ASSESSMENT OF PREPAREDNESS OF INTERN PHYSICIANS IN MAZOWIECKIE VOIVODESHIP FOR CIVIL-MILITARY COOPERATION IN THE EVENT OF A POTENTIAL ARMED CONFLICT

Ocena poziomu przygotowania lekarzy stażystów województwa mazowieckiego z zakresu współpracy cywilno-wojskowej na wypadek ewentualnego konfliktu zbrojnego

Sławomir Piotr Paszek[1], Marcin Rabijewski[2], Anna Kurek[2], Hubert Goetz[2], Zofia Czaplińska-Paszek[3]

1. *Department of Emergency Medicine, Medical University of Warsaw, Poland*
2. *Department of Emergency Medicine/Student Scientific Club of Battlefield Medicine, Medical University of Warsaw, Poland*
3. *St. Anne's Hospital, Stocer Rehabilitation Center, Poland*

Sławomir Piotr Paszek – 0009-0009-5059-3426
Marcin Rabijewski – 0009-0008-0789-5157
Anna Kurek – 0009-0006-1331-3649
Hubert Goetz – 0009-0007-2384-0589
Zofia Czaplińska-Paszek – 0000-0003-2429-8262

Abstract

Introduction and objective: The current geopolitical situation and ongoing international armed conflicts prompt reflection on the adequacy of medical personnel's preparedness, particularly in the context of their potential involvement in an actual armed confrontation. For this reason, we sought to assess the competencies of medical interns—individuals at the outset of their professional careers who have most recently completed the current medical curriculum. **Materials and methods:** For this purpose, we have prepared a form consisting of 10 closed single-choice questions to assess the knowledge of the procedures developed by the Tactical Combat Casualty Care (TCCC) Committee. **Results:** The mean score obtained by interns was less than 30% of correct answers. Additionally, we were able to identify the areas posing the greatest difficulty for respondents, such as antibiotic therapy and haemorrhage taming. **Conclusions:** We recommend considering an expansion of the medical curriculum to include content related to TCCC, as well as drawing on international experience to explore opportunities for collaborative training.

Streszczenie

Wprowadzenie i cel: Obecna sytuacja geopolityczna oraz trwające konflikty zbrojne o zasięgu międzynarodowym skłaniają do refleksji na temat poziomu przygotowania kadr medycznych na wypadek konieczności ich udziału w realnym konflikcie zbrojnym. Z tego powodu autorzy postanowili poddać ocenie kompetencje lekarzy stażystów, a więc osób rozpoczynających karierę zawodową, realizujących aktualny program nauczania. **Materiał i metody:** Opracowano autorski formularz składający się z 10 zamkniętych pytań jednokrotnego wyboru, mający ocenić znajomość procedur opracowanych przez Komitet Tactical Combat Casualty Care (TCCC). **Wyniki:** Średni wynik uzyskany przez lekarzy stażystów wyniósł niespełna 30% poprawnych odpowiedzi. Dodatkowo udało się ustalić obszary, które stanowią największą trudność dla respondentów, takie jak antybiotykoterapia czy tamowanie krwotoków. **Wnioski:** Uzyskane wyniki wskazują na potrzebę rozważenia rozszerzenia programu nauczania na kierunku lekarskim o treści obejmujące zagadnienia z zakresu TCCC, a także wykorzystania zagranicznych doświadczeń w celu rozwijania współpracy szkoleniowej o zasięgu międzynarodowym.

Keywords: combat medicine; postgraduate medical internship; civil-military cooperation; injured as a result of military operations; combat injuries

Słowa kluczowe: medycyna pola walki; podyplomowy staż lekarski; współpraca cywilno-wojskowa; poszkodowani w wyniku działań zbrojnych; obrażenia bojowe

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Corresponding author:
Sławomir Piotr Paszek
Department of Emergency Medicine,
Medical University of Warsaw,
4 Lindleya, 02-005 Warsaw, Poland
e-mail: slawomir.paszek@wum.edu.pl

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Introduction

Training in combat medicine is not formally integrated into medical curricula, including university-level medical programmes. To date, the Armed Forces have employed medical personnel educated in civilian institutions and later adapted to operational needs through postgraduate training aligned with the specific demands of military service. The only exception is the education of cadets of the Military Academy of Land Forces studying at the Military Medical College of the Medical University of Łódź, who fulfil their military service obligations concurrently with their medical training. Given the dynamic geopolitical environment, there is a growing rationale for ensuring that civilian physicians are appropriately equipped to function in the event of armed conflict. Battlefield medical care protocols differ markedly from civilian standards, particularly in terms of capabilities, objectives, and priorities. Familiarity with prehospital procedures used in combat settings may significantly influence therapeutic decisions, even when those decisions are made by a civilian physician in a civilian hospital. At present, the Military Health Service would be insufficient to meet the healthcare demands of the armed forces in the event of a large-scale armed conflict involving entire divisions. This issue was already raised in 2017 by physicians from the Military Institute of Medicine [1]. Their analysis demonstrated that if the Polish Armed Forces were to sustain casualties typical of a symmetrical armed conflict, the healthcare system would be unable to cope. These findings highlight the need for fundamental changes in the educational model and functioning of medical personnel, including those working in civilian settings, to ensure adequate preparedness for potential military contingencies. For this reason, the Warsaw District Medical Chamber has initiated a tactical combat casualty care (TCCC) training programme for physicians within its jurisdiction [2]. Comparable forms of training have recently gained increasing popularity in other NATO member states, both among medical students [3] and practicing healthcare professionals [4].

Aim

The aim of this study is to assess the level of knowledge among interns regarding procedures used in the Armed Forces of the Republic of Poland and other NATO member states for the management of casualties of armed conflict in accordance with TCCC guidelines. The findings are considered in the context of potential civil–military cooperation, in which civilian physicians without prior military training may be required to provide medical care to soldiers and civilians injured as a result of military operations.

Methods

The study was conducted between July 1 and September 30, 2023, using a proprietary questionnaire comprising 10 closed, single-choice questions. The questionnaire was administered to a cohort of 156 medical interns who graduated in 2022 and were attending mandatory emergency care training organized by the Department of Emergency Medicine at the Medical University of Warsaw.

Participants were informed of the study's objectives and provided voluntary consent by completing an anonymous questionnaire. The questionnaire assessed knowledge of current TCCC guidelines, which have been translated into Polish and made available on the website of the Military Medical Training Center in Łódź. The questions addressed issues not included in the standard medical school curriculum nor in the postgraduate internship programme.

Results

The study group consisted of 156 interns. The mean proportion of correct responses was 30%. Only one item yielded a correctness rate of ≥ 50% (question 7, concerning the oral administration of moxifloxacin). Question 1, which also addressed battlefield antimicrobial therapy, proved most challenging, with only 6% of participants selecting the correct answer. The median score was 32%. The results, including the distribution of correct responses, are presented in Table 1.

The most challenging questions were those on antimicrobial therapy (questions 1 and 7), for which the mean percentage of correct responses was 28.5%. Slightly higher scores were observed for questions addressing haemorrhage control (questions 4, 6, and 10), with participants achieving an average correctness rate of 30%. In turn, questions on pain management (questions 2 and 5) were answered correctly by an average of 31% of respondents. Across all items assessing knowledge of medications or their dosages (questions 1, 2, 3, 5, 7, and 10), the mean percentage of correct responses was 31.67%. Figure 1 below presents the distribution of correct answers for each individual question and compares these values with the overall test performance.

Discussion

The survey findings demonstrate a markedly insufficient level of knowledge among trainee physicians regarding broadly understood battlefield medicine and TCCC guidelines. Only one survey item was answered correctly by at least half of the respondents. Most interns affiliated with the Warsaw District Medical Chamber are graduates of the Medical University of Warsaw, where, beginning in the 2024/2025 academic year, pilot instructional sessions addressing the aforementioned topics were introduced for fifth-year medical students as part of a one-day module in Orthopaedics and Traumatology of the Musculoskeletal System. Consequently, these sessions were not available to the 2022 graduates who were completing their postgraduate medical internship at the time this study was conducted.

Russia's invasion of Ukraine in 2022 revealed significant shortcomings in the preparedness of NATO member states for a symmetric armed conflict. The pattern of battlefield injuries differs profoundly when confronting a peer adversary. During the Global War on Terror (GWOT), the majority of casualties resulted from improvised explosive devices and small-arms fire. In contrast, approximately 70% of injuries among Ukrainian soldiers represented polytrauma caused by artillery and missile strikes [5], requiring a completely different therapeutic

Table 1. Questionnaire with possible answers and score

Questions and possible answers	Correct	*n*	%
1. The casualty has most likely received the following antibiotics as part of typical battlefield antimicrobial regimen:			
Ciprofloxacin	No	35	14%
Ertapenem	Yes	16	6%
Ceftriaxone	No	112	43%
Amoxicillin	No	97	37%
2. A conscious male patient (GCS 15) following traumatic mid-humeral amputation, secured with a tactical tourniquet, and presenting with third-degree burns covering approximately 30% TBSA, sustained as a result of an explosive detonation. Estimated blood loss: 1600 mL. HR: 145/min, BP: 95/50 mmHg, SpO_2: 92%, RR: 14/min. Pain: NRS 8 after self-administration of a standard dose of morphine from a prefilled syringe. Estimated patient body weight: 75 kg. Select correct pain management:			
IO fentanyl 200 mg	No	27	10%
IV fentanyl 2 mg	No	107	41%
IO ketamine 100 mg	Yes	38	15%
IV ketamine 1 mg	No	97	34%
3. The IZAS-05 kit (pre-filled syringes for self-administration in the event of exposure to weapons of mass destruction) does not include:			
Naloxone	Yes	85	33%
Atropine	No	17	6%
Diazepam	No	101	39%
Pralidoxime	No	57	22%
4. The time limit after which the tourniquet must not be removed (without patient monitoring or diagnostic laboratory workup) is:			
2 hours	No	56	22%
4 hours	No	92	35%
6 hours	Yes	102	39%
8 hours	No	10	4%
5. Which of these is used in the form of a lollipop?			
Ketamine	No	76	29%
Fentanyl	Yes	122	47%
Meloxicam	No	47	18%
Acetaminophen	No	15	6%
6. Massive haemorrhage from a penetrating axillary wound (damaged axillary artery), unsuccessfully treated on the battlefield with wound packing and a haemostatic dressing. Estimated blood loss 2,500 mL, bleeding continues (soaking dressing). The patient has developed shock and is unconscious (GCS 8), with blood pressure 58/35 mmHg, heart rate 48/min, absence of a peripheral pulse; is intubated and was put on ventilatory support. Surgical repair of the damaged vessel will be possible in no fewer than 20 minutes. Until then, the recommended management is:			
Adding another layer to the soaking dressing	No	85	33%
Removal of the existing dressing followed by repacking of the wound with a new haemostatic dressing, accompanied by direct manual pressure for 3 minutes	Yes	35	13%
Applying a tourniquet to the limb	No	83	32%
Removal of the ineffective dressing to rapidly prepare the treatment field, followed by compatible whole blood transfusion in accordance with Walking Blood Bank (WBB) protocols	No	57	22%
7. Oral moxifloxacin is recommended for patients with:			
Penetrating eye injury	Yes	133	51%
Internal abdominal injuries as a result of the shock wave from the explosion	No	90	35%
Risk of airway obstruction	No	29	11%
Evident anisocoria and impaired logical contact after head injury, without skin lesions	No	8	3%
8. A 65 kg female patient with second degree burns, 70% TBSA, after evacuation from a burning vehicle. Conscious (GCS 15), BP 130/90 mmHg, HR 150/min, SpO_2 94%, RR 16/min + expiratory stridor. Pain 10 NRS. The recommended form of initial fluid resuscitation is:			
0.9% IV NaCl at 4500 mL/h	No	79	31%
IV Ringer solution at 700 mL/h	Yes	79	30%
(IV Hextend 1000 mL + 400 mL 0.9% IV NaCl)/h	No	76	29%
IO ME 2275 mL/h + 1500 mL H_2O orally	No	26	10%

Table 1 (cont.). Questionnaire with possible answers and score

Questions and possible answers	Correct	*n*	%
9. Which treatment is not recommended in a patient with blunt head trauma, impaired consciousness and evident anisocoria?			
Hyperventilation	No	110	42%
Maintaining $ETCO_2$ within 30–35 mmHg	No	24	9%
Reducing O_2	Yes	69	27%
250 mL of 3% IV NaCl	No	57	22%
10. Which of these is a contraindication for tranexamic acid?			
The fact that it can only be administered intraosseously	No	33	13%
No possibility of performing diagnostic imaging	No	8	3%
Craniocerebral trauma	No	120	46%
The fact that 5 hours elapsed since the injury	Yes	99	38%

BP – blood pressure; $ETCO_2$ – end-tidal carbon dioxide; GCS – Glasgow Coma Scale; H_2O – water; HR – heart rate; IO – intraosseous; IV – intravenous; IZAS-05 – a set of pre-filled syringes for self-aid in the event of exposure to weapons of mass destruction; NaCl 0,9% – saline; NRS – Numerical Rating Scale; ME – Multiple Electrolytes; RR – respiratory rate; SpO_2 – Peripheral Oxygen Saturation; TBSA – total body surface area

approach. In contrast to several other NATO member states, there are virtually no training programmes aimed at preparing civilian surgeons for the medical challenges associated with a large-scale armed conflict in Poland. Significant differences may be also seen in battlefield evacuation. For many years, it was typically expected that a wounded soldier could be transported to a medical facility within 1–2 hours. However, the war in Ukraine has demonstrated that during a high-intensity or asymmetric conflict, evacuation times may extend to several or even more than a dozen hours, generating additional clinical and logistical challenges.

A study conducted at one of the largest trauma centres in South Africa demonstrated that, owing to the high volume of injuries resembling those sustained in combat, even a six-month rotation of surgeons in such a facility would be sufficient to substantially enhance their trauma surgery competencies [6]. Overall, graduates of military universities, compared with graduates of civilian medical schools who completed only a brief course under a military scholarship, rate their preparedness for potential military deployment significantly higher [7]. The competencies of US graduates of civilian universities participating in military scholarship programmes have been compared with those of graduates of the Uniformed Services University, the principal institution responsible for training military physicians. The university reinforces students' competencies for deployment in military operations by providing regular exposure to interactive training within this highly specialized environment. One particularly effective initiative was a comprehensive simulation pro-

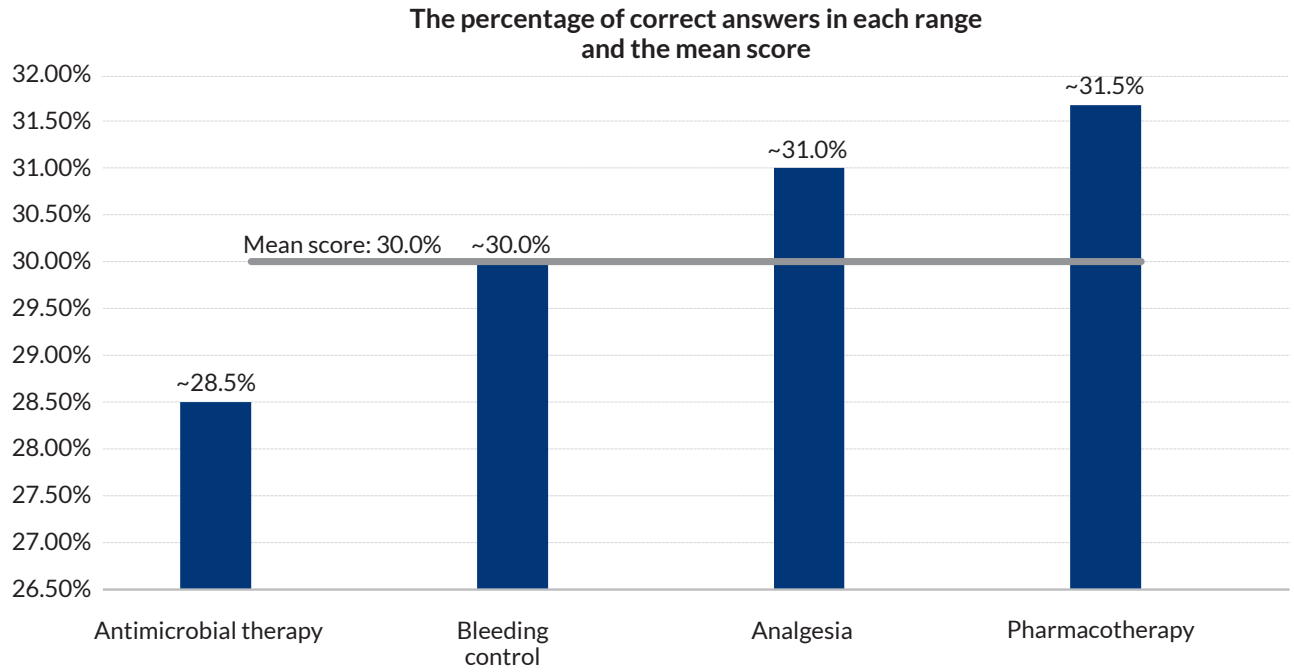

Fig. 1. Comparison of results across the questionnaire

gramme that replicated the duties of medical personnel during mass casualty events, conducted at this university for 4 years. Every year, several-day classes were organized, the content of which was adapted to the current level of knowledge and practical skills of students in their respective years of study. The training familiarized participants with the principles of teamwork, the challenges inherent to combat medicine, as well as procedural and theoretical approaches that diverge markedly from civilian healthcare standards. It also broadened the theoretical and practical competencies essential for medical care in operational settings. Notably, despite the relatively modest time commitment demanded of students, the programme yielded a substantial improvement in participants' skills and self-satisfaction, which may have contributed to their subsequent declarations of readiness for deployment [8]. This experiment provides an encouraging perspective on the future of medical–military education in Poland, assuming that both the frequency and quality of training are increased. Variations in both baseline curricula and the level of education across specific domains, resulting from the structural characteristics of individual national educational systems, should not preclude Poland from pursuing efforts to expand the competencies of future physicians. This is supported by studies assessing the outcomes of several-day TCCC courses conducted at training centres in Ghana and the United States, which were attended by healthcare professionals (primarily physicians). Despite initial disparities in baseline competence arising from differences in training systems and exposure to military scenarios, post-course assessments of participants' skills, performed using an identical medical simulation, demonstrated comparable results in both groups [9]. International TCCC training initiatives are also implemented and frequently regarded as effective, such as the *Kabul Tuesdays* programme [10], which consisted of weekly high-fidelity simulations of complex clinical scenarios. Consequently, it would be reasonable to consider developing comparable training courses for medical students and physicians in Poland. This suggests that, with appropriate organizational measures, it would be feasible to train Polish physicians, particularly specialists in surgery, orthopaedics, and anaesthesiology, to improve the competencies required for the management of war-related injuries. It also appears advisable to explore opportunities for international training exchanges, given that patients with gunshot wounds and other combat-associated trauma are relatively uncommon in Poland.

Conclusions

It seems reasonable to expand this study to include participants from other voivodeships, thereby enabling a more comprehensive assessment of knowledge related to the discussed procedures at the national level. The study demonstrated that, although the interns surveyed had a limited ability to administer pharmacotherapy within the context of combat medicine, they would face substantial challenges in managing patients with complex, multi-organ injuries in life-threatening scenarios. The findings also indicate that early-career physicians lack confidence in managing critically ill patients presenting with injury patterns typical of combat operations.

In light of the current geopolitical context, which implies that a symmetric conflict on the European continent is a realistic possibility, and considering the training experiences of other Allied states, greater emphasis should be placed on military medicine within the curricula of civilian medical universities. International exchange programmes should also be considered, as injuries typical of military operations, such as gunshot wounds, are currently uncommon in Poland, resulting in limited clinical exposure and insufficient experience in managing such cases.

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