 7 days, during discharge from the hospital and further 1, 3, 6, 12 months after the injury; 5) at the rehabilitation stage. Intervals between analgesia were also studied. The neuropathic component of pain was investigated using the diagnostic questionnaire Didier Bouhassiraa, Nadine Attala et al. Pain, 2005, 114: 29-36 (DN4) [7, 10, 26]. The neuropathic component of DN4 pain was investigated at the stage of treatment in a military mobile hospital, a military medical clinical center, then at the time of discharge from a military medical clinical center, and further 1, 3, 6, 12 months after injury. Diagnosis of acute stress reaction (ASR) is anamnesis + The Hospital Anxiety and Depression Scale (HADS) [27]. The diagnosis of GSR was established by a psychiatrist upon admission to a military mobile hospital. The presence of post-traumatic stress disorders (PTSD) was investigated using the *Mississippi Scale* for Combat-Related PTSD (M-PTSD) [7]. The presence of PTSD according to the M-PTSD was investigated in the military medical clinical center 1, 3, 6, 12 months after the injury – the diagnosis was made by a psychiatrist. Quality of life after injury and satisfaction with the results of treatment were studied using the Chaban Quality of Life Scale (CQLS) [18-23]: examined at the time of discharge from the military medical clinical center and further after 1, 3, 6, 12 months after injury.

The prospective study was conducted in the period from February 24, 2022 to May 24, 2022. Data collection was carried out during the Russian invasion of Ukraine and the offensive on Kyiv. All patients under investigation were evacuated to the National military medical clinical center “Main military clinical hospital” for treatment. The

research was conducted using the same methods as during the retrospective analysis.

Data collection and preparation. The research was carried out within the framework of the biotic expertise protocol – Ministry of health of Ukraine, Bogomolets National medical university, Kyiv, Ukraine, commission on biotic expertise and research ethics, protocol No. 158 of May 23, 2022. All study data were reflected in the patient's medical history. They are stored in the archives of the National military medical clinical center "Main military clinical hospital", 18 Hospitalna Street, Kyiv, Ukraine.

Statistical data analysis. The analysis of the research results was carried out in the EZR v.1.35 package (R statistical software version 3.4.3, R Foundation for Statistical Computing, Vienna, Austria). The method of constructing univariate and multivariate logistic regression models was used to analyze the relationship between the risk of not achieving the treatment effect and factor characteristics. The quality of the models was assessed by the area under the ROC curve (AUC – Area under the ROC curve), the 95% probability interval (CI) of the indicator was calculated. To quantify the degree of influence of the factor characteristic, the odds ratio (OR) and its 95% CI (direct selection at the alpha level of 5%) were calculated. When conducting the analysis in all cases, the critical level of significance was taken equal to 0.05.

The results. The method of constructing and analyzing univariate and multivariate logistic regression models was used to analyze the relationship between the risk of pain chronicity (VAS>0 after 3 months) and factor characteristics. The analysis used the results of treatment of 1166 patients – 786 patients with gunshot wounds (group 1) and 380 patients with mine-explosive wounds (group 2). Table 1 presents the general characteristics of the patients (the median Me and the interquartile range (QI-QIII) are presented. In the case when after three months the value of the VAS indicator>0, it was considered that the positive effect was not achieved (resulting variable Y=1 – 271 cases); if after three months the value of the VASH indicator = 0, the positive effect was considered achieved (resulting variable Y=0 – 895 cases). The risk of pain chronicity was 23.2% (95% CI 20.8%-25.8%). Indicators were used as factor characteristics: the presence of a diagnosis – acute stress reaction upon admission to a medical institution, data from the Mississippi scale of post-traumatic stress disorders (military version) 1 and 3 months after the injury and data from the Chaban Quality of Life Scale at the time of

discharge from the medical institution, as well as 1 and 3 months after treatment. Table 2 presents the results of the analysis.

Table 1.

General characteristics of patients with gunshot and mine-explosive wounds (median Me and interquartile range (QI-QIII) are presented.

Indicator	Group 1 (n=786)	Group 2 (n=380)	level of significance of the difference, p
Age (years)	32 (25-39)	32 (26-39)	0.791
Height (cm)	178 (176-182)	178.5 (176-182)	0.29
Weight (kg.)	78 (75-84)	79.5 (75-84)	0.148
Number of operations	5 (5-7)	5 (4-7)	0.349
Number of affected areas of the body	2 (2-2)	2 (1-3)	0.767
ASA	3 (3-3)	3 (3-3)	0.563
Average duration of anesthesia (min.)	125 (110-145)	125 (110-150)	0.786
Average duration of operations (min.)	115 (105-130)	115 (105-130)	0.369
VAS initial	7 (7-7)	7 (7-7)	0.106

Notes: Mann-Whitney test was used for comparison.

Table 2.

Coefficients of univariate logistic regression models predicting the risk of chronic pain.

Factor sign	Value of the coefficient of the model, $b \pm m$	Level of significance of the difference from 0	Indicator OR (95% CI)	Area under the operating characteristics curve AUC (95% CI)
ASR at admission	1.69 $\pm$ 0.34	<0.001	5.41 (2.77-10.6)	0.98 (0.97-0.99)
M-PTSD after 1 month	0.006 $\pm$ 0.011	0.579	–	–
M-PTSD after 3 months	0.085 $\pm$ 0.013	<0.001	1.09 (1.06-1.12)	0.65 (0.62-0.68)
CQLS at discharge	–2.45 $\pm$ 0.28	<0.001	0.09 (0.05-0.15)	0.98 (0.97-0.99)
CQLS after 1 month	–1.63 $\pm$ 0.11	<0.001	0.20 (0.16-0.25)	0.98 (0.97-0.99)
CQLS after 3 months	–1.64 $\pm$ 0.11	<0.001	0.19 (0.16-0.24)	0.98 (0.97-0.99)

When conducting a univariate analysis, there is a very strong relationship between the risk of pain chronicity and the presence of an acute stress reaction in the patient at admission, as well as with Chaban Quality of Life Scale data at the time of discharge from the medical institution, as well as 1 and 3 months after treatment ($AUC > 0.9$). A slightly weaker relationship with the presence of post-traumatic stress disorders according to the Mississippi scale of post-traumatic stress disorders (military version) is observed 1 and 3 months after the injury ($AUC = 0.65$ 95% CI 0.62-0.68). When conducting ROC analysis, it was established that a high risk of chronic pain ($\geq 95.6\%$ of patients with chronic pain) is observed in patients with ASR at admission and HADS data > 10 points, CQLS at discharge ≤ 75 , CQLS after 1 month ≤ 66 , CQLS after 3 months ≤ 66 . Figure 1 shows the curve of operational characteristics of predicting the risk of pain chronicity according to the M-PTSD after 3 months.

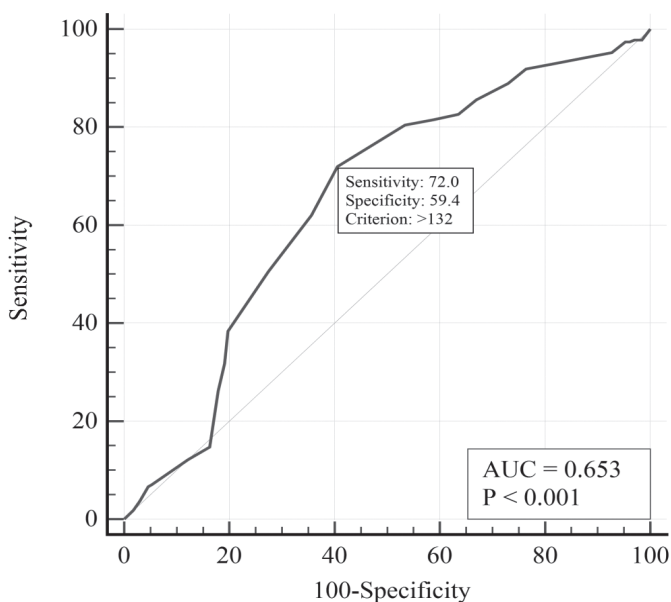


Figure 1. ROC-curve of predicting the risk of pain chronicity according to the M-PTSD 3 months after the injury.

At the second stage, an analysis of the relationship between the risk of pain chronicity and such indicators as the presence of a diagnosis of

acute stress reaction upon admission to a medical institution, the data of the Mississippi scale of post-traumatic stress disorders (military version) 1 and 3 months after the injury and Chaban data was carried out Quality of Life Scale at the time of discharge from the medical institution, as well as 1 and 3 months after treatment, taking into account the type of wound (mine-explosive or gunshot wound) and the intensity of pain according to the VAS upon admission to the medical institution. For this purpose, three-factor logistic regression models were built for predicting the risk of pain chronicity: for each indicator, with standardization for the type of wounds (mine-explosive or gunshot wound) and the intensity of pain according to VAS upon admission to a medical institution. The results of the analysis are shown in table 3.

Table 3.

Coefficients of logistic regression models for predicting the risk of pain chronicity when standardized by the type of wound (mine-explosive or gunshot wound) and the intensity of pain according to VAS upon admission to a medical institution.

Factor sign	Value of the coefficient of the model, $b \pm m$	Level of significance of the difference from 0	Indicator OR (95% CI)	Area under the operating characteristics curve AUC (95% CI)
ASR at admission	1.81 $\pm$ 0.36	<0.001	6.10 (3.03–12.3)	0.99 (0.99–1.00)
M-PTSD after 1 month	0.005 $\pm$ 0.012	0.652	–	0.55 (0.52–0.58)
M-PTSD after 3 months	0.086 $\pm$ 0.013	<0.001	1.09 (1.06–1.12)	0.65 (0.62–0.68)
CQLS at discharge	–2.52 $\pm$ 0.29	<0.001	0.08 (0.05–0.14)	0.98 (0.97–0.99)
CQLS after 1 month	–1.71 $\pm$ 0.13	<0.001	0.18 (0.14–0.23)	0.98 (0.97–0.99)
CQLS after 3 months	–1.73 $\pm$ 0.13	<0.001	0.18 (0.14–0.23)	0.98 (0.97–0.99)

The conducted analysis (table 3) did not significantly change the degree of connection of the studied indicators with the risk of chronic pain. At the same time, it should be noted that for each model in table 2, an increase in the risk of pain chronicity was found in the case of a mine-explosive wounds in comparison with a gunshot wounds ($p < 0.05$ in all cases).

Discussion. Many literary sources highlight the issue of education in wartime conditions, but none of the sources connects the acquired competence of a doctor during training with the impact on the long-term results of treatment [7, 10]. Having conducted our research, we can confidently assert and certainly consider it an extremely important aspect of the educational process of acquisition, in particular, by anesthesiologists of special knowledge and skills of related specialties. Patients who were wounded in combat develop an acute stress reaction, which after 1 month transforms into post-traumatic stress disorders. However, whether these factors influence the outcome of pain management in such patients was unknown. Studies that substantiated the mechanisms of chronic pain formation as a result of ineffective pain treatment in patients with gunshot and mine-explosive wounds have limited access, but it is clear that the doctor who deals with this issue must predict the long-term results of his treatment, and the educational process must promote the development of modulating thinking. Such data are practically absent in the literature. The experience gained by military doctors in Ukraine is unique. Chronic pain in patients with gunshot wounds is diagnosed in 70% of cases [10], and in 83.3% of patients with mine-explosive wounds, which is a negative result of pain treatment. Therefore, we studied the effect of the stress factors of war on the patient and the education of anesthesiologists in the issues of pain treatment on the processes of chronic pain. This is really important and can potentially improve the treatment outcomes of such patients in the long term, because our study revealed a very strong relationship between the risk of chronic pain and the presence of an acute stress reaction in patients, as well as CQLS data at the time of discharge from the medical institution and 1 and 3 months after treatment ($AUC > 0.9$). A connection with the presence of PTSD was revealed according to the M-PTSD 1 and 3 months after injury ($AUC = 0.65$ 95% CI 0.62-0.68). A high risk of pain chronicity ($\geq 95.6\%$ of patients with chronic pain) is observed in patients with ASR at admission and HADS data > 10 points, CQLS at discharge ≤ 75 , CQLS after 1 month ≤ 66 , CQLS after 3 months ≤ 66 .

Conclusions. Taking into account the results of the analysis, it is clear that military anesthesiologists planning intensive care and predicting the long-term prospects of pain treatment should have the knowledge and practical skills of related specialties, because the acute stress reaction and quality of life according to the CQLS have a strong relationship with the risk of chronic pain, which requires special diagnostics.

Ethics approval and consent to participate. All methods were carried out in accordance with relevant guidelines and regulations Declarations of Helsinki. Informed consent was obtained from all subjects and/or their legal guardian(s). All study participants provided informed consent to participate in accordance with the protocol on bioethical examination No. 158 of May 23, 2022, issued by the Commission on Biotic Expertise and Research Ethics of the Bogomolets National Medical University, Ministry of Health of Ukraine.

The study protocol was approved for research by the Commission on Biotic Expertise and Research Ethics of the Bogomolets National medical university, Ministry of health of Ukraine.

Author Declaration:

Consent for publication: Not applicable.

Availability of data and materials: The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions: Kuchyn Iu. L. – study concept and design; Horoshko V. R. – collection and processing of the data, analysis, composing the paper.

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Abstracts

ЮРІЙ КУЧИН, ВАСИЛЬ ГОРОШКО. Освіта військових анестезіологів в умовах російсько-Української війни та результати лікування болю у пацієнтів з вогнепальними та мінно-вибуховими пораненнями на етапах лікування в Збройних Силах України. Освіта військових анестезіологів відіграє найважливіше значення для покращення результатів лікування пацієнтів з вогнепальними та мінно-вибуховими пораненнями. Адже, саме анестезіолог оцінює важкість стану пацієнта, планує тактику інтенсивної терапії та прогнозує віддалені перспективи лікування. До таких компонентів інтенсивної терапії відноситься й лікування болю. Неефективне знеболення чи відсутність якісного контролю над болем може стати причиною його хронізації. Нажаль, хронічний біль у пацієнтів з вогнепальними пораненнями діагностується в 70% випадках, а з мінно-вибуховими пораненнями – 83.3%. Саме тому вивчення результатів впливу, стресових факторів війни на пацієнта та освіченості анестезіологів в питаннях лікування болю, на процеси хронізації болю мають важливе значення і потенційно може покращити результати лікування таких пацієнтів у віддаленій перспективі.

Методи. Представлено результати лікування 1166 пацієнтів з вогнепальними та мінно-вибуховими пораненнями. Інтенсивність болю діагностували за допомогою візуальної аналогової шкали (ВАШ). Наявність гострої стресової реакції (ГСР) діагностували за допомогою *The hospital anxiety and depression scale* (HADS) та анамнезу хвороби, діагноз встановлював психіатр. Вдоволеність результатами лікування вивчали за допомогою шкали оцінки якості життя (*Chaban quality of life scale* (CQLS)). Діагностика посттравматичних стресових розладів (ПТСР) – за допомогою Місісіпської шкали посттравматичних стресових розладів (військовий варіант) (МШ ПТСР (в)). Порівняння груп проводилося за критерієм Манна-Уїтні та за критерієм χ^2 -квадрат з урахуванням поправки на неперервність. Для аналізу зв'язку ризиків отримання негативного результату лікування з факторними ознаками було використано метод побудови однофакторних та багатофакторних моделей логістичної регресії. Якість моделей оцінювалася за площею під ROC-кривою (AUC – *Area under the ROC curve*). Для кількісної оцінки ступеню впливу факторної ознаки розраховувався показник відношення шансів.

Результат. Виявлено дуже сильний зв'язок хронізації болю з наявністю у пацієнтів ГСР, а також даними CQLS під час виписки з лікувального закладу та через 1 і 3 місяці після лікування (AUC>0.9). Виявлено зв'язок із наявністю ПТСР за даними МШ ПТСР (в) через 1 та 3 місяці після поранення (AUC=0.65 95% BI 0.62-0.68). Також, високий ризик хронізації болю ($\geq 95.6\%$ пацієнтів із хронічним болем) спостерігається у пацієнтів з ГСР при поступленні та даними HADS >10 балів, CQLS під час виписки ≤ 75 , CQLS через 1 місяць ≤ 66 , CQLS через 3 місяці ≤ 66 .

Висновки. Враховуючи результати проведеного аналізу зрозумілим є те, що військові анестезіологи плануючи інтенсивну терапію та прогнозуючи віддалені перспективи лікування болю повинні володіти знаннями та практичними навиками суміжних спеціальностей, адже гостра стресова реакція та якість життя за даними CQLS має сильний зв'язок із ризиком хронізації болю, що потребує спеціальної діагностики.

Trial registration

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Ключові слова: освіта, війна, анестезіолог, хронічний біль, вогнепальні поранення, мінно-вибухові поранення, гостра стресова реакція, якість життя, етапи лікування.

IURII KUCHYN, VASYL' HOROSHKO. **Kształcenie anestezjologa w warunkach wojny rosyjsko-ukraińskiej oraz wyniki leczenia bólu u pacjentów z ranami postrzałowymi i ranami po wybuchu min na etapach leczenia w Siłach Zbrojnych Ukrainy.** Kształcenie anestezjologów wojskowych ma kluczowe znaczenie dla poprawy wyników leczenia pacjentów z ranami postrzałowymi i ranami spowodowanymi wybuchem min. W końcu to anestezjolog ocenia ciężkość stanu pacjenta, planuje taktykę intensywnej terapii i prognozuje długoterminowe perspektywy leczenia. Do takich elementów intensywnej terapii należy również leczenie bólu. W wyniku nieskutecznego znieczulenia czy braku wysokiej jakości środków przeciwbólowych może dojść do procesu chronifikacji bólu, gdy ból ostry przechodzi w ból przewlekły. Niestety ponad 70% pacjentów z ranami postrzałowymi cierpi z powodu przewlekłego bólu, z ranami spowodowanymi wybuchem min - 83,3% pacjentów. Dlatego badanie wpływu wojny i stresu na pacjenta oraz znajomość głównych zasad leczenia bólu przez anestezjologów, na proces chronifikacji bólu są ważne i mogą potencjalnie poprawić wyniki leczenia takich pacjentów w perspektywie długoterminowej.

Metody. Przedstawiono wyniki leczenia 1166 chorych z ranami postrzałowymi i ranami po wybuchu min. Natężenie bólu diagnozowano za pomocą skali wzrokowo-analogowej (VAS) Obecność ostrej reakcji na stres (ASD – szok psychiczny) rozpoznano na podstawie Szpitalnej Skali Lęku i Depresji (HADS) oraz wywiadu lekarskiego, diagnoza postawiona przez psychiatrę. Poziom zadowolenia z efektów leczenia zbadano za pomocą Chaban quality of life scale (CQLS) Diagnoza zaburzeń stresowych pourazowych (PTSD) – za pomocą Mississippi (MSC, Mississippi Scale for Civilian Related PTSD-B\wersja dla żołnierzy). Porównanie grup przeprowadzono według testu Manna-Whitneya i testu chi-kwadrat z uwzględnieniem poprawki na ciągłość. W celu przeanalizowania zależności między ryzykiem otrzymania negatywnego wyniku leczenia a stałych wskaźników czynników wykorzystano jednowymiarowy i wielowymiarowy kreator regresji logistycznej Podczas oceny jakości modeli wykorzystano wyliczanie pola pod wykresem krzywej ROC, oznaczanego jako AUC (ang. area under curve). W celu ilościowego określenia stopnia wpływu itałych wskaźników czynników obliczono wskaźnik ilorazu szans.

Wynik. Wykryto związek między procesem chronizacji bólu a występowaniem ASR u pacjentów oraz danymi CQLS w momencie wypisu z placówki medycznej oraz 1 i 3 miesiące po zakończeniu leczenia ($AUC > 0,9$). Wykryto związek między obecnością PTSD według MS PTSD (w) po upływie 1 i 3 miesiące po zakończeniu leczenia ($AUC = 0,65$ 95% BI 0,62-0,68). Wysokie ryzyko przejścia bólu ostrego w ból przewlekły ($\geq 95,6\%$ pacjentów z bólem przewlekłym) obserwuje się u pacjentów z ASR podczas przyjęcia do szpitala i z wynikami HADS > 10 pkt, CQLS podczas wypisu ≤ 75 , CQLS po 1 miesiącu ≤ 66 , CQLS po 3 miesiącach ≤ 66 .

Wnioski. Biorąc pod uwagę wyniki przeprowadzonej analizy, wyraźnie widać, że anestezjolodzy wojskowi planujący intensywną terapię i przewidujący długoterminowe perspektywy leczenia bólu powinni posiadać wiedzę i praktyczne umiejętności z zakresu pokrewnych dziedzin medycyny, ponieważ ostra reakcja na stres i jakość życia wg. CQLS mają silny związek z ryzykiem przejścia bólu ostrego w ból przewlekły, który wymaga specjalistycznej diagnostyki.

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Słowa kluczowe: edukacja, wojna, anestezjolog, ból przewlekły, rany postrzałowe, rany po wybuchu min, ostra reakcja stresowa, jakość życia, etapy leczenia.