
PRACTICAL SKILLS FOR DISASTER MEDICAL RESPONSE: ARE MEDICAL STUDENTS ADEQUATELY PREPARED?

Elena Valkanova

Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv, Bulgaria, elena.valkanova@mu-plovdiv.bg

Mariya Georgieva

Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv, Bulgaria, mari_georgieva@mu-plovdiv.bg

Rumyana Etova

Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv, Bulgaria, rumyana.etova@mu-plovdiv.bg

Kiril Atliev

Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv, Bulgaria, kiril.atliev@mu-plovdiv.bg

Rostislav Kostadinov

Department of Epidemiology and Disaster Medicine, Faculty of Public Health, Medical University of Plovdiv, Bulgaria, rostislav.kostadinov@mu-plovdiv.bg

Abstract: Disaster medical support requires rapid execution of practical clinical skills in high-stress, resource-constrained environments. Although disaster medicine is included in Bulgarian undergraduate medical curricula, training remains largely focused on theoretical instruction. This study aimed to evaluate medical students' self-perceived preparedness for disaster medical support and examine the core practical competencies required for effective disaster medical response. A cross-sectional questionnaire-based survey was conducted among 166 medical students at the Medical University of Plovdiv. Participants assessed their theoretical knowledge and practical preparedness for disaster medical response using a structured questionnaire. Descriptive and comparative analyses were performed to assess the needed skills for disaster medical support. Most respondents (69.8%, n=116) reported awareness of the competencies required for disaster medical support, while only 9.6% (n=16) considered themselves practically prepared to provide medical assistance during disasters. Despite prior disaster medicine education, 17.5% (n=29) remained uncertain regarding the required competencies. These findings reveal a substantial theory–practice gap in undergraduate disaster medicine education. Effective disaster response requires practical competencies including use of communication equipment, triage, airway management, cardiopulmonary resuscitation, hemorrhage control, immobilization, personal protective equipment use, and vascular access techniques, including intravenous and intraosseous access. Disaster medical support training should begin during undergraduate medical education, with greater emphasis on simulation-based practical skills development to prepare future physicians for real-world emergency and disaster scenarios.

Keywords: Disaster Medicine; Medical Students; Disaster Preparedness.

1. INTRODUCTION

A disaster is generally defined as an event that overwhelms the affected community's capacity to respond and causes significant harm to human health and societal functioning. In such situations, healthcare professionals play a central role in disaster medical support to the population. When available physician resources are insufficient, medical students may serve as an auxiliary resource. (Martin et al. 2022) The competencies required to maintain safety while delivering effective medical care under these conditions form a fundamental part of disaster medicine education. (Markenson et al. 2013, Rashid et al. 2024)

Although disaster medicine is incorporated into undergraduate medical education in Bulgaria, current instruction is predominantly theoretical, focusing on conceptual knowledge rather than practical preparedness. While essential procedural skills relevant to disaster medical support are addressed elsewhere in medical training, including various clinical disciplines, it remains uncertain whether students acquire the level of practical competence necessary to function effectively in real disaster scenarios. (Cheng et al. 2023, Ragazzoni et al. 2013)

This study aimed to evaluate medical students' self-perceived preparedness for disaster medical support and examine the key practical skills required for effective participation in disaster settings.

2. MATERIALS AND METHODS

A cross-sectional study was conducted in 2021 using an anonymous questionnaire distributed online to students at the Medical University of Plovdiv. The survey aimed to assess students' perceptions of their preparedness for disaster medical support.

Data were analyzed, processed, and systematized using IBM SPSS Statistics version 21. Both quantitative and qualitative variables were included in the analysis. Statistical significance was defined at $\alpha = 0.05$.

Descriptive methods were used to examine the significance of disaster medicine practical skills for medical professionals. Comparative and deductive analyses were conducted to assess and identify areas of importance.

3. RESULTS AND DISCUSSION

We surveyed 166 students from MU-Plovdiv. The distribution according to the specialty of study is presented on Table 1. The majority of the respondents are women - 75.3% (n = 125), compared to 24.7% (n = 41). The mean age of the subjects is 22.64 ± 0.23 years, in the range of 19 to 35 years.

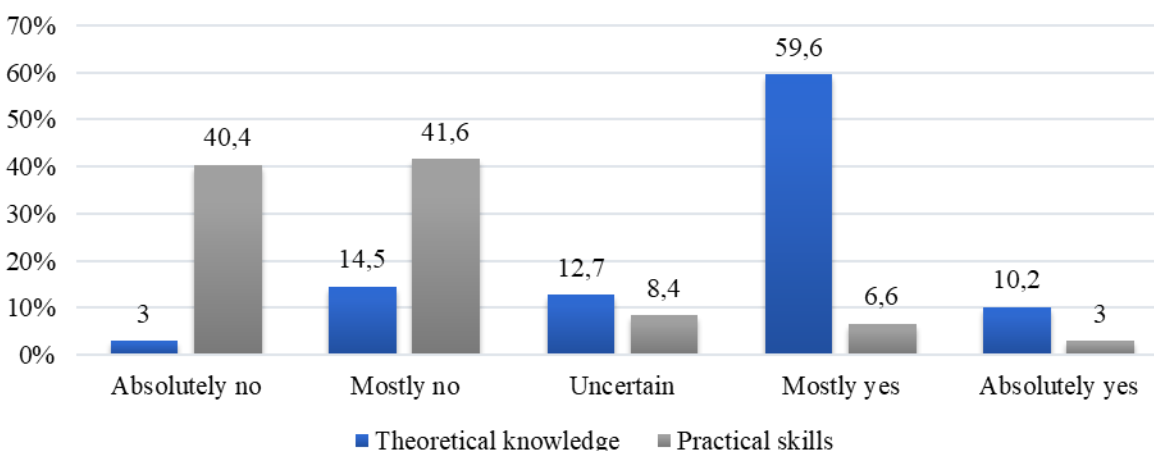
Table 1. Distribution of the surveyed group according to the specialty

Specialty	Number	Percent (%)
Major in Dental Medicine	19	11,4
Major in Medicine	102	61,4
Bachelor in Nursing	28	16,9
Professional bachelor from Medical College	17	10,3
Total	166	100,0

Source: The table contains data from own research

All surveyed students had taken disaster medicine course before the survey. Most respondents (69.8%, n=116) reported awareness of the competencies required for disaster medical support, while only 9.6% (n=16) considered themselves practically prepared to provide medical assistance during disasters. Figure 1 presents the results of the self-assessment that students make of their knowledge and skills for providing medical care in case of disasters.

Fig.1 Self-assessment of knowledge and skills for disaster medical support



Source: The figure contains data from own research

A clear imbalance exists between students' self-assessment of their theoretical knowledge and their perceived practical competence in disaster medical support. While a substantial proportion of respondents reported awareness of the competencies required in disaster situations, only a small minority considered themselves practically capable of providing effective medical assistance. This discrepancy suggests that existing medical training provides conceptual understanding but does not adequately develop operational confidence or hands-on competence. As

consequence disaster readiness and willingness for participation could be undermined. (Sausser et al. 2010, Kaiser et al. 2013)

The nature of disasters imposes specific requirements on healthcare personnel that differ substantially from routine clinical practice. To bridge the gap between theoretical knowledge and practical preparedness, the practical skills most essential for effective participation in disaster medical support should be identified and analyzed.

The preservation of medical professionals' safety is a fundamental principle of disaster medical support. They should be able to recognize environmental hazards and use personal protective equipment. The ability to select the appropriate equipment and to correctly perform donning and doffing procedures without self-contamination represents a priority practical competency that medical students should acquire. (Burke et al. 2026)

Disaster environments require effective communication and accurate situational reporting. Medical students should practice relaying timely and precise information regarding casualty numbers, injury severity, resource needs, and operational hazards to incident commanders and coordinating authorities in order to support effective decision-making and resource allocation. This also requires familiarity with established reporting protocols and the ability to use available communication equipment effectively, as communication failures in disaster settings may significantly compromise coordination and patient outcomes. (Hsu et al. 2006)

Another important disaster specific feature is the sorting of casualties for optimization of the provided aid. Triage training should go beyond theoretical instruction and include practical application in simulated mass casualty incidents and diverse disaster scenarios, allowing students to develop rapid decision-making skills under realistic conditions. (Voicescu et al. 2022) Basic patient monitoring skills, including assessment of vital signs and level of consciousness, are also essential for triage, assessment, and ongoing stabilization in disaster settings.

In disaster medical support, casualty management prioritizes immediate life-saving interventions. Healthcare providers must be able to rapidly identify and address critical threats to life, including airway compromise, severe hemorrhage, respiratory failure, and circulatory collapse. Skills such as airway management, cardiopulmonary resuscitation, hemorrhage control, and rapid vascular access are therefore essential. Main airway skills include oxygen delivery methods, basic airway maneuvers, airway adjunct placement, bag-valve-mask ventilation, and the use of supraglottic airway devices for rapid stabilization. More advanced techniques like tracheal intubation and surgical airway should also be trained by students. (WHO, 2021)

Resuscitation competencies including recognition of cardiac arrest, high-quality chest compressions, and automated external defibrillator use should be learned during the university education. Hemorrhage control with emphasize on direct pressure, tourniquet application, wound packing, and hemostatic dressings are essential medical skills. Rapid vascular access skills include peripheral intravenous cannulation and intraosseous access. The latter is increasingly popular in disaster settings. Safe preparation and administration of emergency medications via appropriate routes should be considered an important practical competency. Bladder catheterization may also be necessary in patients requiring urinary drainage and urine output monitoring. (WHO, 2021)

Practical disaster medical support competencies should also include immobilization techniques, such as cervical spine protection, fracture stabilization, splint application, and pelvic stabilization, to prevent secondary injury during casualty management. Wound and burn assessment, including initial cleaning, contamination control, and early management, constitute important practical competencies in disaster medical support. (WHO, 2021)

Disasters may produce injury patterns that differ substantially from those encountered in routine clinical practice, including crush syndrome, blast trauma, inhalation injury, chemical contamination, radiation exposure, infectious outbreaks. Adequate disaster preparedness therefore requires familiarity with specific practical competencies, including rapid trauma assessment, damage control interventions, decontamination procedures, antidote administration, recognition of radiation injury, biological dosimetry principles, infection control measures. (WHO, 2021)

Safe patient transport and evacuation, including casualty movement techniques and stretcher handling, represent important practical competencies in disaster medical support. Familiarity with the basic medical equipment is essential part of it. (Ciottone, 2016)

Psychological first aid and effective communication with distressed casualties, despite often being overshadowed by immediate life-saving interventions in high-pressure situations, should be recognized as relevant competencies in disaster medical support, given their role in reducing panic, improving cooperation, and supporting overall patient management. (Jones et al, 2022)

Beyond the practical competencies outlined above, decision-making, critical thinking, and problem-solving are fundamental requirements in disaster medical support, where rapid adaptation and sound clinical judgment are essential. The development of these competencies should be supported throughout the entire medical education process, preparing students to respond effectively to complex and unpredictable disaster scenarios. (Westman et al. 2024)

4. CONCLUSIONS

The findings of this study demonstrate a significant gap between theoretical knowledge and practical preparedness for disaster medical support among medical students. The inability to translate theoretical understanding into effective action in real emergency scenarios may lead to hesitation, increased stress, impaired decision-making, and reduced confidence, potentially compromising both responder safety and patient outcomes. Addressing this theory–practice gap requires curricular changes that emphasize structured hands-on education, simulation-based learning, and realistic disaster-focused practical exercises. Early integration of disaster medical support training into undergraduate medical education, with a stronger focus on essential practical competencies, may substantially improve student preparedness and strengthen the future healthcare workforce’s capacity to function effectively in disaster settings.

ACKNOWLEDGEMENTS

This research is a part of university-funded project DPDP 5/2025 “Intraosseous vascular access in patients in critical condition”.

REFERENCES

- Burke, R. V., Cadet, J., Quintanilla, N. A., Knieser, L., Kirsch, T. D., Wada, N. I., Unruh, L., Rainwater-Lovett, K., & Freeman, J. D. (2026). Updated core competencies for disaster medicine and public health. *JAMA Network Open*, 9(2), e2560176.
- Cheng, T. H. T., Tan, B. Y. Q., Chin, A. M. C., Muthiah, M. D., & Teo, N. W. Y. (2023). Assessing knowledge, attitudes, and perceptions of medical students toward emergency preparedness and disaster medicine in Singapore. *Disaster Medicine and Public Health Preparedness*, 17, e497.
- Ciottone, G. R. (Ed.). (2016). *Ciottone’s disaster medicine* (2nd ed.). Elsevier
- Hsu, E. B., Thomas, T. L., Bass, E. B., Whyne, D., Kelen, G. D., & Green, G. B. (2006). Healthcare worker competencies for disaster training. *BMC Medical Education*, 6, 19.
- Jones, R. T., & colleagues. (2022). Psychological first aid in disaster response: A systematic review. *International Journal of Environmental Research and Public Health*, 19(15), 9165.
- Kaiser, H. E., Barnett, D. J., Hsu, E. B., Kirsch, T. D., James, J. J., & Subbarao, I. (2013). Perspectives of future physicians on disaster medicine and public health preparedness: Challenges of building a capable and sustainable auxiliary medical workforce. *Disaster Medicine and Public Health Preparedness*, 7(2), 210–216.
- Markenson, D., DiMaggio, C., Redlener, I., & Reilly, M. J. (2013). Disaster medicine and public health preparedness of health professions students: A multidisciplinary assessment of knowledge, confidence, and attitudes. *Disaster Medicine and Public Health Preparedness*, 7(5), 499–506.
- Martin, A., Blom, I. M., Whyatt, G., Shaunak, R., Viva, M. I. F., & Banerjee, L. (2022). A rapid systematic review exploring the involvement of medical students in pandemics and other global health emergencies. *Disaster Medicine and Public Health Preparedness*, 16(1), 360–372.
- Rashid, H., Alexakis, L. C., & Pereira, I. (2024). Disaster medicine education for medical students: A scoping review. *Cureus*, 16(12), e75035.
- Sausser, K., Burke, R. V., Fernandez, N., & Kraus, C. K. (2010). Disaster preparedness among medical students: A survey assessment. *American Journal of Disaster Medicine*, 5(5), 275–284.
- Voicescu, G. T., Valente, M., Della Corte, F., Becerril, M., Ragazzoni, L., & Caviglia, M. (2022). Medical students’ education in disaster medicine: A systematic literature review of existing curricula. *International Journal of Disaster Risk Reduction*, 77, 103090.
- Westman, A., Kurland, L., & Hugelius, K. (2024). Non-technical skills needed by medical disaster responders: A scoping review. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 32, 25.
- World Health Organization. (2021). *Classification and minimum standards for emergency medical teams*. World Health Organization.