

**IMPACT OF SIMULATION EDUCATION ON THE DEVELOPMENT OF
PROFESSIONAL SKILLS OF STUDENTS: FUTURE MEDICAL AND SOCIAL
WORKERS**

**IMPACTO DA EDUCAÇÃO POR SIMULAÇÃO NO DESENVOLVIMENTO DE
HABILIDADES PROFISSIONAIS DE ESTUDANTES: FUTUROS MÉDICOS E
ASSISTENTES SOCIAIS**

**IMPACTO DE LA EDUCACIÓN EN SIMULACIÓN EN EL DESARROLLO DE
HABILIDADES PROFESIONALES DE LOS ESTUDIANTES: FUTUROS
TRABAJADORES MÉDICOS Y SOCIALES**



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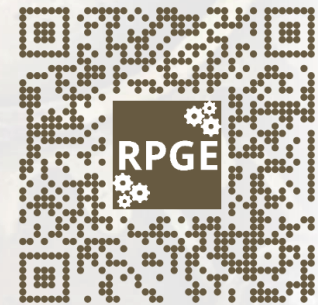
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ABSTRACT: The present study aims to investigate the impacts of education through simulation on enhancing students' professional skills. Employing an analytical research approach, the authors engaged experts to evaluate the sources' quality. The results reveal that simulation-based training offers a safe and controlled environment where students can practice and develop their skills, adequately preparing themselves to cope with the demands and pressures of real-life situations. Through these experiences, students can apply their knowledge, decision-making skills, and technical competencies to manage critical situations effectively. By incorporating simulation-based learning into the curriculum, educational institutions can provide students with the necessary knowledge to develop their professional skills and competencies.

KEYWORDS: Pedagogy. Simulation Education. Medicine. Emergency Medical and Social Care.

RESUMO: *O presente estudo tem como objetivo investigar os impactos da educação por meio de simulação no aprimoramento das habilidades profissionais dos estudantes. Utilizando uma abordagem de pesquisa analítica, os autores envolveram especialistas para avaliar a qualidade das fontes utilizadas. Os resultados obtidos revelam que a capacitação por simulação oferece um ambiente seguro e controlado no qual os estudantes podem praticar e desenvolver suas habilidades, preparando-se adequadamente para lidar com as exigências e pressões das situações reais. Através dessas experiências, os estudantes conseguem aplicar seus conhecimentos, habilidades de tomada de decisão e competências técnicas para gerenciar de forma efetiva situações críticas. Ao incorporar a aprendizagem por simulação no currículo, as instituições de ensino podem fornecer aos estudantes o conhecimento necessário para o desenvolvimento de suas habilidades e competências profissionais.*

PALAVRAS-CHAVE: *Pedagogia. Simulação Educacional. Medicamento. Assistência Médica e Social de Emergência.*

RESUMEN: *El propósito del estudio es determinar el efecto de la educación de simulación en el desarrollo de las habilidades profesionales de los estudiantes. Los autores utilizaron el método analítico de encuesta, con la participación de expertos para evaluar la calidad de las fuentes. Los resultados del estudio muestran que, si bien la capacitación con simulación brinda un entorno seguro y controlado, los estudiantes pueden practicar y desarrollar sus habilidades, lo que garantiza que estén bien preparados para manejar las demandas y presiones de las situaciones del mundo real. A través de estas experiencias, los estudiantes pueden aplicar sus conocimientos, habilidades para la toma de decisiones y habilidades técnicas para gestionar eficazmente situaciones críticas. Al integrar el aprendizaje de simulación en el plan de estudios, las instituciones educativas pueden proporcionar a los estudiantes los conocimientos necesarios para desarrollar habilidades y competencias profesionales.*

PALABRAS CLAVE: *Pedagogía. Educación de simulación. Medicamento. Emergencias Médicas y Atención Social.*

Introduction

Medical training is widely recognized as a significant step for medical and social education students today. As a fundamental part of their training curriculum, future healthcare professionals are required to undertake specialized techniques in the medical field, including qualified training in first aid and technical courses targeted toward nursing specialists (KURGANISKY; KOVALENKO; SOKOLOVA, 2022). By dedicating themselves to medicine, students can acquire in-depth knowledge in critical areas such as anatomy, physiology, and emergency medical procedures. This knowledge provides them with a solid foundation to assess and treat injuries and perform crucial interventions to preserve lives and stabilize patients while awaiting additional medical resources.

Simulation training has become an invaluable tool to prepare students and future medical professionals for dangerous and ever-changing situations (BRIDGES; SEERY; ORR, 2021). This approach allows them to practice their skills in realistic and high-stress scenarios, empowering them to handle such challenges effectively (GADZAOVA *et al.*, 2023). Simulation-based education offers an undeniable advantage in such circumstances, enabling healthcare professionals, both individually and as a team, to learn and enhance the necessary actions. Furthermore, simulation training is a valuable tool for testing the accuracy of new procedures or medical equipment, providing an opportunity to evaluate their effectiveness and safety (SMIRNOV; RAZGONOV, 2016).

The present study aims to analyze the possibilities of applying simulation education in tactical medicine for students enrolled in medical and social education programs. This field involves providing medical care in high-risk situations, such as combat environments, natural disasters, or crisis situations.

Methods

This study follows the dialectical research method, which is applied to analyze simulation training in tactical medicine. In this context, it is essential to consider the international experience of the participants. A more comprehensive and in-depth understanding of combat medicine is sought by comparing the practices and approaches used by different countries or regions. Additionally, the study employs systemic-structural and logical-formal methods to conduct a comprehensive and coherent analysis of the collected data.

Considering the inherent limitations of document analysis methods (it is essential to acknowledge that the quality and completeness of selected sources may vary, as well as possible subjective opinions of the authors), complementary research was conducted with experts in the field of tactical medicine (EUBANKS; VOLNER; LOPREIATO, 2022).

In the initial phase of the study, the source base consisted of scientific and research articles published in journals indexed in the RSCI, Scopus, and Web of Science over the past decade. This practice significantly contributes to the robustness and validity of the information used in the study, as peer-reviewed works tend to have greater scientific rigor and reliability.

In the study's second phase, we contacted 25 specialists for the research. These professionals were selected based on specific criteria, such as having at least three articles on tactical medicine published in HAC RF journals listed in the Scopus or Web of Science citation databases or having a minimum of 10 years of experience in medical education. The participants received emails containing information about the study's topic and were invited to evaluate the reliability of the selected materials through a questionnaire (as presented in Table 1). The evaluation assists in identifying possible gaps or limitations in the desired information sources and confirming the relevance and appropriateness of the materials for the research.

The questions included a list of sources identified by a specific number. The specialists used the Harrington scale to evaluate each source, selecting the corresponding number in the designated box.

Table 1 - Questionnaire Sent to Professionals

Nº	Scale of items	Rank
1	Central source on the topic	10
2	Highly important	9
3	Important	8
4	Needs to be considered	7
5	Interesting source, consider only if necessary	6
6	Interesting source, does not have to be considered, because it goes beyond the scope of the declared topic of the study	5
7	Not very important	4
8	Minor importance	3
9	Supplements the sources mentioned earlier in the list	2
10	Irrelevant	1

Source: Elaborated by the authors

The research results from the participants have been condensed and are presented in Table 2.

Table 2 - Summary of Research Results with Experts to Assess the Reliability of Selected Documents

Nº	Primary characteristics	Result
1	Number of proposals sent to the experts	25
2	Number of completed questionnaires received from the experts	21
3	Mean reliability score of the selected information sources	0.78 points

Source: Elaborated by the authors

The experts analyzed the selected documents as high quality and trust, assigning them an overall high-level rating. As defined by the Harrington scale, the "high" rating range is delimited by the interval of 0.64-0.8.

In the third stage of the research, the collected information was processed, and the obtained results were interpreted. The experience in simulation training in tactical medicine in the United States Army received significant prominence based on the number of identified sources presented to the professionals.

Results and Discussion

Foreign Experience in the Use of Simulation Training in Tactical Medicine

Tactical medicine is a relatively recent field in the context of medical science. During World War II, advancements in combat medical treatment were in the early stages of development. As a result, the mortality rate among soldiers due to combat injuries was high, estimated at around 30%.

During the Vietnam War, commanders in the United States Army recognized the unique challenges they faced in the conflict. The hostile terrain and unfavorable weather conditions made engagements with enemy forces difficult, as they demonstrated combat proficiency regardless of circumstances. Additionally, the US Army encountered unconventional warfare tactics such as improvised explosive devices, traps, and ambushes. These distinctive characteristics of war motivated military leaders to seek innovative solutions in tactical medicine, aiming to empower soldiers to address the consequences of combat operations independently. The goal was to increase their chances of survival on the battlefield.

Despite the implemented improvements and revised procedures, the results could have been more satisfactory. Specifically, the mortality rate due to combat injuries reduced from 30% to 24%. However, there was limited progress in tactical medicine in the subsequent years, and even the first Gulf War resulted in minimal changes (EUBANKS; VOLNER; LOPREIATO, 2022).

It was not until 1997 that significant transformations occurred with the development of specialized guidelines for medical care on the battlefield by the United States Army. These guidelines, known as Tactical Combat Casualty Care (TCCC), were specifically tailored to the needs of special operations forces. They were formulated based on lessons learned from previous conflicts and patterns of injuries suffered by service members. TCCC established comprehensive guidelines to provide medical assistance on the battlefield, outlining specific procedures and actions to address combat-related injuries.

According to the TCCC guidelines, treatment methods were reorganized, and it was established that the primary approach for the control of severe external hemorrhage, which accounts for 90% of prehospital deaths on the battlefield, would be tactical hemostasis, such as the application of tourniquets. The TCCC manual also emphasized the importance of thorough case analysis and implementing changes and training for frontline medical personnel and soldiers. Even with modern armaments, 25% of fatal cases could be treatable (RASMUSSEN *et al.*, 2017). In 1999, the United States Army initiated training programs for military physicians, adopting simulators as the primary training method (MOSES *et al.*, 2001).

After a comprehensive analysis of previous conflicts in Iraq and Afghanistan, the Pentagon found that mandatory and essential inclusion of medical simulators in training reduced combat-related deaths from 24% to 10% (BIRD; FAIRWEATHER, 2007). However, a report published in 2005 highlighted additional deficiencies in the existing military medical education system. One of the main identified issues was the lack of standardization in the training and equipment used to impart medical knowledge to military personnel (LINDE; MCGINNIS; THOMPSON, 2017). This can result in gaps in the medical care provided to soldiers in combat situations, endangering their safety and lives.

Subsequently, in response to the report, the United States Army developed a training program based on Medical Simulation Training Centers (MSTCs), implemented in November 2005. This program aimed to establish consistent standards and update the skills of healthcare professionals on the battlefield, defining specific areas of medical education and training requirements for physicians. According to the program, each service member underwent self-care training, assisting fellow service members and performing complex rescue procedures during combat situations (GLASSBERG *et al.*, 2014).

The educational program was designed to address the three leading reversible causes of death identified through combat and trauma analysis: severe bleeding, pneumothorax, and airway obstruction.

To ensure consistent program implementation, 25 MSTCs were established throughout the United States. These centers train soldiers, physicians, civilian staff, and first responders according to a protocol developed based on TCCC guidelines (EUBANKS; VOLNER; LOPREIATO, 2022).

Implementing standardized training in the United States Army has significantly improved the quality and effectiveness of activities performed. Simulation training has become an essential component and has caught the attention of the United States Navy. As a result, the Navy began using simulation training for healthcare professionals on two major hospital ships: the USNS Mercy and the USNS Comfort. Simulation practice encompasses many areas, including simulated rescue operations in maritime environments, patient transportation, and actions performed on a hospital ship. Additionally, boat and submarine crews started using simulators to simulate mass casualty situations. Specialized medical teams known as the Emergency Resuscitative Surgery System (ERSS) were established on Navy ships to strengthen response capability further. These systems consist of three distinct specialized units: the Expeditionary Trauma Team (ETT), the Expeditionary Surgical Team (EST), and the En Route Care Team (ECT) (RASMUSSEN *et al.*, 2015).

Another example of medical simulators in the United States Armed Forces is observed in the United States Air Force, where a specialized training program has been established. This program encompasses various stages, from battlefield medical evacuation (MEDEVAC) to the transportation and medical care of injured individuals during flights to the hospital. The preparatory course lasts two weeks and includes activities conducted in low-visibility conditions, using mannequins and simulators onboard helicopters or aircraft to practice the skills necessary to rescue individuals with severe injuries. The establishment of the Aeromedical Simulation Training and Education Center (ASTECC) (JEN HENG; EVELYN; LATEEF, 2015) played a significant role as it was the first training center dedicated exclusively to the air transport of injured individuals.

However, a disparity was observed between combat medical skills and the skills required to treat hospitalized military personnel, which led to the need to include training for members of hospital care in the MSTCs. In response to this demand, in 1999, the Military Health System (MHS) established the first simulation training center at the Uniformed Services University of the Health Sciences to provide specific preparation for military physicians (ROSEN, 2008).

Initially, the C.A. Andersen Simulation Center, located in an army hospital, commenced operations in March 2002, offering training for soldiers preparing for overseas missions. However, the training objective was quickly expanded to include specialists from various medical disciplines, such as anesthesiologists, otolaryngologists, gynecologists, and surgeons.

National Application of Simulation Training in Tactical Medicine

In Russia, simulation practice is widely employed in various military institutions (SMIRNOV; PEPELIAEV; PORFIREV, 2015) to enhance medical competencies in combat and emergency scenarios (RABADANOVA *et al.*, 2022). Based on conducted studies and analyses, the resources utilized in this type of training include first aid simulators, organ simulators, simulated models of human tissue, augmented reality (AR) and virtual reality (VR) technology, along with other devices that allow replication of conditions similar to those encountered in actual medical practice.

- Specifically, manual training simulators are employed for various purposes, including enhancing intravenous access skills, airway clearance, and needle decompression of pneumothorax, among other procedures

These practices have been shown to be of utmost importance, as "approximately 90% of combat deaths occur on the battlefield itself before the injured have the chance to receive medical care in an appropriate facility. Therefore, medical training targeting severe bleeding and airway complications, such as tension pneumothorax, has resulted in a 9% reduction in mortality rate among the injured. This decrease is emphasized by the guidelines established by the TCCC" (PISARENKO; GUMENIUK; POTAPOV, 2022, p. 70).

- First aid simulators, such as Basic Life Support (BLS) and Advanced Life Support (ALS), are equipped with functionalities that allow control of the depth, quality, and speed of chest compressions;
- High-fidelity simulators that accurately reproduce patient parameters, medical history, analysis of heart rhythm, pupil response, auscultation, and medication administration.

Simulation training in tactical medicine in Russia is carefully designed to prepare healthcare professionals to face various challenging scenarios encountered in actual combat situations. Simulators capable of replicating actions performed in adverse conditions such as

fire, darkness, and noisy environments are utilized. Additionally, simulators modeled based on medical facilities of different levels are employed, providing a more realistic environment for training. Battlefield medical evacuation exercises, using mannequins and military equipment, are also incorporated into the training practices (SMIRNOV; PEPELIAEV; PORFIREV, 2015).

Studies conducted emphasize the significant impact of using high-precision mannequins, simulators, and synthetic tissue models in increasing the realism of simulations (LOTERO VASQUEZ; GARRIDO RAAD; RAMÍREZ PEÑA, 2022). These advanced technologies have provided new opportunities in specialized training, allowing healthcare professionals to gain practical experience in a simulated and controlled environment.

Simulators based on Augmented Reality (AR) or Virtual Reality (VR) technology are becoming increasingly popular and widely used in tactical medicine training (OKLA; EDEN, 2015; HORDIEIEV *et al.*, 2023). Various scholars emphasize the distinct properties of these simulators, which are increasingly integrated into training programs, allowing students to engage in authentic situations without risking their lives (STROTHER; DAVENPORT; HATZFELD, 2021). These methods enable the recreation of complete areas, hospital wards, combat zones, structures, and much more. Virtual Reality (VR) technology enhances immersion, improving the effectiveness of military medics who must be prepared to act in stressful and dangerous situations dealing with severe injuries.

Despite advances in simulation equipment development, it is essential to highlight military institutions' challenges and limitations in practical implementation. A significant obstacle is the high cost associated with implementing and maintaining simulation technology, which can restrict access to specific professionals (CHIZH; RUSANOV; KARPENKO, 2018). Additionally, the effectiveness of simulation training may be reduced when combat operations occur in unique environments, such as those involving chemical, biological, radiological, and nuclear threats (ALEKSEEV *et al.*, 2023).

Based on our analysis, we have found that in addition to equipment acquisition, university students must develop organizational skills and enhance command and control operations (CHEREMISIN *et al.*, 2022). During conflicts and military operations, a continuous collaboration between medical and civilian professionals is crucial in developing comprehensive and effective tactical medicine training programs (STROTHER; DAVENPORT; HATZFELD, 2021). Therefore, simulation training accurately represents reality and plays a vital role in fostering autonomy. During simulation exercises, students are organized into teams

and encouraged to act independently while being observed by exercise supervisors in a separate room or through cameras installed in the training rooms.

Interpersonal skills, such as teamwork (KURGANSKY; KOVALENKO; SOKOLOVA, 2022), effective communication, patient interaction, and assimilation of complex information, play a fundamental role in these environments. Students have the opportunity to develop expertise in specific areas depending on the scenario objectives. Training can focus on performing complex rescue procedures, employing stasis tactics, applying hemostatic dressings, or dealing with patients exhibiting post-traumatic shock or post-traumatic stress disorder (PTSD).

Debriefing techniques facilitate constructive dialogue between students and instructors after a simulation session. Participants have the opportunity to analyze the scenario step-by-step, review their actions, and discuss the results obtained (CHIZH; RUSANOV; KARPENKO, 2018). The role of the instructor is to moderate the discussion, facilitate communication, and ask relevant questions following a debriefing structure. The instructor needs to maintain a neutral and impartial tone, avoiding making judgments, as this helps create a safe environment for students to express themselves openly.

To ensure training effectiveness for future military doctors, involving experts with experience in conflicts and establishing contact with individuals who have participated in similar events is crucial. These unique sources of information are fundamental in providing valuable insights and honest perspectives on the tasks and challenges students will face in combat situations (VEREMEEVA; KRASNOLOBOVA; GONCHARENKO, 2022). Continuous collaboration between medical and civilian professionals is indispensable in developing comprehensive and effective programs for tactical medicine education.

Therefore, when used with appropriate devices and educational approaches, simulation training provides the most effective resources to introduce military students to the complexities of real-world situations.

Conclusion

Simulation training is a flexible and versatile tool that finds application in various areas of human activity. Utilizing different educational methods becomes a powerful instrument for developing appropriate behaviors and enhancing students' practical skills. Furthermore, it provides a flexible way to assess and improve established procedures, refine equipment usage, and promote effective communication within student groups.

In the context of tactical medicine, simulation practice plays a crucial role. This method enables an accurate assessment of student's knowledge levels, aids in enhancing practical skills, and ensures readiness to face real-life situations where their intervention is required. With constant technological advancements, simulation solutions are becoming increasingly realistic, further intensifying learning and students' competence. As a result, combat-related mortality rates from injuries are expected to decrease to less than 10%.

Training centers are becoming indispensable components in medical education institutions, being employed in military settings and other healthcare-related areas. Simulation-based training is a versatile tool that benefits both students in training and already-graduated professionals.

By integrating scientific dialogue, clinical practice, theoretical research, and experimentation, it is possible to cultivate future professionals in the medical and social fields. The adoption of simulation technology allows these professionals to enhance their core skills, deepen their knowledge, and refine their competence in responding to challenging and high-pressure situations. In this way, simulation training plays an essential role in professional advancement and enhancing the responsiveness of healthcare professionals.

REFERENCES

- ALEKSEEV, E. *et al.* Problems of the efficiency of ensuring environmental security: development of constitutional and legal norms. **Lex Humana**, v. 15, n. 2, p. 473–486, 2023.
- BIRD, S.; FAIRWEATHER, C. B. Military Fatality Rates (by Cause) in Afghanistan and Iraq: a Measure of Hostilities. **The International Journal of Epidemiology**, v. 36, n. 4, p. 841–846, 2007. DOI: 10.1093/ije/dym103.
- BRIDGES, E.; SEERY, G.; ORR, R. The Need for Tactical Medicine Training in Modern Warfare. **Military Medicine**, v. 186, n. 1-2, p. e12-e16, 2021.
- CHEREMISIN, P. A. *et al.* a digitalization as a new educational paradigm. **Revista on line de Política e Gestão Educacional**, v. 26, n. esp.2, 2022. DOI: 10.22633/rpge.v26iesp.2.16558.
- CHIZH, I. M.; RUSANOV, S. N.; KARPENKO, I. V. Novye metodologicheskie podkhody k podgotovke vypusnikov meditsinskikh vuzov k rabote v usloviakh chrezvychaynykh situatsii [New methodological approaches to training medical university graduates to work in emergency situations]. **Clinical Medicine**, v. 96, n. 9, p. 847-852, 2018.
- EUBANKS, A. A.; VOLNER, K.; LOPREIATO, J. O. **Past Present and Future of Simulation in Military Medicine**. Treasure Island (FL): StatPearls Publishing, 2022.
- GADZAOVA, L. *et al.* Conditions and opportunities of subject-based learning at universities and its impact on students' linguistic competence. **Revista Conrado**, v. 19, n. 90, p. 107-111, 2023.
- GLASSBERG, E. *et al.* Moving Forward with Combat Casualty Care: the IDF-MC Strategic Force Buildup Plan “My Brother’s Keeper”. **Israel Medical Association Journal**, v. 16, n. 8, p. 469-474, 2014.
- HORDIEIEV, V. *et al.* Application of innovative technologies in the educational process: psychological and pedagogical aspect. **Synesis**, v. 15, n. 2, p. 132–143, 2023.
- JEN HENG, P.; EVELYN, W.; LATEEF, F. Simulation Training for Emergency Teams. **Education in Medicine Journal**, v. 7, n. 4, p. 37-44, 2015.
- KURGANSKY, S. I.; KOVALENKO, E. V.; SOKOLOVA, O. A. Cooperation of training individuals as a methodological basis for enriching the experience of social interaction in young students. **Interacción y Perspectiva**, v. 13, n. 1, p. 39-49, 2022.
- LINDE, A. S.; MCGINNIS, L. J.; THOMPSON, D. M. Multi-Battle Domain-Perspective in Military Medical Simulation Trauma Training. **Journal of Trauma and Treatment**, v. 6, n. 4, 2017. DOI: 10.4172/2167-1222.1000391.
- LOTERO VASQUEZ, D. F.; GARRIDO RAAD, D. R.; RAMÍREZ PEÑA, M. Seguridad y salud en el trabajo, perspectivas metodológicas de investigación. **Gaceta Médica de Caracas**, v. 130, n. 4, 2022. DOI: 10.47307/gmc.2022.130.4.13.

MOSES, G. *et al.* Military Medical Modeling and Simulation in the 21st Century. **Studies Health Technology and Informatics**, v. 81, p. 322-328, 2001.

OKLA, G.; EDEN, D. Learning by Simulation. **Middle East Journal of Anesthesiology**, v. 23, n. 2, p. 247-250, 2015.

PISARENKO, L. V.; GUMENIUK, S. A.; POTAPOV, V. I. Osobennosti sovremennykh lokalnykh voyn i vooruzhennykh konfliktov i problemy okazaniia meditsinskoi pomoshchi naseleniiu v dogospitalnom periode [Peculiarities of modern local wars and armed conflicts and problems of medical care at the prehospital phase]. **Disaster Medicine**, v. 4, p. 68-72, 2022. DOI: 10.33266/2070-1004-2022-4-68-72.

RABADANOVA, R. *et al.* Motivational support as a factor of formation of students' professional competence in the conditions of digitalization of education. **Revista on line de Política e Gestão Educacional**, v. 26, n. esp.2, 2022. DOI: 10.22633/rpge.v26iesp.2.16547.

RASMUSSEN, T.E. *et al.* Ahead of the Curve: Sustained Innovation for Future Combat Casualty Care. **Journal of Trauma and Acute Care Surgery**, v. 79, n. 4, p. 61-64, 2015.

RASMUSSEN, T.E. *et al.* Combat Casualty Care Research for the Multidomain Battlefield. **Journal of Trauma and Acute Care Surgery**, v. 83, n. 1, p. 1-3, 2017.

ROSEN, K.R. The History of Medical Simulation. **The Journal of Critical Care**, v. 26, n. 2, p. 157-166, 2008.

SMIRNOV, N.P.; PEPELIAEV, A.V.; PORFIREV, V.A. Voенno-meditsinskaia podgotovka kursantov: ot voiskovogo opyta k innovatsiiam v obuchenii [Military-medical training of cadets: from military experience to innovations in training]. **Modern high technologies**, v. 12, n. 3, p. 548-551, 2015.

SMIRNOV, N. P.; RAZGONOV, V. L. Rol simuliatsionnogo obucheniia v formirovanii professionalnykh kompetentnostei u kursantov voennogo vuza [The role of simulation training in the formation of professional competencies in military university cadets]. **Modern Problems of Science and Education**, v. 4, p. 1-8, 2016. DOI:10.17513/spno.25047.

STROTHER, D. S.; DAVENPORT, M.; HATZFELD, J. J. Advancements in Simulation Training for Tactical Medicine: Preparing Providers for the Next Generation of Warfare. **Military Medicine**, v. 186, n. 3-4, p. e401-e406, 2021.

VEREMEEVA, S.; KRASNOLOBOVA, E.; GONCHARENKO, O. Innovative methods in the training of veterinarians. **Revista on line de Política e Gestão Educacional**, v. 26, 2022. DOI: 10.22633/rpge.v26i00.17334.

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