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DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF THE TRAINING COURSE FOR UNDERGRADUATE MEDICAL STUDENTS 'FIRST ON THE SCENE' AT UKRAINIAN MEDICAL UNIVERSITIES

(the EU co-funded Erasmus+ project SimS 'Simulation medicine and Scenario-based learning for emergency care')

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The EU co-funded Erasmus+ project SimS (Simulation Medicine and Scenario-Based Learning for Emergency Care) aims to improve first aid and emergency care training in Ukraine. As part of this initiative, a certified training course entitled *'First on the Scene: Emergency Care Simulation Training Course'* was developed and implemented for

undergraduate medical students at three Ukrainian medical universities. This paper details the course's pedagogical approach and presents the results of its assessment and evaluation.

The course was collaboratively designed by educators from Bukovinian State Medical University, Kharkiv National Medical University, and Odesa National Medical University, following a train-the-trainer programme led by European experts. The pedagogical approach centred on scenario-based learning (SBL), integrating virtual patient cases with hands-on simulation exercises. This methodology promoted experiential learning, clinical reasoning, and the acquisition of both technical and non-technical emergency care skills, including psychological first aid (PFA).

A total of 170 fourth- to sixth-year medical students successfully completed the course. Assessment results showed a significant improvement in emergency care competencies after the training. Evaluation surveys revealed increased student confidence in providing psychological first aid and managing medical emergencies. Participants also expressed high levels of satisfaction with the course's relevance and instructional quality, as well as the overall learning environment.

The findings affirm the effectiveness of scenario-based simulation training in preparing medical students to address real-world clinical challenges. Aligned with national and European emergency care standards and emphasising psychological safety and reflective practice, the 'First on the Scene' training course can serve as a scalable training model for emergency preparedness, fostering resilience among healthcare future healthcare professionals.

Key words: scenario-based learning, emergency care training, simulation medicine, psychological first aid, medical students, Erasmus+ project SimS.

Щудрова Тетяна, Сажин Сергій, Смандич Віталій, Годованець Олексій, Богуцька Наталія, Трофимович Єлєна, Марічереда Валерія. Розробка, імплементація та оцінювання навчального курсу «Перший на місці події» в українських медичних університетах *(проєкт Erasmus+ SimS «Симуляційна медицина та сценарій-орієнтоване навчання з невідкладної допомоги», співфінансований ЄС)*

Проєкт SimS (Симуляційна медицина та сценарій-орієнтоване навчання з невідкладної допомоги), співфінансований Європейським Союзом у межах програми Erasmus+, має на меті вдосконалення навчання з надання першої та екстреної медичної допомоги в Україні. У межах цієї ініціативи розроблено та впроваджено сертифікований навчальний курс для студентів-медиків під назвою «Перший на місці події: перша допомога та психологічна підтримка в надзвичайних ситуаціях», який реалізовано в трьох українських медичних університетах. У статті описано педагогічний підхід та представлено результати оцінювання ефективності курсу.

Навчальний курс спільно розроблено викладачами Буковинського державного медичного університету, Харківського національного медичного університету та Одеського національного медичного університету після проходження програми підготовки тренерів під керівництвом європейських експертів. Педагогічний підхід ґрунтувався на методології сценарій-орієнтованого навчання з інтеграцією віртуальних кейсів та практичних симуляційних занять. Такий підхід сприяє дослідницькому навчанню, розвитку клінічного мислення й набуттю як технічних, так і нетехнічних навичок надання невідкладної допомоги, включно з першою психологічною допомогою.

Загалом 170 студентів 4–6 курсів успішно завершили курс. Результати оцінювання показали значне підвищення рівня компетентності з надання невідкладної допомоги після проходження навчання. За результатами анкетування виявлено підвищення впевненості студентів у здатності надавати першу психологічну та медичну допомогу та діяти в надзвичайних ситуаціях. Учасники високо оцінили актуальність курсу, якість викладання та загальне навчальне середовище.

Отримані результати підтверджують ефективність сценарного й симуляційного навчання в підготовці студентів-медиків до реальних клінічних викликів. Розроблений відповідно до національних і європейських стандартів надання невідкладної допомоги та з акцентом на психологічну безпеку та рефлексивну практику, курс «Перший на місці події» може слугувати масштабованою моделлю підготовки до реагування на невідкладні ситуації, сприяючи розвитку резильєнтності серед майбутніх медичних працівників.

Ключові слова: сценарій-орієнтоване навчання, навчання з надання екстреної допомоги, симуляційна медицина, перша психологічна допомога, студенти-медики, проєкт Erasmus+ SimS.

Background. The EU co-funded Erasmus+ KA2 CBHE project SimS (Simulation medicine and Scenario-based learning for emergency care, 101082077-SimS-ERASMUS-EDU-2022-CBHE, 01.01.2023-31.12.2025) aims to improve the quality of first aid (including psychological) and emergency care training and delivery in Ukraine. The SimS project consortium brings together five Ukrainian HEIs: Bukovinian State Medical University (BSMU, the project coordinator), Dnipro State University of Internal Affairs (DSUIA), Kharkiv National Medical University (KhNMU), National Academy of Internal Affairs (NAIA), Odesa National Medical University (ONMedU), and four European partners: Aristotle University of Thessaloniki (AUTH, Greece), Lithuanian University of Health Sciences (LUHS, Lithuania), University of Santiago de Compostela (USC, Spain), Spanish Society of Primary Care Physicians SEMERGEN (FS, Spain), and National Agency for Higher Education Quality Assurance (NAQA, Ukraine). The beneficiaries of the project are the Ministry of Education and Science of Ukraine, the Ministry of Health of Ukraine, and the Ministry of Internal Affairs of Ukraine.

The SimS project aims to deliver innovative scenario-based simulation training courses to three

project target groups (undergraduate medical students, police cadets/officers, and school teachers). These courses are designed to provide participants with the knowledge and skills necessary to deliver first aid (including psychological support) and emergency care at the scene of an accident (the pre-hospital phase) and during the initial stage of hospital emergency care.

This paper describes the pedagogical approach and methodology used to develop and implement the training course for undergraduate medical students, *'First on the Scene: Emergency Care Simulation Training Course'*, as well as the results of the course assessment and evaluation.

DEVELOPMENT AND IMPLEMENTATION OF THE TRAINING COURSE

Methodology. Scenario-based learning (SBL) is an educational approach which uses realistic, situation-specific scenarios to promote active decision-making and reasoning within a controlled setting. Scenario-based simulations have been shown to facilitate experiential learning in a risk-free environment, thereby enhancing problem-solving, critical thinking and communication skills. This methodology has proven particularly effective in first aid and emergency care training, bridging the gap between theory and practice in a safe and engaging environment [1–3].

SBL is increasingly being used in undergraduate medical education and first responder training in emergency care, significantly improving students' confidence and competence [2; 4; 5]. Repeated simulation practice involving authentic emergency scenarios fosters the development of technical and non-technical skills, such as communication, teamwork and leadership, which are essential for an effective emergency response [6–9].

Scenario-based training in psychological first aid (PFA) uses realistic simulations to prepare healthcare workers, first responders and other individuals to provide immediate psychological support in crisis situations [10; 11]. This approach aims to build the necessary practical skills, confidence and resilience needed for an effective response in disaster and emergency situations [12; 13]. Integrating PFA training into medical curricula can significantly improve future healthcare professionals' knowledge of psychological support and their perceived ability to use PFA skills. It can also boost their confidence and preparedness for crisis situations, as well as improving their overall psychological health [14–16].

Virtual patients (VPs) are interactive, computer-based simulations of real-life scenarios that are used in medical education to enhance learning and refine students' clinical reasoning, problem-solving, decision-making and communication skills. VPs offer authentic and realistic scenarios that enhance the learning experience by helping students to apply their theoretical knowledge and prepare for real-world practice more effectively. They complement traditional clinical training by providing a safe, adaptive learning environment that facilitates deliberate practice [17–19]. Immediate feedback and assessment opportunities allow students to evaluate their performance and identify areas for improvement, which is crucial for reinforcing learning and acquiring skills [20].

The OpenLabyrinth platform (https://demo.openlabyrinth.ca/) is used to create and manage virtual patient cases and offers features such as branching narratives, multimedia integration and tracking of user interactions. This platform was chosen to develop virtual cases for the SimS project.

Collaborative course design. Educators from BSMU, KhNMU and ONMedU who had undergone training collaborated to develop a scenario-based simulation training course for undergraduate medical students, with a focus on first response scenarios. The teachers jointly designed the thematic plan, structure and content of the 1.5-3 ECTS credit training course, producing virtual cases, simulation scenarios and learning and assessment materials in the process.

The training course has been developed in accordance with the regulations and standards established by the Law of Ukraine 'On Emergency Medical Care' (5 July 2012, No. 5081-VI), the Resolution of the Cabinet of Ministers of Ukraine 'On approval of the procedure for basic and advanced training of persons obligated to provide first aid' (21 November 2012, No. 1115), the Ministry of Health of Ukraine's Regulation "On the approval of procedures for the provision of pre-medical care to persons in emergencies" (9 March 2022, No. 441), the European Resuscitation Council (ERC) Guidelines, the WHO Emergency Preparedness Competency Model and the Psychological First Aid (PFA) guides and recommendations.

'First on the Scene' training course

The training course for medical students, *'First on the Scene: Emergency Care Simulation Training Course',* was jointly developed and implemented during the 2024–25 academic year. The course aims to equip students with the knowledge and skills to provide emergency care, including psychological support, to critically ill or injured patients at the scene of an accident (the pre-hospital phase) and during the initial stage of emergency care in hospital.

The learning objectives of the course

By the end of the course trainees should be able to:

– explain the pathophysiology, clinical features, and emergency response algorithms for life-

threatening conditions such as cardiac arrest (adult and pediatric), airway obstruction, shock, coma, and acute poisoning;

– define the ethical, psychological and procedural considerations involved in delivering bad news and providing emotional support to patients and families;

– perform airway management maneuvers, including choking relief techniques in adult and pediatric patients;

– demonstrate high-quality CPR (basic and advanced) for adults and children, incorporating the safe use of an AED;

– control massive external bleeding using tourniquets, hemostatic dressings, pressure bandages, and wound packing techniques;

– apply structured assessment frameworks (e.g. ABCDE, AVPU, Glasgow Coma Scale) to evaluate trauma, shock, and coma in simulation scenarios;

– initiate the appropriate management of acute poisonings, including toxin identification, initial decontamination and taking stabilisation measures, based on scenario data;

– describe the principles of trauma-informed care and psychological first aid (PFA) in emergencies;

– practice PFA techniques and apply structured communication strategies when providing emotional support and breaking bad news under time pressure;

– triage multiple victims using structured tools (e.g. START) and prioritize care using clinical reasoning in resource-limited or chaotic settings;

– demonstrate leadership, real-time decision-making, and reflection-in-action when coordinating team-based responses in complex emergencies;

– develop a personal and professional psychological self-help strategy to maintain emotional resilience before, during, and after critical incidents.

The course content (thematic plan):

1. Emergency care for airway obstruction
2. Emergency care for adult cardiac arrest
3. Emergency care for pediatric cardiac arrest
4. Emergency care for massive external bleeding
5. Emergency care for shock and coma
6. Emergency trauma care
7. Emergency care for acute poisoning
8. Mass casualty triage
9. Breaking bad news
10. PFA and effective communication in emergencies. Psychological self-help and provider resilience

The course assessment

Several formative and summative assessment methods are employed to analyse participants' achievements and evaluate the effectiveness of the course:

– Checklists for the objective and standardised assessment of procedural tasks, communication and teamwork behaviors, and adherence to protocols or clinical guidelines.

– Direct observation and debriefing are used to evaluate critical thinking, situational awareness and self-regulation. These methods also facilitate the provision of immediate feedback and promote reflective learning following the simulation.

– Formative feedback should be ongoing and supportive, often delivered during or after simulations by instructors, peers, and standardised patients.

Pre- and post-tests are essential for objectively measuring the impact and effectiveness of a training course or programme. They also guide personalised feedback and learning plans for individual learners. By comparing scores before and after the course, we can quantify knowledge acquisition and/or skill improvement. The results of the analysis are used to assess instructional effectiveness in terms of content, delivery and methodology, identify learning gaps via analysis of question-level performance, support the provision of tailored feedback, promote self-reflection, and guide the customisation of future training.

The training course for medical students, *'First on the Scene: Emergency Care Simulation Training Course'*, was delivered by BSMU, KhNMU, and ONMedU. Each participant completed a pre-test consisting of 30-50 multiple-choice questions at the start of the course to analyse their initial level of knowledge, and a post-test at the end. Participants' achievements were systematically assessed and analysed, and both trainees and trainers evaluated the course through structured surveys.

ASSESSMENT AND EVALUATION OF THE TRAINING COURSE

Assessment of the training course. A total of 170 fourth-, fifth- and sixth-year medical students from BSMU, ONMedU and KHNMU successfully completed the ***'First on the Scene: Emergency Care Simulation Training Course'*** in the 2024–25 academic year. The following section provides a comparative analysis of the participants' performance, as measured by pre- and post-training assessments. This analysis highlights the gains in knowledge and competency development within the target group.

Figure 1 illustrates the impact of the 'First on the Scene' training course on participants' emergency care knowledge and readiness. The pre- and post-test results reveal a substantial improvement in performance among undergraduate medical students.

The 24.2 percentage point increase in the assessment score following simulation-based

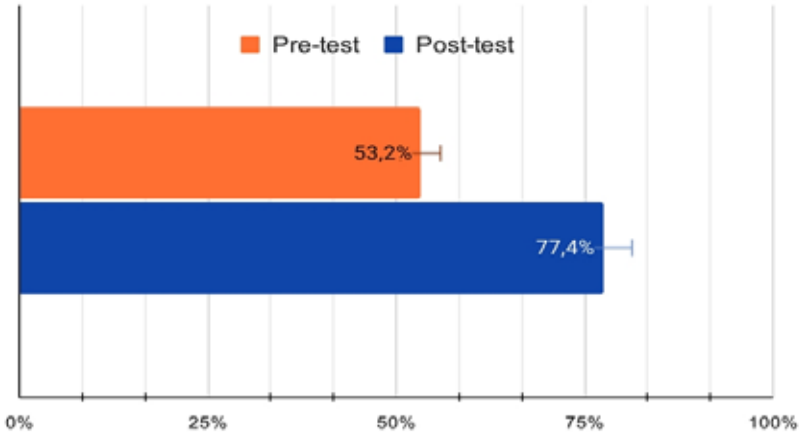

Fig. 1. Pre-test and post-test results, %

training indicates a significant improvement in students' performance. This notable gain indicates strengthened understanding of emergency protocols and enhanced decision-making under pressure. The training's effectiveness is attributed to its use of realistic simulations, structured debriefings, and formative feedback, which collectively fostered both cognitive and behavioural competencies. These results affirm the value of scenario-based learning in preparing future healthcare providers for real-world clinical challenges.

Evaluation of the training course. The evaluation survey was designed to analyse the effectiveness of the course, pinpoint areas for improvement, and evaluate the overall learning experience. It provides insights into how relevant, high-quality and practical the course content, structure and delivery are from the participants' perspective. Teachers and institutions use these findings to evaluate the course's effectiveness in achieving its learning objectives and supporting student learning. By analysing the feedback, instructors and institutions can evaluate the overall learning experience and pinpoint areas for enhancement. These findings are then used to refine the course materials, teaching strategies and assessment methods for future iterations of the course.

The next section summarises the results of the evaluation survey completed by medical students who undertook the *'First on the Scene: Emergency Care Simulation Training Course'* in the 2024–25 academic year. To gather qualitative and quantitative data, the survey comprised 25 open and closed questions about course content, teaching methods, quality of instruction, self-assessment of knowledge and skills acquired, and the learning environment.

To assess the learners' perceived improvement, participants were asked to self-rate their level of emergency care knowledge and skills before and after completing the course. The results are shown in (Fig. 2 A, B).

Prior to the course, the majority of medical students rated their emergency care knowledge and skills as limited, highlighting the urgent need for this group to receive foundational emergency training. Conversely, a significant increase in medical students' self-assessed knowledge and skills was observed after the course, demonstrating its strong effectiveness in enhancing competence in emergency care.

To evaluate the relevance and quality of the course content and instructional methods, participants were asked to rate the effectiveness of simulation training and virtual scenarios in facilitating the acquisition of practical skills (Fig. 3).

The results showed that most participants perceived both simulation training and virtual scenarios as highly effective in terms of gaining and applying knowledge, and mastering practical skills. This suggests that both training approaches were well received and impactful, with an almost equal split in perceived effectiveness, highlighting the complementary value of using both strategies in emergency care education.

After completing the course, participants were asked to rate their confidence in providing emergency care and psychological first aid in emergencies (Fig. 4).

The results show that 53% of medical students felt very or completely confident in their ability to provide emergency care after taking the course. This highlights the strong impact that the course had on increasing students' self-assessed competence in emergency response. Furthermore, 67% of medical students reported feeling confident in providing psychological first aid in emergency situations, suggesting that the course was highly effective in

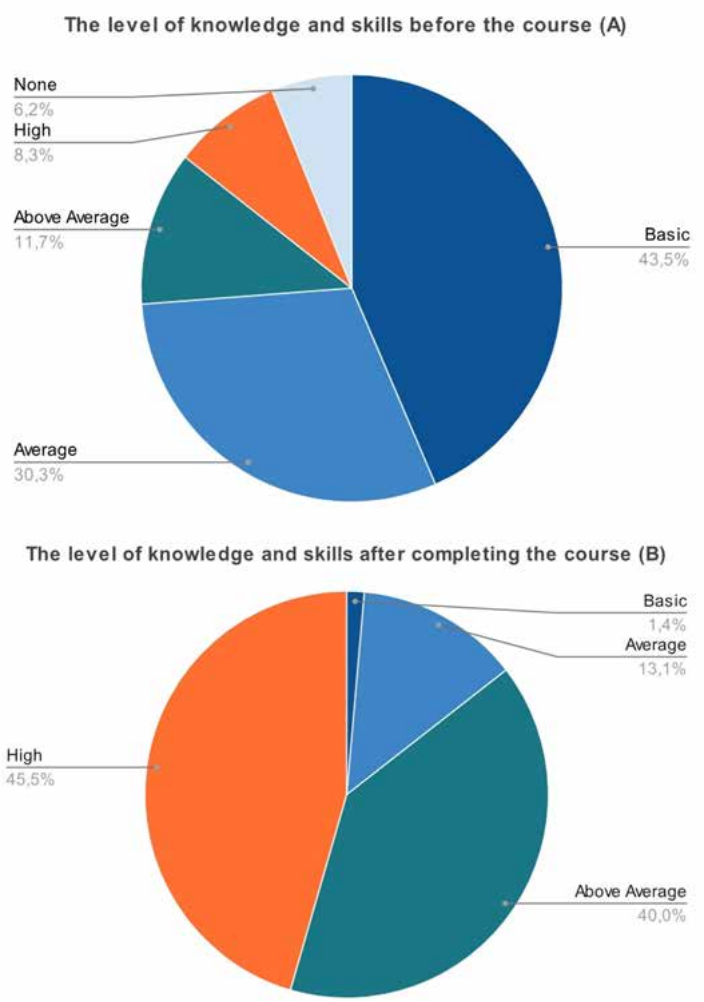

Fig. 2. The level of knowledge and skills before (A) and after completing the course (B), %

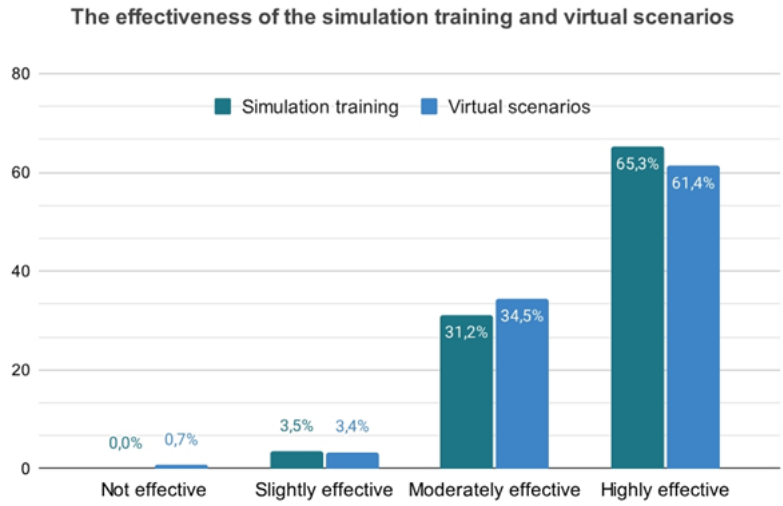

Fig. 3. The effectiveness of the simulation training and virtual scenarios, %

fostering psychological preparedness alongside clinical proficiency.

To estimate satisfaction with the learning outcomes of the course, we asked participants to indicate their level of agreement with the following statements: 1) The training course met its stated goals and objectives, 2) The course met or exceeded my expectations, 3) The course was relevant and useful for my

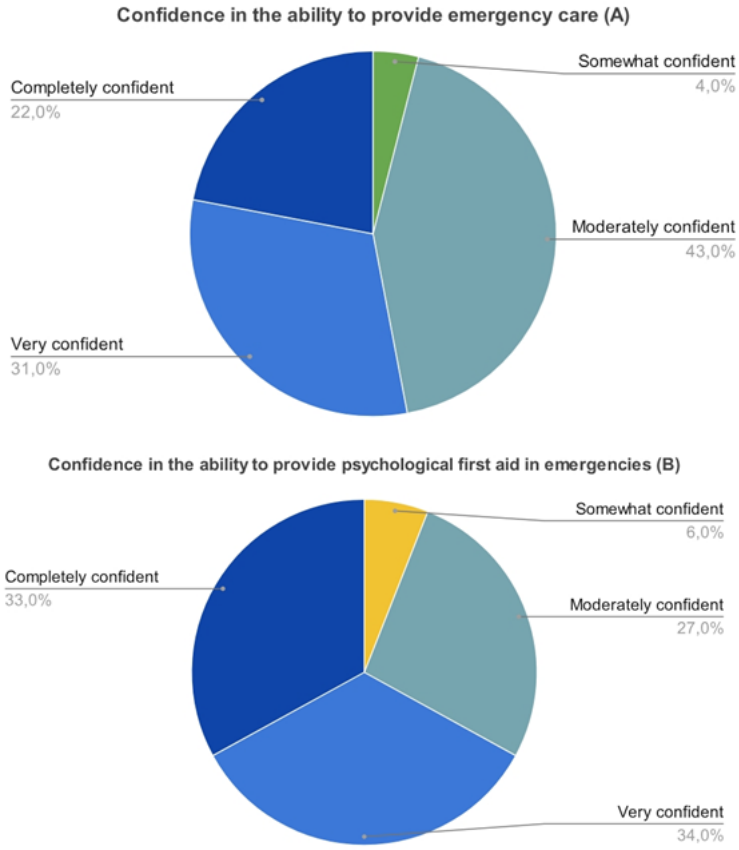

Fig. 4. Confidence in the ability to provide emergency care (A) and psychological first aid in emergencies (B), %

future work, 4) The course improved my professional competence and confidence, and 5) The learning environment was comfortable and safe (Fig. 5).

The results obtained highlight the strong positive feedback from medical students regarding the course's impact and effectiveness. Students were satisfied with the outcomes of the course and how well it aligned with their expectations. This reinforces the course's success in equipping future healthcare professionals with the practical skills and confidence needed for real-world emergency care. Course participants agreed that the learning environment was comfortable and safe, reflecting the course's success in providing a psychologically secure and supportive setting for emergency care education.

Finally, we asked students to indicate their overall satisfaction with the course (Fig. 6).

The high level of overall satisfaction among medical students with the *'First on the Scene: Emergency Care Simulation Training Course'* course highlights the course's positive impact and perceived value of the course in preparing students for real-life emergency situations.

In summary, quantitative assessments revealed significant improvements in knowledge and skill acquisition, with medical students achieving gains of 24 percentage points from pre- to post-training. These results were further reflected in self-assessments, with participants overwhelmingly reporting enhanced confidence in emergency medical interventions and psychological first aid. Beyond skills and scores, the training fostered a culture of preparedness, as demonstrated by high learner satisfaction: over 85% of participants confirmed that the course content aligned with or surpassed their expectations, was relevant to their professional duties, and enhanced their competence. Learners consistently described the environment as comfortable and psychologically safe – a positive reflection on the course's effective pedagogical design.

Conclusions. A total of 170 medical students participated in emergency care training courses developed and implemented under the SimS project during the 2024-25 academic year. Pre-training assessments revealed that most students had only limited or basic knowledge and skills, highlighting the importance of foundational instruction and scenario-based learning.

Post-training evaluations revealed substantial improvements in student performance, confirming significant gains in knowledge and practical skills.

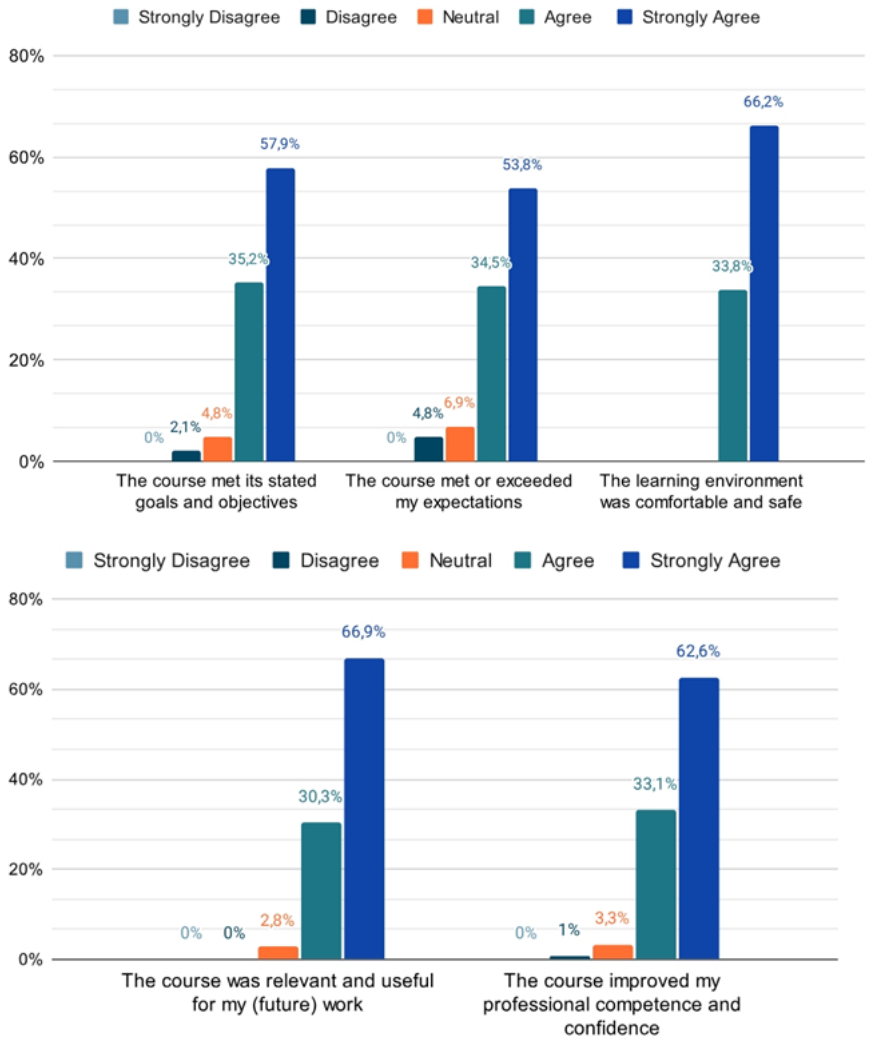

Fig. 5. Satisfaction with the course learning outcomes, %

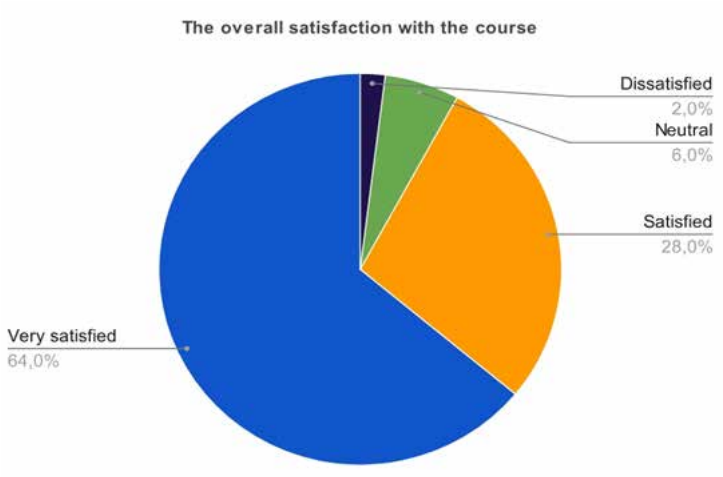

Fig. 6. The overall course feedback, %

Scenario-based learning (SBL) and simulation technologies were key contributors to this success, improving learners' decision-making abilities, situational awareness and emotional resilience.

Following the training course, over 90% of students from all universities reported feeling more confident in delivering emergency care and psychological first aid. Learners praised the realism,

clarity and impact of the scenarios and debriefings. The majority of students agreed that the course met or exceeded their expectations. The course was particularly valued for its practical relevance, the psychologically safe environment it provided, and the balanced integration of theoretical content with hands-on experience. Both virtual patient cases and live simulations were recognised as valuable educational tools.

The SimS *'First on the Scene: Emergency Care Simulation Training Course'* initiative has successfully delivered a positive educational experience, equipping Ukrainian medical students with the skills needed to act decisively and empathetically in emergency situations. With a focus on scenario-based learning and simulation, the courses have provided learners with the clinical and communication skills that are essential for an effective emergency response.

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