V4 Medical Simulation Centers Best Practices

Visegrad Fund

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DOI: 10.26399/978-83-66723-75-7

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Warsaw 2024

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Recommended by the Polish Society of Medical Simulation

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ISBN 978-83-66723-75-7
e-ISBN 978-83-66723-76-4

Lazarski University Publishing House
Świeradowska St. 43, 02-662 Warsaw

Visegrad Fund

The project is co-financed by the governments of Czechia, Hungary, Poland and Slovakia through Visegrad Grants from the International Visegrad Fund. The mission of the fund is to advance ideas for sustainable regional cooperation in Central Europe.

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INTRODUCTION

Modern medical education primarily focuses on acquiring and skillfully using theoretical knowledge to master practical skills that require critical and creative thinking. Consequently, the education process aims to develop all types of technical and non-technical competences, as well as learning outcomes (knowledge, skills, social competences) tailored to each medical field. These include areas related to the specificity of professional work, life activities, self-development, and cooperation with members of therapeutic teams.

Over the last 30 years, there has been significant evolution in education, with the most noticeable transformations occurring after 2010. These changes primarily coincided with advancements in technology and the adoption of mainstream educational models. They included the broadening of education to embrace protection outside of traditional care settings, as well as childcare, in line with societal expectations, medical science standards, and pedagogical techniques. Additionally, shifts in societal expectations now prioritize patient safety and ethical judgment in procedures involving living patients.

The joint integration of scientific communities in medical areas has provided the opportunity to share knowledge among representatives of the Visegrad Group countries.

In 2023, four universities collaborated on a joint project focused on Best Practices in the field of medical simulation development:

1. University of Szeged (Clinical Skills Center, Faculty of Medicine), Szeged, Hungary.
2. Pavol Jozef Šafárik University in Košice (Department of Medical Informatics and Simulator Medicine, Faculty of Medicine), Košice, Slovakia.
3. Masaryk University (Department of Simulation Medicine, Faculty of Medicine), Brno, Czech Republic.
4. Lazarski University (MedExcellence Medical Simulation Center, Faculty of Medicine), Warsaw, Poland.

The result of this cooperation is a manuscript that provides insights into one of the areas researched and taught by staff at the aforementioned universities.

Medical simulation is an intensively developing field of medical education that utilizes the capabilities of various simulation technologies. Simulation refers to using various educational methods, employing resources such as simulated patients (actors) and both simple and complex mannequins (trainers, simulators) to teach medical procedures and necessary interventions. Medical simulation is a method and technique that allows for the learning and training of both individuals and entire therapeutic teams by reproducing the conditions of a real clinical situation. This spectrum of educational activities covers not only work based on technological and computer objects but also significant human interactions in communication and crisis situations.

This process may involve a single case utilizing both advanced human simulators (HPS) and simulated patients – actors (SP), as well as trainers during the scenario, or it may consist of multiple cases implemented separately, depending on the available tools and resources.

Each medical simulation is accompanied by the following stages: assessment, verification, and discussion of the course of a specific clinical case. Depending on the established assessment criteria, the technical and non-technical skills of therapeutic individuals or teams can be assessed. In medical teams dedicated to working with patients, both skill sets are extremely important and desirable.

Medical simulation should also serve as a bridge connecting theoretical classes with clinical ones, preparing students to work in real conditions through training in a simulated environment – recreating the actual clinical environments in which various medical professionals work daily.

Medical simulation was created to enhance and accelerate learning. For this reason, the Association of American Medical Colleges (AAMC) has stated, "Simulation has the potential to revolutionize health care and address the patient safety issues if appropriately utilized and integrated into the educational and organizational improvement process."

Medical simulation teaching can vary depending on the knowledge level provided to students while maintaining compliance with the curriculum. Thanks to medical simulation, students have the opportunity to perform the same procedures in accordance with applicable standards or guidelines and propose treatments, which is not always feasible in hospital conditions. However, the purpose of simulation is not to replace clinical exercises at the bedside; rather, it serves as an addition to the educational process – a bridge connecting the didactic world with the clinical world.

The main benefits of teaching using the medical simulation method include:

- Improving patient safety
- Enhancing the quality of teaching
- Modeling scenarios
- Debriefing and case analysis
- Composing medical procedures and verifying their functionality
- Increasing the attractiveness of teaching

Depending on the level of advancement of the teaching process and the need to reflect actual clinical conditions necessary for conducting classes, medical simulation is divided into:

- Low Fidelity (LF) Simulation
  Low fidelity methods are utilized at the beginning of the teaching stage for medical professions. Typically, these methods involve repeating patterns demonstrated by the teacher. The primary task of LF simulation is to practice a given skill or intervention pattern. Low fidelity methods and tools are usually inexpensive and relatively easy to implement in the teaching process. However, learners generally do not have the opportunity to build the highest level of experience by linking acquired skills with the emotions experienced during this process. Achieving educational goals is complemented by the educator who provides constructive feedback in real time, immediately after the student demonstrates the skills. There is a wide range of LF simulation methods for which appropriate trainers are used.
  Many teachers use such a traditional model for teaching specific procedures in medical professions, based on the principle: the teacher presents, and the student performs (repeats multiple times). In this approach, the teacher typically demonstrates and explains a specific procedure, after which students practice it repeatedly. Currently, many effective low-fidelity methods are utilized, and a common feature among them is the real-time demonstration, either delivered by the teacher through a presentation or via previously recorded material.
- Intermediate Fidelity (IF) Simulation
  Intermediate Fidelity Simulation is a teaching model more advanced than the previously described low-fidelity simulation. It uses simple simulators where students can practice procedures woven into a simple medical case (scenario). The teacher, often present in the room, influences the course of these simple scenarios. This type of simulation still operates under assumptions and imaginations, as it is not yet fully realistic. The process shapes participants' behavior and influences their mastery of behavior patterns or algorithms. Pauses or even interruptions are possible during the script to explain difficulties or correct errors. Summarization is also most often achieved through feedback or a shortened form of discussion.
- High Fidelity (HF) Simulation
  High Fidelity Simulation requires the use of high-fidelity simulators – a full-fledged human figure with physiological and pathological features. Classes are conducted in high-fidelity rooms that mirror real clinical conditions in hospital facilities. These conditions allow for the creation of an autonomous

environment, in which participants make all decisions without the presence or support of a teacher/instructor. The simulation session includes several phases:

- Prebriefing: Time dedicated to introducing participants to the simulation environment where they will work, specifically devoted to familiarizing them with the conditions and equipment, and providing an opportunity to check the simulator's capabilities.
- Briefing (case briefing): This stage allows for presenting assumptions or tasks that participants are to perform during the scenario. It describes the clinical situation, event location, participants' roles, and assigns tasks.
- Scenario: The actual time spent working with the simulated patient – manikin, in the conditions previously discussed. Participants address a clinical problem faced by a patient under simulation conditions.
- Debriefing: Discussion of the scenario's course. This involves analysis and discussion of medical events in which students participated, serving as a specially moderated extended feedback session, often referred to as the "heart" of the medical simulation. The teacher, acting as the session moderator, encourages students to self-reflect, i.e., to draw conclusions regarding the decisions they made during the simulation. During debriefing, a helpful structure often used is: Emotion, Description, Analysis, and Application. This process begins with presenting emotions, followed by a chronological description of the scenario, its analysis, and application, i.e., drawing conclusions for future scenarios and clinical situations.
- Summary and end of the session.

The type of simulation using a Standardized Patient (SP), an amateur actor who plays the role of a patient according to the simulation scenario's assumptions, should also be mentioned. This type of medical simulation is an educational tool that improves soft skills based on communication with the patient.

In addition to simulation using a Standardized Patient, there is a hybrid simulation, which combines simulation equipment with live patient interaction. This approach allows for the improvement of procedures while also enhancing realism through communication with a live person.

Medical simulations can be further divided based on the location in which they are conducted. The primary setting for this modern method of medical education is the medical simulation center, which offers near-laboratory conditions for training exercises. The second setting is the actual working environment of medical staff, known as "*in-situ* simulation".

In-situ simulation takes place in the most realistic environment, i.e., the working environment of medical staff (patient care).

In order to achieve a high level of fidelity and realism, training sessions (which include verification of skills, audits, and assessment of procedures) can take place in the medical staff's own environment of everyday clinical practice. Such simulations mean that there is no need for a prebriefing stage (familiarization with the equipment) before they are carried out, as the staff works in conditions familiar to them. This offers the opportunity to check their knowledge and equipment, correct therapy or implemented procedures, influence work ergonomics, and much more.

A systematic increase in the quality and availability of medical services is possible when the effects of actions taken are long-term. Supporting the medical staff education system is one such activity.

Effective teaching is a responsible process that requires a strategic approach and appropriate structure or organization. Modern medical education focuses on enabling learners to gain practical skills, the ability to think critically and creatively, and use theoretical knowledge.

Education using the techniques and possibilities of medical simulation should be an indispensable standard in medical fields, allowing academic teachers to create an unlimited clinical space, and students to take advantage of the opportunity to test theoretical knowledge in the created realities of simulated diagnostic and therapeutic paths.

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CHAPTER 1

INTEGRATING MEDICAL SIMULATION TECHNOLOGY INTO MEDICAL TRAINING

DOI: 10.26399/978-83-66723-75-7/j.majernik/l.dimunova/b.gress-halasz/v.pencakova/j.janosik

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Integrating Medical Simulation Technology into Medical Training

The challenging era of modern medical education driven by the latest advancements in technology and clinical procedures, is also impacting the historically established, traditional approaches used to prepare medical and healthcare workers for their professional career. Medical universities and faculties have transformed, or are currently transforming their curricula to meet these challenges and to ensure the highest quality of education. Considering a wide range of educational tools and methods, virtual patients and simulation-based learning hold an irreplaceable place. These methods have great potential to meet the requirements for providing a student-centered teaching approach, as well as improving the knowledge, attitudes, practical skills, and behavior of healthcare professionals.

Various simulation methods and forms, including standardized patients, mannequins, and interactive computer simulations – also known as virtual patients – have been implemented into the medical curriculum. The term "virtual patient" is frequently used across academic publications, but its meaning varies and often leads to some level of misunderstanding or confusion. However, the primary forms of educational virtual patients presented in the literature are interactive patient scenarios. Virtual patients are widely accepted by learners as they provide immediate feedback, allow them to work anytime and anywhere, and most importantly, ensure that wrong decisions have no fatal consequences for real patients.

In general, simulation-based learning, in the form of virtual patients or clinical cases, is a learning method based on specific computerized software that simulates real-life clinical scenarios. When playing a virtual patient, learners act as healthcare providers, who usually have to obtain the patient's history, conduct the patient's physical examination, understand and explain the results of various laboratory tests, and make diagnostic and therapeutic decisions. Unlike real practice, learners interact with their virtual patient through the selection of predefined options, which generate appropriate responses. This type of simulation is safe, can be repeated, and the learner's assessment produces objective results. Historically, the first virtual cases were designed with linear scenarios, in which learners followed an ideal path. To infuse more student-centered activities and a feeling of reality into the scenarios, most of the contemporary virtual cases are designed with a branched structure. Such cases employ more complex situations and interactions, which force students to think and make decisions, evaluating different options and relations with their previous decisions. To increase the impact of practical application of virtual patients in the educational process, they have to be developed with respect to their authenticity. In this way, the quality of self-directed learning can be increased and the goal of enhancing learners' clinical reasoning skills can be more efficiently fulfilled. However, it must be realized together with the adequate technical background, as the learners' perception is also affected by the format in which the virtual patient is offered to them and the quality of computer representation.

Body Interact™ (BI)

There are various software- and hardware-based tools offering an immersive learning environment that mirrors real-life clinical scenarios, including emergencies, outpatient and inpatient management, consultations, etc. One of the complex solutions developed to master clinical teaching in medical and healthcare services is Body Interact™ [1].

This type of simulation device is based on simulating reality through a specific case and situation in different clinical and healthcare environments. The simulation-based method integrated into this educational tool allows students and practitioners from the medical, nursing, and healthcare disciplines to comprehensively train their knowledge and skills through particular case solving. BI and its cases offer several levels of difficulty for each discipline and/or level of expertise. Simulations can be run within the simulation center with access to the facility and the BI device (Figure 1.1), or as an application in a shortened version (Figure 1.2) that the user can access anywhere and anytime.

Figure 1.1 Body Interact™ Table

Participants of the educational activities can complete the simulation with a facilitator, or alternatively, if they are familiar with the technical aspects of BI, they can self-train in their own time and at their own pace, booking a date and time at the simulation center.

Figure 1.2. Body Interact™ Application Using a Tablet, Smart Phone, or a Computer

Content: Case Simulation

BI offers a library of hundreds of virtual patients and their cases in scenario format for pre-hospital, consult, hospital emergency, acute, or long-term care settings. Learners or training participants can engage in the simulation either as a small group or individually, depending on the organization of training units and the learning objectives and outcomes that need to be achieved. Given the nature of the facility and the simulation itself – in terms of content and target group – the facilitator must adjust the proper number of participants. Depending on the competencies of future professionals, some simulated cases using BI may also be multi-professional. BI offers users high-fidelity simulations. The simulation itself consists of three main parts: briefing, scenario, and debriefing.

Prebriefing and Briefing

Before the simulation begins, both the facilitator and participants need to familiarize themselves with the facility, the BI device, the content that BI offers, and the expectations of the high-fidelity simulation. They should understand what the simulation will entail and what is expected of them throughout its different phases.

If a small group of participants is involved in the simulation, the facilitator can divide them into an intervention group and a group of observers. The latter will passively observe the performance and then actively participate in the evaluation part of the simulation. The necessary tools include a BI device with a touchscreen or another device with the BI application downloaded, and, if necessary, a whiteboard or paper on which participants can write notes. BI allows participants to press any relevant icon on the screen repeatedly if they forget any previously seen information.

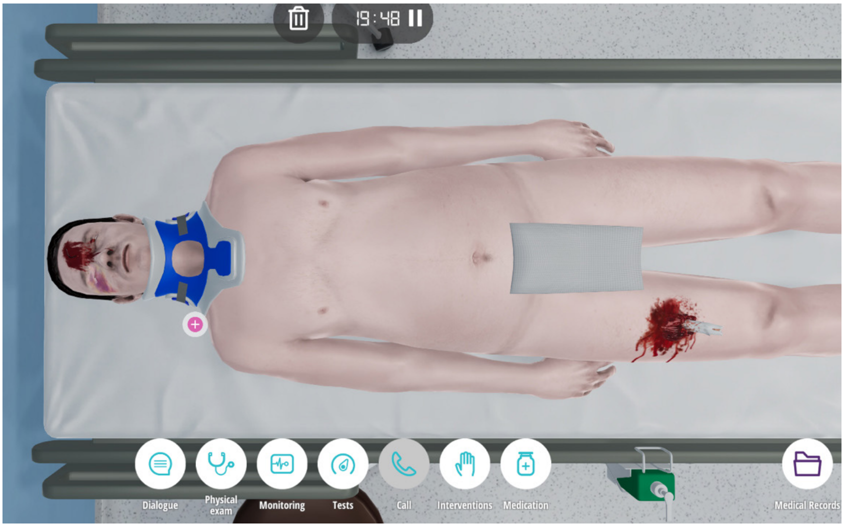
Scenario

Each patient case begins with a short briefing (introduction) that contains basic, important information about the situation, which participants need for their further work (Figure 1.3). Immediately after the case briefing, participants are informed of the timeframe for solving the case. They then press the "Solve Case" button to start working.

Figure 1.3. Short Case Description and Basic Information about the Patient

On the device screen, virtual patients and their available characteristics can be shown or hidden using several icons located at the bottom of the screen. This scenario menu is intuitive and easy to navigate. Each icon offers steps that participants can select to further work with the information provided or to perform virtual interventions. It includes seven standard icons: "dialogue", "physical examination", "monitoring", "tests", "call", "interventions", and "medication" (Figure 1.4). The virtual patient view can also be changed.

Figure 1.4. Body Interact Menu



Touching the **dialogue** icon displays several possible categories of questions (Figure 1.5a and 1.5b). BI allows users to select a domain and then choose a specific question from the dropdown menu offered by the scenario prepared for that particular simulation. It is up to the participants to select the areas and specific questions that are most relevant to the situation and follow-up activities.

Figure 1.5a. Menu of the Dialogue Icon

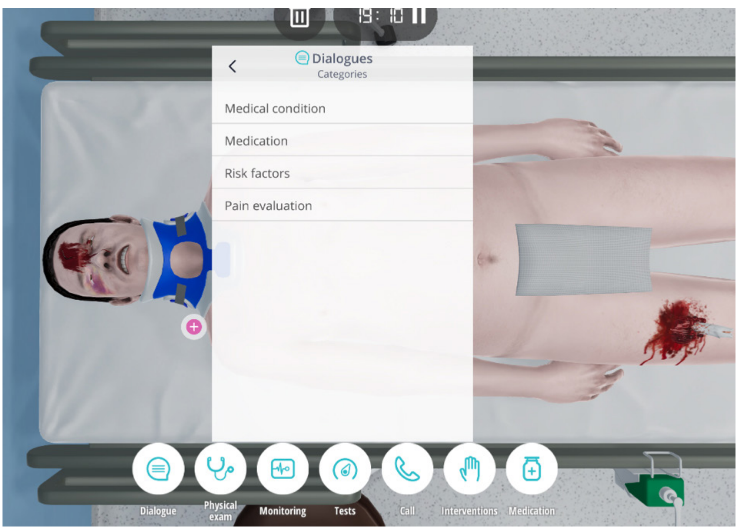
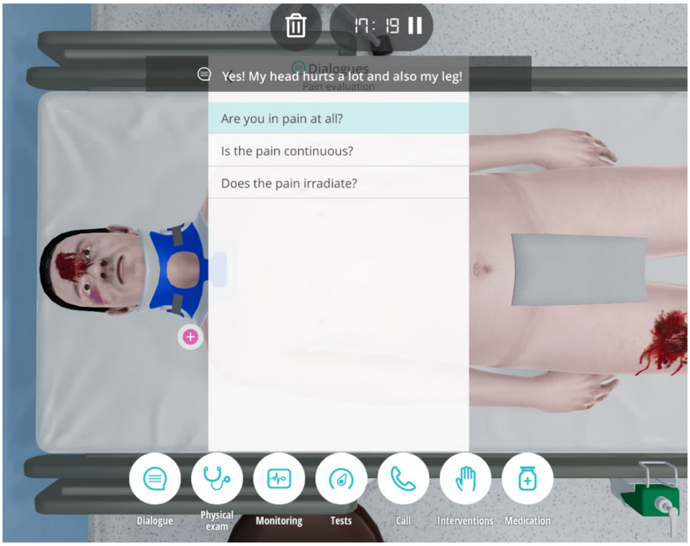
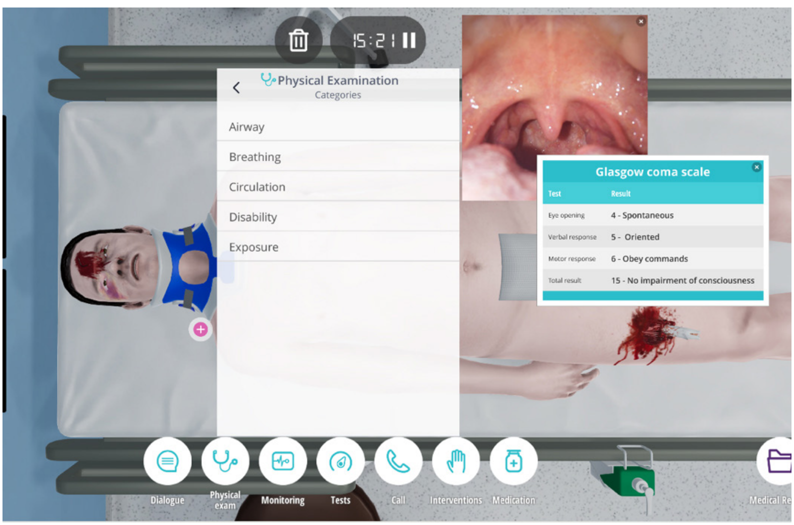


Figure 1.5b. Menu of the Dialogue Icon



As part of the **physical examination** option, participants can select appropriate steps from a dropdown menu and perform a virtual physical examination (Figure 1.6). They will receive the results instantly either as a sound (e.g., auscultation, percussion) or in written format (e.g., pulses palpation, Glasgow Coma Scale results, etc.).

Figure 1.6. Menu of the Physical Examination Icon



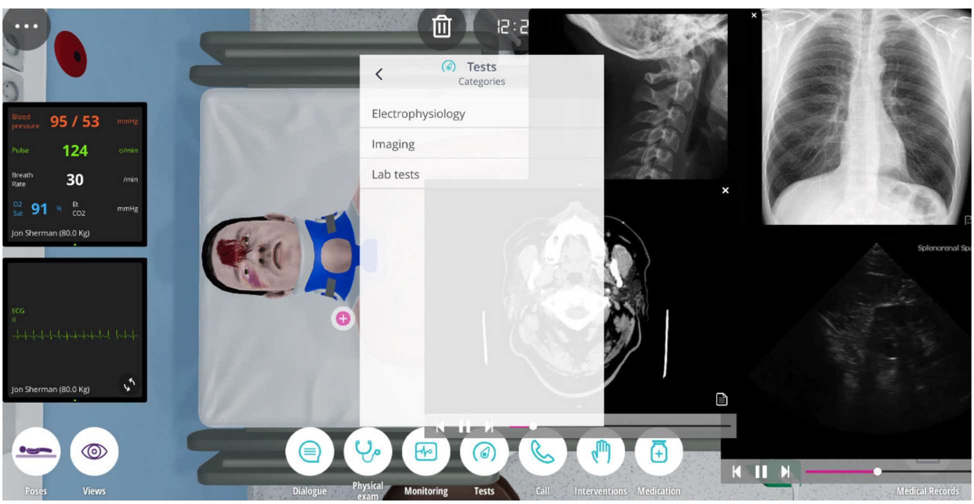
However, participants may choose to monitor the patient as a first or second step. They do not have to follow the order of the icons that appear on the screen.

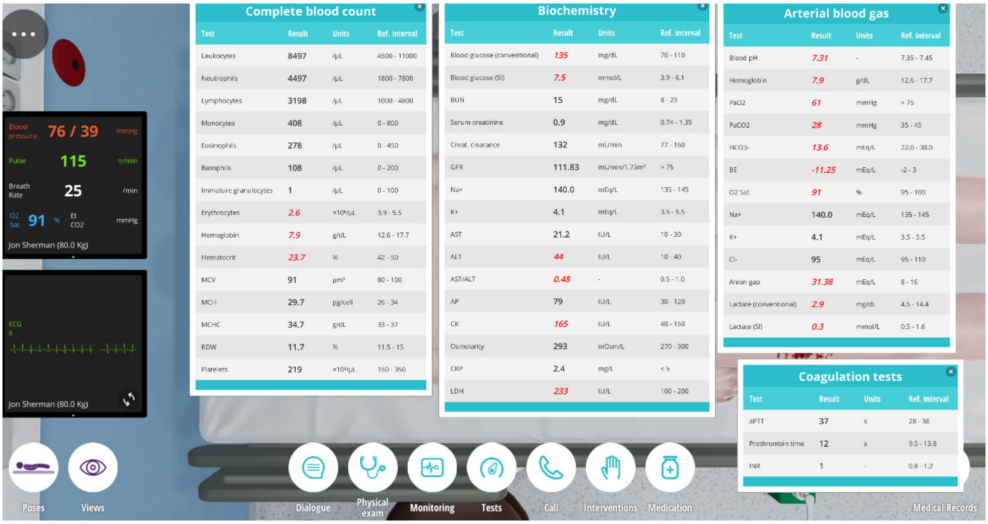
The **monitoring** option allows participants to monitor current vital signs (Figure 1.7). Participants select from a dropdown menu which vital signs they want to be displayed and triggered, so they can be evaluated at any time throughout the scenario.

Figure 1.7. Menu of the Monitoring Icon

Testing can also be carried out at any time as required. It includes on-site, laboratory tests, and imaging tests (Figure 1.8a and 1.8b). The results will be displayed in a few seconds as popup windows. The visual results of the imaging tests resemble actual clinical results, allowing for detailed evaluation as needed. Any of these tests can be used and checked repeatedly to offer participants up-to-date results.

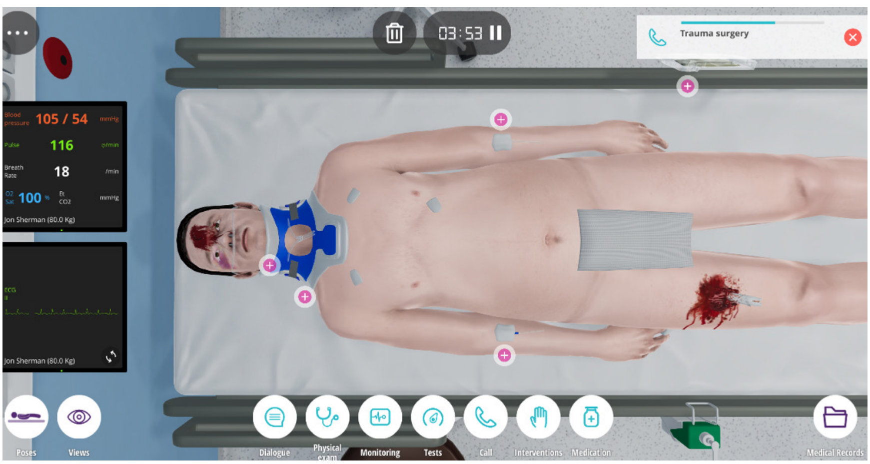
Figure 1.8a and 1.8b. Menu of the Tests Icon





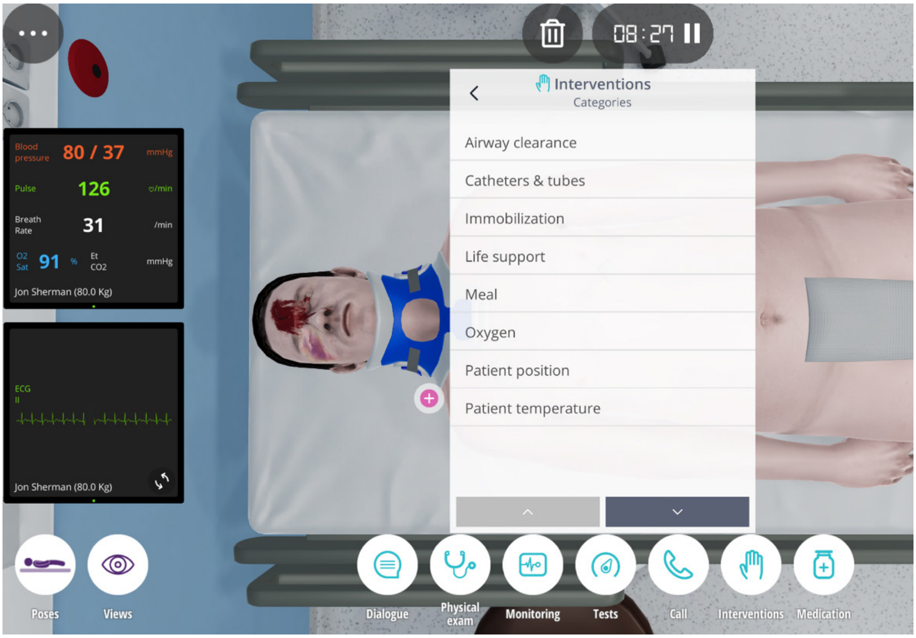
The **call** option represents the opportunity to consult with an expert as needed (Figure 1.9). Again, participants choose from a dropdown menu and within seconds receive a written response and recommendation from the expert in the form of a popup screen.

Figure 1.9. Menu of the Call Icon



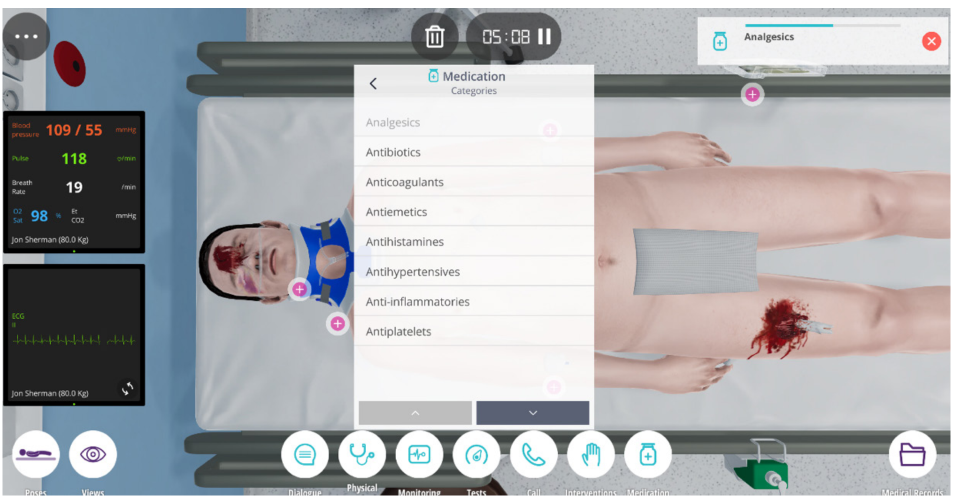
Interventions can be carried out practically as needed (Figure 1.10). This option includes various areas of clinical interventions such as the insertion of a peripheral IV catheter, urinary catheter, administration of blood transfusion, administration of IV fluids and electrolytes, application of an oxygen mask, etc.

Figure 1.10. Menu of the Interventions Icon



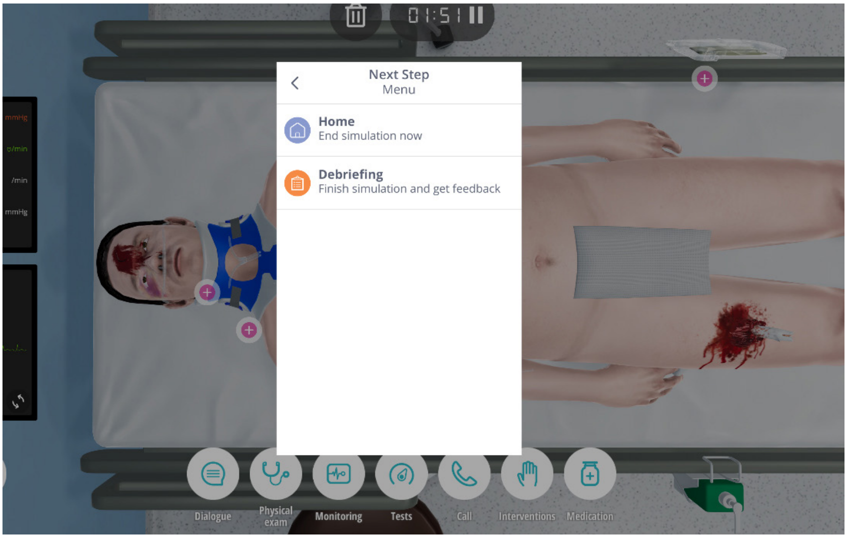
The **medication** option allows for the virtual administration of any relevant drug that the participants decide to administer to the patient (Figure 1.11). It offers a wide range of generic medicines. The effects of the administered medication can then be checked on the vital signs monitor or other results from relevant tests and procedures.

Figure 1.11. Menu of the Medication Icon



Any particular virtual case that the participants solve is limited by the time set by the facilitator at the beginning of the simulation. Therefore, the scenario ends either when the case is resolved or when the set time is up (Figure 1.12). The simulation process then continues with the evaluation and debriefing phase.

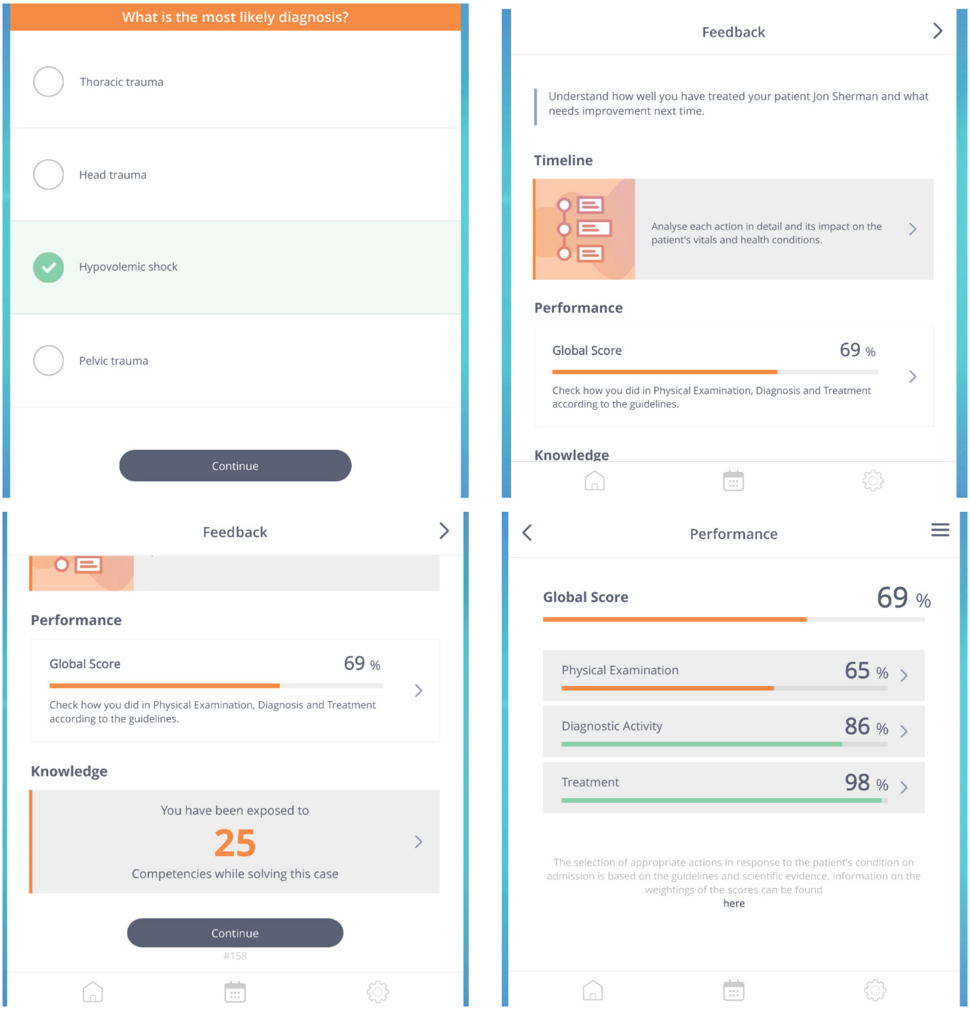
Figure 1.12. The End of Case Solving



Debriefing

Depending on the aims of the simulation, the debriefing part can be facilitated or not. The first screen in the assessment asks participants to choose a general diagnosis by selecting the correct one from several suggestions. Subsequently, the evaluation part of the scenario offers a summary where the total score, expressed in percentage, defines the success rate of the solved case. After clicking on the global score, BI displays the specific areas with the corresponding scores. Individual areas can be assessed, and the participants will now see which interventions had priority, which were secondary or unnecessary if they were selected during the scenario. This summary provides detailed feedback to the participants on where they have been more successful and where they may have made minor or major mistakes. Participants can also see the list of interventions to which they were exposed (Figure 1.13).

Figure 1.13a, 1.13b, 1.13c and 1.13d. Detailed Feedback and Debriefing of the Simulated Case



This detailed time report reflects the performance of the participants and aids in the overall feedback and evaluation. Participants can understand the correct and incorrect decisions they have made. At the end of the debriefing part, they are offered a take-home message.

Evaluating Simulation Using Body Interact

Dimunová et al. conducted research on implementing of simulation in health professions education [2]. The main aim of the evaluation procedures of this first experiment after implementing simulation in education was to map and assess students' feedback on the learning environment. After the implementation of simulation including the use of Body Interact™ technology in the learning processes at the Medical Faculty of Pavol Jozef Šafárik University in Košice, Slovakia, students rated the learning environment at a satisfactory quality level.

Simulation plays an important role, as the authors found not only from the results in the questionnaire but also from informal discussions with students. The evaluation of the learning environment is significant in terms of optimizing teaching by reflecting both positive and negative aspects of teaching and the associated impacts.

The use of simulation methods in the clinical subjects of nursing, general medicine, and public health students can be considered a modern and beneficial approach, as confirmed by Dimunová et al. [2] as well as by several international research studies. The applied assessment tools allow for empirical data on how students perceive the simulation that leads to specific decisions. The overall perception of simulation by students of health disciplines was positive. The domains prebriefing, learning, self-perception, and debriefing were positively and significantly correlated with each other. Differences in perceptions were found particularly between general medicine and public health students, and between nursing and public health students, with public health students reporting the lowest perception values. This may be influenced by the content and focus of study of each discipline in the first three semesters of the course.

There are very similar positive results in comparison to existing research on simulation evaluation. Therefore, it can be concluded that students perceive simulation as beneficial to their learning and that it also increases their confidence in professional activities. Debriefing remains an important process of any simulation. Numerous studies using the same assessment tools in the context of implementing simulation in the education of healthcare students as an innovative progressive-educational method confirm several positive results. In this investigation, more significant shortcomings were found in terms of teachers' authoritarian approach and overstepping of the factual curriculum. An authoritarian approach and an excessive emphasis on factual learning can significantly undermine students' motivation and willingness to learn. It is therefore essential to focus on definitive areas and make the necessary changes. Understanding students' perceptions of their learning environment plays a key role in the design and implementation of a holistic curriculum. In addition, it is a suitable basis and tool for the objective evaluation of the learning environment not only to assess quality but also to specify deficiencies to correct them afterward [3].

Simulation is a form of experiential learning that allows focus on specific areas of activities. Students learn at their own pace, without fear of damaging the health of an actual patient. Simulations provide a wide range of opportunities for practice and are one of the most effective ways of designing learning environments. Simulation-based learning is suggested to be used even from the beginning of a degree program because it works well for both beginner and advanced students [4]. Preparing students using simulation methods provides a foundation for gaining clinical competencies and experience. Simulations pose a challenge to educators whose activities in designing and facilitating simulations require creativity, continuous progress in preparation to meet educational needs in the context of current educational opportunities. Guidance and support from educational institutions in applying modern learning through simulations are prerequisites for the students' success in preparing for their future profession.

Advantages and Disadvantages

The primary advantage of using the Body Interact™ device for simulation is that students can learn in a safe environment without risking harm to real patients. They can also learn at their own pace, with or without facilitation, and repeat the simulation as often as needed to enhance their performance. The Body Interact™ scenarios provide high-fidelity simulations that improve participants' decision-making, reasoning, and critical thinking skills, focusing particularly on soft skills while excluding hard skill performances. On the downside, the scenarios may not always align with local policies related to the competencies required for each future or current healthcare professions, such as paramedics or advanced nurse practitioners. There might be overlapping competencies across different professional categories within the scenarios. Some guidelines and clinical recommendations in particular scenarios may be too general and not reflect specific steps or actions required by local standard diagnostic, therapeutic, and preventive practices. Therefore, it is recommended that facilitators (or assistants/assigned staff) are familiar with the offered scenarios and guide participants to avoid any misunderstandings. However, there is also the possibility to create custom scenarios tailored to local policies and learning goals.

Conclusion

This simulation modality allows students and practitioners to develop and enhance their decision-making skills, clinical reasoning, and critical thinking in a variety of environments. It offers an interactive learning experience using high-fidelity simulation. Participants' engagement is heightened by the flexibility to access scenarios anytime and anywhere, on any device, allowing them to rehearse and refine their skills in a risk-free environment.

Simulation is a strategy that requires careful planning and dedicated time for teaching. The introduction of any new teaching method necessitates an evaluation of its effectiveness. Even though simulation is a relatively new learning platform in health programs, its impact needs to be assessed. Positive outcomes can motivate educators to become more involved in developing scenarios, implementing simulations, and enhancing the education of future health professionals with due diligence. Recent research indicates that students find simulation beneficial for learning and that it boosts their confidence in professional activities.

Debriefing remains a crucial component of any simulation. Employing simulation methods prepares students by laying a foundational framework for gaining clinical competencies and experience. Educators face challenges in designing and facilitating simulations that require creativity and ongoing development to meet educational demands within the current landscape. Guidance and support from educational institutions in applying modern educational methods through simulations are essential for student success in preparing for their future professions.

In conclusion, considering local clinical policies for diagnostic, therapeutic, and preventive interventions across professional categories, the Body Interact™ simulator is ideal for enhancing soft skills, provided participants are assisted in selecting the appropriate scenario and made aware of key differences between the scenario content and local practices.

About the Center

- Full name of the Medical Simulation Center (in original language):
  Centrum simulátorovej a virtuálnej medicíny
- Full name of the Medical Simulation Center (in English):
  Center of Simulator and Virtual Medicine
- Names and academic titles of Center' s Team:
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List of Medical Fields/Specialties taught at your Center
The center offers opportunities to study and develop skills in areas such as anatomy, nursing, first aid, anesthesiology and intensive care, emergency medicine, physiology, internal medicine, gynecology, obstetrics, neonatology, pediatrics, surgery, cardiology, dental medicine, and more. The list is continuously expanded based on curriculum changes and the needs of teachers and learners.

Description of the Center

The Center for Simulator and Virtual Medicine at the Faculty of Medicine of Pavol Jozef Šafárik University in Košice, Slovakia, represents a new era in the interactive teaching of medical and non-medical study fields, bringing a fresh perspective to modern solutions in teaching and learning processes. The Center equips students with the means to augment their theoretical knowledge with practical training on a variety of simulators, ranging from low to high fidelity to ensure the most realistic simulations possible. Boasting more than 30 simulators and other equipment, it is currently the largest simulator center in Slovakia. Students practice on a range of devices from interactive teaching aids and multimedia tables with software that includes virtual patients for training and solving various clinical scenarios, to a virtual laparoscope offering a virtual operating room environment. Since its establishment in 2021, the Center has significantly enhanced the standard of teaching at both undergraduate and postgraduate levels at the Faculty of Medicine of the UPJŠ in Košice.

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CHAPTER 2

COMMUNICATION AND TECHNICAL SKILLS: THE ROLE OF THE SBAR TECHNIQUE AND MICROSURGERY IN SIMULATION-BASED SURGICAL EDUCATION

DOI: 10.26399/978-83-66723-75-7/a.sarusi/z.peto/a.rutai/m.boros

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Introduction

The University of Szeged Clinical Skills Center has joined the V4 Network of Medical Simulation Centers Project, coordinated by Lazarski University in Warsaw, Poland, in collaboration with Masaryk University in the Czech Republic and Pavol Jozef Šafárik University in Košice, Slovak Republic. The main objective of this project is to promote cooperation between medical skills centers in the regions and to develop health science simulation training in the V4 countries. As part of this initiative, best practices at each of the centers were introduced and explored through study visits and hands-on workshops. In addition to showcasing the educational benefits of the surgical-microsurgical technical background at Szeged (our professional specialty, see below), we aimed to highlight a critical component of our pedagogic system, which has stood the test of time and is considered good practice. Notably, while all areas of medicine are team-based, effective teamwork is particularly emphasized in invasive-manual surgical areas. The transfer of information always plays a crucial role in healthcare, but miscommunication or inadequate data exchange particularly impairs patient safety and the overall quality of practice during perioperative care, night-time handovers, or emergencies. Furthermore, poor interdisciplinary communication can reduce the efficiency of joint performance, and a disrupted organizational flow can lead to diagnostic or treatment errors. This is why we have chosen to incorporate the SBAR tool in our curriculum, a method that offers a solution to these challenges.

The SBAR Technique

SBAR stands for “Situation, Background, Assessment, Recommendation.” Originally developed by the U.S. Navy and modeled on nuclear submarines, this scheme facilitates rapid and appropriate interprofessional communication and accurate information exchange. SBAR organizes information into a concise structure that is easily comprehensible to the receiving party:

1. **S**ituation: Identification of oneself, the patient, and the problem. The existing circumstances are briefly outlined, including the patient’s name, age, gender, and current condition (leading diagnosis and condition following trauma or intervention). Reference should also be made here to the patient’s current critical status.
2. **B**ackground: A focused patient history with relevant elements, the patient’s current chief complaint or condition. A concise summary of additional information necessary for an objective assessment of the problem is provided,

including previous illnesses, medications, risk factors, and allergies as well as biographical circumstances that should be given special consideration in care.

3. **A**ssessment: Vital signs and their main changes, assessment of severity, stable/unstable status, and impressions relevant to care. A focused presentation of the objective examination findings obtained aims to provide an accurate picture of current health and care status.
4. **R**ecommendation: Precise indication of the need for further care, clarification of timeliness, agreement on further therapeutic steps. Planned further treatment should be outlined, including expected course of treatment. Possible complications should also be explicitly addressed.

This communication method is a skill that can only be mastered through practice. Often, it is the youngest residents who first encounter patients in serious conditions, making it particularly important for them to be able to accurately assess whether the patient's condition is deteriorating or becoming critical. They should thus be equipped to initiate a care plan that allows the patient to be properly managed by their superiors and, if necessary, referred to other specialties or transferred to the next shift in a structured manner.

As our students transition directly to bedside practice after the preclinical modules, we have prioritized teaching effective medical communication from the early years of undergraduate training. Bedside medicine consists of numerous small building blocks of practical implementation of theoretical foundations, connected by several tight communication links. With this in mind, the University of Szeged Clinical Skills Center has introduced systematic teaching and practice of communication skills alongside manual-technical skills in all relevant subjects. To reiterate, effective communication is particularly crucial in surgeries and emergency cases where there is no time for lengthy diagnostics or consultation [1,2].

In the practical part of this curriculum, we aim to equip our students with the fundamental manual skills necessary for the primary care of critically ill patients. This includes tasks such as assessment of vital signs, basic resuscitation, manual and instrumented airway clearance and maintenance, ventilation, monitoring, defibrillation, ECG recording and analysis, intravenous cannulation, drug administration, blood typing and transfusion, blood gas sampling and analysis, spinal, limb, and full body immobilization, and advanced resuscitation techniques for both adults and children. Students in classes IV, V, and VI are expected to apply the skills they have already acquired in increasingly complex, interdependent simulated environments, resolving challenging scenarios in teamwork. Immediately after the scenario is presented, we employ the SBAR patient management system, and similarly at the end of the simulation, we always expect students to refer to the patient and the case, call for assistance, and hand over the patient to another colleague or team using the already introduced SBAR system. In this scheme, we consistently utilize small group teaching with 5–8 student members, where everyone has the opportunity to take on the role of team leader. Throughout these exercises, we also place emphasis on developing a number of additional non-technical skills:

1. The team leader's responsibilities include planning ahead, delegating tasks, considering the abilities of team members, creating a positive atmosphere to motivate them, making clear decisions, and communicating these decisions effectively. Additionally, the team leader determines the need for further action, summarizes the case, and refers the patient for definitive care based on the SBAR system.
2. Team members execute their assigned tasks, provide clear feedback on the success or failure of these tasks, communicate and cooperate with each other in a non-disruptive manner, and assist the team leader when necessary.
3. Our instructors assume the role of the colleague to whom the student refers the patient. If there are any issues with the referral – such as excessive, insufficient, or unstructured information – the instructor can guide the student interactively with targeted questions to ensure correct information transfer. According to feedback from questionnaires collected over the years, this structured, well-organized approach routinely enhances effective and clear medical communication by the time our students enter the workforce.

Another important aspect of this approach is that novice doctors and healthcare professionals often struggle to accurately assess the severity and urgency of a condition, even after conducting a detailed physical examination using the ABCDE rapid assessment. Research has shown that severity scoring systems can greatly alleviate this challenge. Therefore, we also incorporate the Wellington Early Warning Score system into out training for assessing the severity of a patient's condition. This straightforward, calculable scoring system appropriately weights the parameters obtained during the ABCDE rapid assessment, with the resulting score helping to determine the need and frequency of re-examinations by attending physicians and nurses.

Although high-quality research on the SBAR method is limited (and we are no exception), several studies have demonstrated its effectiveness in improving patient safety. A systematic review summarized the results of three clinical trials and eight studies with before-and-after structures, reporting 26 outcomes. Of these, eight showed significant improvements, eleven indicated slight improvements, and six showed no significant changes [3]. Another recent study surveyed patient satisfaction before and after healthcare workers participated in

SBAR training, finding significant differences in median scores between pre- and post-intervention groups regarding nursing handovers, patient satisfaction, and acceptance of health professionals [4].

The following paragraph provides an example, among many possibilities, with brief descriptions, illustrating how we set up a scenario for students to assess and screen a patient for appropriate referral to the final care facility using the SBAR system.

Situation: Specifies the exact location (emergency department, operating room, internal medicine ward, ambulance, general practitioner's office, etc.). The reason for contact is also specified (e.g., a nurse calls because their patient is experiencing worsening shortness of breath, has chest pain, has become unconscious, patient's Early Warning Score is increasing, resuscitation has been initiated, etc.).

Background: Provides details such as age, gender, and current medical investigations (e.g., undergoing investigation for renal failure, treatment for community-acquired pneumonia for 2 days, presented with chest pain 1 hour ago, was discharged from the operating room 4 hours ago following rectum resection, rescued from the wreckage after a high-energy motor vehicle accident, etc., is free of significant underlying diseases, is undergoing long-term treatment for underlying diseases, etc.).

Assessment: Describes the patient's current state (conscious, unconscious, pale, wheezing, bleeding, apparent injuries to body parts from A to Z).

Recommendation: Outlines the actions requested by the nurse (e.g., examine the patient as soon as possible, take over the initiated resuscitation, accept the injured individual at the Emergency Department).

After the student team (leader and members) has examined the patient and initiated treatment, they determine whether the patient is in a stable, potentially unstable, or unstable condition. They then decide on further actions for the patient, such as transportation for imaging diagnostics, surgical consultation, admission to the cardiology department, or placement in the ICU. It is always expected that the student will present the patient to another healthcare professional, but in many cases, they are also asked to provide information to the relatives. Presenting the patient to another colleague always follows the SBAR format. Our experience shows that communicating with relatives, which requires a significantly different language from professional communication, is also greatly facilitated by structured information delivery according to SBAR. Next, let us demonstrate a few more direct, exemplary details:

Situation: My name is Dr. X, a resident in the emergency department. I am requesting an intensive care consultation for a patient with diabetic ketoacidosis.

Background: The patient, a 22-year-old female undergoing long-term treatment for SLE, was brought in by relatives due to altered consciousness. She has no other known or treated medical conditions. Her symptoms began yesterday with dyspnea and confusion.

Assessment: From the ABCDE rapid assessment, it has been noted that she exhibits Kussmaul breathing with a respiratory rate of 35/min. Her blood pressure is 100/50 mmHg, and her heart rate is 140/min, accompanied by a significantly prolonged capillary refill time. She is somnolent, without evident neurological deficits. Initial blood glucose was measured at 38 mmol/L. Blood gas analysis indicates a pH of 7.05, HCO_3 of 10 mmol/L, and lactate of 7 mmol/L. She has exhibited upper respiratory tract symptoms accompanied by fever for the past two days, but currently, her body temperature is normal.

Recommendation: We have initiated fluid resuscitation and administered insulin and potassium. Due to the need for close patient monitoring and frequent blood gas checks, placement of an arterial cannula was necessary. Please come and examine the patient and decide whether she should be admitted to the intensive care unit. Is there anything else I can do for the patient before you arrive?

After the conclusion of this scenario, the following example illustrates a proposed method to inform relatives:

Situation: Hello, I am Dr. X, an emergency physician. Are you Mrs. Y, our patient's mother? The patient has given us permission to provide you with information about her condition.

Background: The patient's confusion and changes in breathing were caused by severe disruptions in her blood sugar levels. The underlying causes need further investigation, but our primary focus is stabilizing her blood sugar and fluid balance, which we have already initiated in our department.

Assessment: Currently, we are closely monitoring her and regularly checking her vital parameters using plastic cannulas inserted into her veins. She is receiving infusions and insulin to restore metabolic balance. She is drowsy but responsive, and her breathing and circulation parameters show slow improvement.

Recommendation: Due to the severity of her condition, we have also informed our intensive care colleague, who will arrive soon to examine the patient. It may take several days to fully stabilize her condition, so we ask for your patience. As soon as we notice any changes in her condition, we will inform you immediately. Do you have any questions now?

To summarize the lessons learned from the SBAR-based skills training, the following can be concluded about the value of incorporating SBAR or a related scheme into the skills training part of a medical curriculum:

1. Communication is always influenced by personal and interpersonal factors. SBAR creates a respectful atmosphere for professional information exchange, which is particularly useful for establishing safety.
2. Regular practice with collaborative situations strengthens team spirit and improves individual performance, which also facilitates technical skill development.
3. SBAR aids not only in interprofessional communication but also in the concise and proper transfer of information to family members and relatives, making the exchange of critical data clear and professional.
4. Stressful and unfamiliar situations can arise at any moment, and a well-practiced, easy-to-use system integrated into daily routines can effectively overcome these challenges.
5. Patient handover is a regular, safety-relevant process in daily medical practice that should be standardized and taught. The advantages of mnemonic-based schemes have been demonstrated by many relevant studies, and the SBAR scheme aligns with this concept.
6. As university classes and the healthcare workforce become increasingly international, it is essential to overcome diverse educational backgrounds and language barriers by using standardized communication techniques.

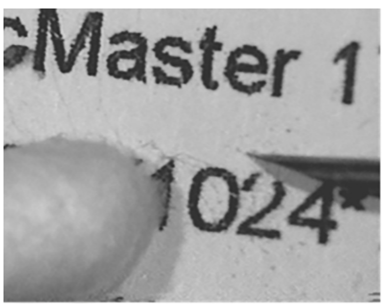
Microsurgery in a Surgery-based Graduate and Postgraduate Curriculum

The second part of this chapter is devoted to microsurgery, another "good practice" at Szeged Skills, and a feasible method for technical skill development which has proven effective. Generations of our students and residents have been captivated by the world they see under the microscope.

Microsurgery is a technique rather than a specialty. It is employed across various surgical fields, including neurosurgery, traumatology, ophthalmology, otolaryngology, maxillofacial surgery, plastic surgery, urology, transplantation surgery, pediatric surgery, and gynecology. Microsurgical procedures are characterized by surgical interventions performed under optical magnification, using a loupe or operating microscope, and require specialized operative instruments. However, microsurgery is not solely about using specialized tools; it also demands exceptional manual dexterity and a comprehensive understanding of topographic anatomy. The primary indications for microsurgery include the approximation of vessels and nerves, either to re-establish anatomical connections or to create new connections within the millimeter range, particularly where sensitive structures are involved. It is important to note that “micro” does not strictly refer to size, although most procedures involve structures significantly smaller than those in macroscopic surgery, with proportions visible only through optical magnification. Microsurgery requires a higher level of cerebral and manual coordination, as well as the acquisition of specialized skills. Achieving these goals necessitates a mindset distinct from conventional surgery. While dynamism is a key component of general surgery, microsurgery demands a more thoughtful and error-free approach to troubleshooting. Consequently, microsurgical procedures present significant challenges for students and residents, as reducing errors and enhancing surgical competence can only be accomplished through extensive practical experience. The operating microscope, providing a magnified view, enables access to structures in the 0.3–1.2 mm range. To function effectively in this precise environment, students must master techniques that require extreme precision and refinement.

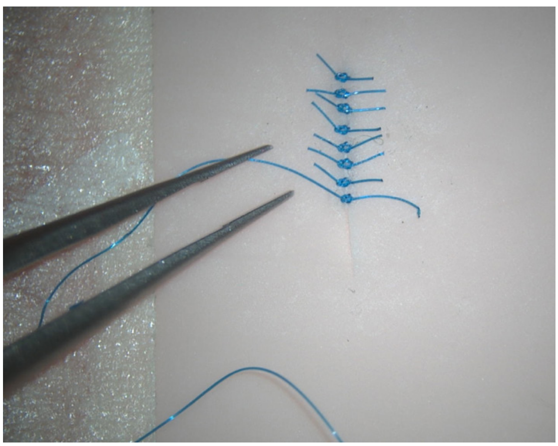
An example is shown involving designing a basic microsurgery training course for medical students, featuring simple yet challenging exercises that gradually increase in complexity. The practical sessions, which span a 20-hour course, are outlined below. By the end of this curriculum, students will be able to perform basic vascular anastomosis (set as a learning outcome) within a simulated environment in a skills laboratory.

Practical 1. Topics include posture, movement coordination, hand and tool positioning, and adjusting the microscope. Hand-eye coordination is then practiced and refined by scraping off printed letters from a sheet of paper using an approximately 20-gauge needle under the microscope. First, students practice bringing the tool into the microscopic field. Then, using the tip of the needle, they slowly remove individual letters. The goal is to remove the letter while leaving behind a spot that is macroscopically invisible.

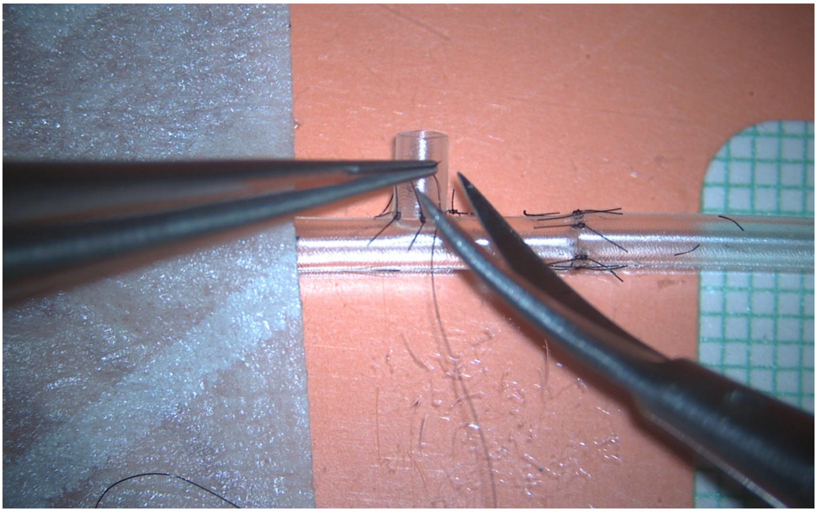


Topic area / **Practical 2:** The goal is to improve manual dexterity and learn proper instrument handling. Using two forceps, students remove a vertical thread from a gauze dressing (sponge). Next, they place the filament back in its original position within the net. Students are advised to use both hands equally to grab the thread, aiming to grab the thread as many times as possible. The aim is to return the previously removed vertical thread so that it is indistinguishable from the rest of the net.

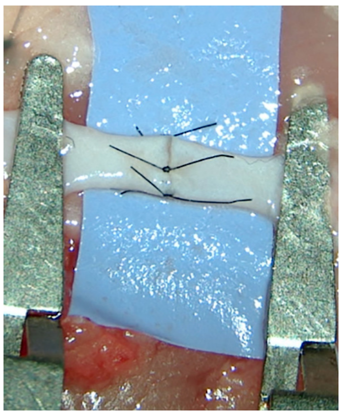
Topic area / **Practical 3:** In microsurgery, it is of particular importance to practice stitching and knotting. To learn the basic steps of suturing, students practice on an incision made in a sheet of surgical glove material. Microsurgical knotting requires the simultaneous use of two instruments, similar to the laparoscopic techniques. Two methods of knot tying are taught: the one-handed and the two-handed techniques.



Topic area / **Practical 4:** Building on the skills learned in previous exercises, students practice tying microsurgical knots and suturing techniques on gloves. This forms the foundation for managing bleeding and performing more complex suture techniques. After individual practice, students perform microsurgical end-to-end anastomosis on a 2 mm silicone vessel model using microsurgical instruments (a needle holder, forceps and scissors) and 8-0 microsurgical thread.



Topic area / Practical 5: Microsurgery *ex vivo*: This involves performing an end-to-end anastomosis of a rat carotid artery with eight microsurgical stitches, and tying knots to secure them.



During the practical period, it is crucial to accurately apply the techniques and maintain a proactive attitude toward correcting any errors. To support this, regular self-assessments are conducted at pre-defined stages of the curriculum. For example, students are encouraged to consider the following questions:

- Why is it crucial to avoid grasping the vessel wall with forceps during the opening of the lumen?
- Why are interrupted sutures preferred in microvascular surgery instead of continuous sutures?
- What are the methodological similarities and differences between preparing an anastomosis on a silicone tube and a blood vessel?

- Why is it is recommended to make a larger incision on the recipient vessel than the diameter of the donor vessel in cases of end-to-side anastomosis?

The purpose of the assessment is to evaluate the extent to which the learning outcomes specified in the course have been achieved. A sample evaluation system, based on points collected across parts 1–6, is outlined below:

1. The student's position at the microscope is appropriate (0–10 points), and instruments are held correctly throughout all procedures (0–10 points).
2. A thread of gauze net is laced within an optimal time frame, and the net is rearranged appropriately (10 points).
3. Suturing on the rubber pad is performed evenly with equal distances from the incision. At least ten stitches are made into vertical, horizontal, and right and left oblique incisions within two hours (10 points).
4. Microsurgical knotting is performed perfectly within 30 seconds. The thread direction is perpendicular to the incision, and knots are not loose (15 points).
5. The student is able to apply the skills learned with planar stitching on three-dimensional tubular structures. The stitch order is correct, and distances are equal (20 points).
6. The stitch bites are equal, and the vessel anastomosis is patent. When the vessel is cut longitudinally, the stitch bites are consistently deep and always include the intimal layer (35 points).

All modules and practical topic areas, along with the overall quality of the training, are regularly monitored using detailed questionnaires completed at the end of each course. Rather than providing numerical data, it is worth noting that interest in these courses is so high that eligible students often face a waiting period of one to two years due to the limited number of workstations. Below is a summary of the results based on opinions selected from several dozen similar textual comments:

- By practicing in a controlled, risk-free environment, participants gain confidence in their abilities, making them better prepared for real-life surgical situations.
- Microsurgical training lays the groundwork for more complex procedures, enabling aspiring surgeons to advance their skills and tackle more challenging cases.
- The skills learned in microsurgical courses are valuable across various specialties, making the training beneficial for a wide range of medical professionals.
- Microsurgical skills are essential for conducting experimental surgeries in animal models, facilitating research and innovation in medical science.
- These courses emphasize the importance of precision and accuracy in surgical procedures, reducing the risk of errors during actual surgeries.

In summary, a one-time investment in human and material resources for "microsurgery" can establish a sustainable and excellent skills training system with strong student support. This relatively simple tool significantly raises the quality of medical education in the short term. Preclinical microsurgery courses provide a solid foundation for residency in surgical specialties, and mastering these techniques greatly enhances participants' skills and confidence, ultimately benefiting their patients.

About the Center

Today, the University of Szeged Clinical Skills Center, known as "Szeged Skills," is an independent educational unit of the university's Albert Szent-Györgyi Medical School. The center opened its doors on March 6, 2013. As a result of complex technical development, the infrastructure now provides educational background for numerous clinical subjects as well as specialty training practice. This evolution did not occur overnight; a brief historical overview of the preceding period may help understand why the teaching of surgical technical skills – a characteristic feature of Szeged – is a focal point of our activity compared to other educational centers with similar functions.

In 1952–1953, four university institutes were established in Hungary to teach practical surgery, including a diverse range of operations for medical students. The central aim was to provide the necessary logistics and educators to train undergraduates to perform primary wound care or emergency surgeries in war situations. After the tensions of the Cold War eased, the scope and depth of teaching underwent significant changes. These institutes and their compulsory graduate courses became increasingly focused on the needs of general medical practice. Over time, surgery, which had once been guided by definitive-looking principles, underwent radical changes as novel, minimally invasive procedures profoundly transformed the discipline. Learning in surgery is traditionally done in a master-pupil relationship, meaning the basics can be learned during graduate courses, but it typically takes another four to six years under the guidance of senior colleagues to develop into a well-trained surgeon with safe technical skills. These skills and abilities can only be developed with practice. To achieve competence, it is compulsory to participate in various operations and integrate numerous steps. However, acquiring skills in human operating theatres is always risky and raises serious ethical, legal, and logistical issues. Considering these factors, an optimal solution is to perform simulated operations in situations nearly identical to those encountered in human surgery. In order to address the needs and tasks outlined above, necessary developments were made at the Institute for Surgical Research in Szeged to create an appropriate base for both undergraduate and postgraduate skills training in surgery. The fundamentals of surgery-related techniques (e.g., basics of asepsis, wound healing, instruments, knotting, suturing, and laparoscopy) were introduced to medical students and residents in simulated environments. The quantifiable results of this process were first reported in 2005 at the inaugural international congress in this field [5]. In subsequent years, this framework facilitated the development of a hands-on simulation training portfolio across several other clinical areas, such as anesthesiology, intensive care, urology, and emergency medicine. In 2006, a new educational unit called the "Medical Skills Laboratory" was established at the Institute, the first of its kind in the country.

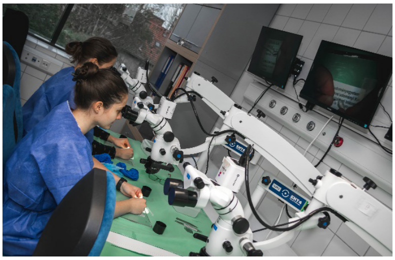
Further steps in this development saw new units of the Center open, still retaining the surgery-oriented tradition, and the educational range was expanded to include a cadaveric operation theatre in line with international trends. Fully equipped simulation surgical operating theatre blocks, shared with the Institute of Surgical Research, were also inaugurated. High-fidelity computer-assisted anesthesia, obstetrics, gynecology, invasive cardiology, intensive care training rooms, nursing, and specialized nursing rooms were established, along with units equipped with ear, nose and throat, urology, imaging, and other therapeutic-diagnostic workstations. As an indicator of activity level, in 2023, the Szeged Skills Center hosted more than 5,000 graduate students per academic year for their practice in clinical subjects, offered in both Hungarian and foreign languages.

In parallel with the developments in general medical and surgical teaching technology, opportunities for microsurgery training have also been steadily expanded. "Basics of Microsurgery" was introduced in 2002 with eight hours of theory and 20 hours of in vitro practice per semester, and in the form of five-day courses using in vitro and in vivo models in postgraduate residency training. Specially designed workstations with individual monitors, two-person training microscopes, and other equipment became available. In 2021, further professional and instrumental developments led to the establishment of the Microsurgical Training Center, a unit linked to the Clinical Skills Center. The teaching of microsurgery continues to be very popular, with more than 1,300 medical and dental students having completed the basic course to date; advanced microsurgical suture techniques courses are also a component of the residency training at Szeged Skills, with two-to-four-week surgical skills training programs forming a compulsory part of residency training in Hungary. All practicals include individual feedback, providing students with direct, measurable information on their competence through the Objective Structured Assessment of Technical Skills (OSATS) system.

Illustrations

Figures 2.1–2.4. SBAR-based Communication during Prehospital Emergency Scenarios (Figures 2.1–2.3) and in the Hospital Environment (with the METI Human Patient Simulator) (Figure 2.4)

Figure 2.5–2.7. Microsurgery for Graduates (Basics of Microsurgery Course for Third-year Medical and Dentistry Students)



Figures 2.8–2.10. Basic Surgical Technique Courses for Medical School Graduates (Year 2). Simulated Surgical Training for Residents Includes VR Temporal Bone and Endoscopic Sinus Surgery [6]

Acknowledgements

The authors gratefully acknowledge the expert support of Zsófia Csorba, Dániel Érces Szabolcs Péter Tallóssy, Gyöngyi Jónás, Andrea Szabó and Attila Rutai, and the excellent assistance of Eszter Bittó, Domonkos Perényi, Anna Zsigmond, Norisz Kiss and Dávid Zsolt Fekete during the implementation of the courses described in this chapter.

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CHAPTER 3

HOW TO ACHIEVE LEARNING OUTCOMES

DOI: 10.26399/978-83-66723-75-7/j.dvoracek/m.kosinova/m.zizlavska/m.komenda/j.travenec/p.ruzickova/p.stourac

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Simulation-Based Education

Simulation-based education (SBE) in healthcare is designed to bridge the gap between theoretical knowledge and practical skills. It provides a realistic, controlled, and safe environment where learners can practice, make mistakes, and receive feedback without the risk of harming patients. This chapter discusses the process of developing medical simulation scenarios, the importance of setting learning outcomes, and the clinical structured objective evaluation (OSCE) as one of the possible tools for assessing the achievement of these outcomes.

High Fidelity Simulation Scenario in Medical Education

For a simulation lesson to be effective, it must be well-prepared and clearly structured. Each simulation session should adhere to general principles of simulation, which include having a clearly defined structure, ensuring students arrive prepared, and maintaining a safe learning environment. Below is a breakdown of the essential components of a structured simulation lesson.

Before the Lesson

Students should arrive prepared. To facilitate this, pre-learning materials are sent to students in advance, which they study at home. This ensures that students understand the goals of the lesson, know what to expect, and do not arrive unprepared, which could disrupt the flow of the lesson.

Lesson Introduction

The lesson starts with a clarification of its goals, a summary of the rules, and the establishment of a safe learning environment. This initial phase is crucial to setting the tone for the entire session and ensuring that students feel comfortable and ready to engage.

Familiarization with the Simulation Environment

Before the initial simulation, it is essential that students are given sufficient time to become familiarized with the simulation environment. They learn how to properly use the patient simulator and medical equipment. This step ensures that students are confident in their ability to interact with the simulation tools, which enhances the realism and effectiveness of the simulation.

Briefing

During the briefing, the scenario is introduced, and roles are assigned to the students. This phase includes time for questions, ensuring that all participants understand their responsibilities and the context of the scenario. A clear briefing helps align student expectations and prepares them mentally for the simulation.

Conducting the Simulation

The simulation has a clearly and explicitly defined beginning and end. Clear instructions and signals ensure that the students understand when the simulation begins and when it concludes, which helps maintain focus and structure throughout the session.

Structured Debriefing

Immediately following the simulation, a structured debriefing takes place. This debriefing session is crucial for consolidating learning and includes several key components:

- Introduction: Acknowledge the students' participation and effort in the simulation.
- Emotional Release: Provide space for students to express their emotions and decompress from the experience.
- Description: Discuss how the situation was understood, what the problem was, and what the patient's condition was.
- Analysis: Critically analyze the situation, noting what went well and what could be improved. This phase encourages reflective learning and critical thinking.
- Summary: Address questions and highlight the take-home messages. Discuss learning outcomes achieved during simulation-based medical education.

Conclusion of the Lesson

It is paramount at the conclusion of the lesson to provide the students with a summary of the lesson and to highlight the key take-home messages. This ensures that the predefined learning objectives have been met and reinforces the main learning outcomes of the lesson.

Achieving Learning Outcomes during Simulation-based Medical Education

Simulations are strategically integrated into the curriculum to reinforce theoretical knowledge and develop practical skills. They are not standalone activities but are designed to complement and enhance other educational methods. When planning a lesson that includes a simulation, educators must first assess what the student needs to achieve. This process involves setting clear, measurable objectives that align with the overall curriculum goals. These objectives guide the entire planning and execution of the simulation. By identifying the desired outcomes, educators can ensure that each simulation scenario is purposeful and effectively contributes to meeting these goals. This approach ensures that the simulation is not merely an engaging activity but a meaningful and impactful educational experience. The importance of lesson planning in achieving learning outcomes cannot be overstated. Educators break down the overall lesson into smaller segments, each aligned with a different simulation scenario. Each scenario is crafted to target specific skills or knowledge areas. This segmentation allows students to concentrate on one aspect at a time, facilitating deeper learning and skill acquisition.

While the simulation itself may be the most engaging part of the lesson, the primary focus should be on what students learn from it. The goal is to facilitate the acquisition of new knowledge and skills that align with the predetermined objectives, ensuring that students leave the session with a concrete understanding of the material presented. To achieve this, educators must pay meticulous attention to both the preparation and delivery of the lesson.

Developing Medical Simulation Scenarios

The process of developing a simulation scenario commences with the identification of educational needs, which can be derived from the curriculum of a specific course or may result from identified gaps in knowledge. Understanding these needs ensures that the simulation is relevant and targeted toward the necessary learning outcomes. It is crucial to consider the lesson placement within the overall curriculum before defining specific learning objectives. This ensures alignment with the broader educational goals of the course. If learning objectives are connected to other courses, collaboration with the directors of those subjects may be essential to ensure curriculum consistency and coherence.

Having identified the educational needs, it is necessary to define the learning outcomes. For each outcome, the most appropriate teaching method must be selected. While some outcomes may be more effectively addressed through simulations, others might be better achieved through lectures or online materials. The decision regarding the most appropriate teaching method should be informed by an analysis of local conditions, availability of resources, infrastructure of the simulation center, and the experience of the teaching team.

Simulation Scenario Form

For learning objectives suitable for simulation, a patient story must be created. This story forms the baseline for a simulation scenario that takes place in a specific setting with a fictional patient of a specific age and condition. The number of students participating in the simulation should also be considered, and their specific roles and tasks planned. Clear role delineation ensures that each student knows their responsibilities and can participate meaningfully in the simulation.

The simulation scenario development should be documented in a simulation lesson form, which should have a clear and standardized structure for each simulation center. This form ensures that all aspects of the scenario are planned and communicated effectively.

Initial parameters for monitored vital signs must be determined, including, *inter alia*, airway patency, breathing quality, circulatory status, and consciousness level. These values set the baseline for the simulation.

Subsequently, changes in the patient's condition and vital signs in response to all possible student actions should be planned. In areas where student uncertainty is expected, contingency plans must be prepared. These plans address scenarios where students may struggle or take incorrect actions. It may also be advantageous to provide students with assistance, such as a telephone call from a supervisor, to help guide them back to the simulation.

It is advisable to prepare the expected results from diagnostic tests (e.g., electrocardiograms, blood tests, and imaging examinations) in advance.

The simulation scenario form should also include detailed instructions for the technician setting up the simulation. This includes specifications of the environment, patient masking, simulators, medical equipment, tools, and consumables required for the scenario.

After completing the simulation form, the technician programs it into the patient simulator software. The scenario is then pilot tested with a pre-arranged group of students from the target group to identify and correct any deficiencies before the actual simulation lesson

Example of Simulation Scenario

The following is an example of a completed simulation scenario form. The form has three pages. At the top of the first page is the scenario code (S23en) and the patient's name and age. This information helps to keep the scenario database well organized. An introduction to the story usually reflects the instructions given in the role of the first participant in the simulation. Listed normal values at the age can be used during the briefing, especially in pediatric patients.

Baseline vital signs are given in the same order as recommended by the European Resuscitation Council for the management of the critically ill adult or child. The following lines give expected student actions and instructions for scenario progression depending on the student action.

Instructions on how to start the simulation and the take-home messages can be found at the bottom of the page.

The second page contains essential information for technicians who will prepare the simulation scene and the simulator before the lesson. This includes data on what type of simulators are used, what monitor sensors should be put on the patient at the beginning of the scenario, and more details about masking and camouflage.

The third page contains the instructions for participants in the specific roles. This page is then cut and the individual strips are given out during the briefing for participants to read.

The scenario form can evolve over time. The last date of revision is found at the bottom of the second page.

Figure 3.1. An Example of Simulation Scenario Form – Page 1

S23en Peter 15 years old (drowning)		MUNI | SIMU MED
Peter and his friends were swimming in the local river. While boys had been diving into the water, Peter didn't swim out after his jump. His friends pulled him out of the water after about 5 minutes. One friend starts chest compressions, the other one calls EMS. Peter does not respond, the dispatcher starts assisted CPR over the phone.	**Participant: 3x**	
	Normal values at age:	**notes**
	Weight: 60 kg	
	Respiratory rate: 12-15/min	
	Heart rate: 60- 80/min	
	Blood pressure syst. 120	
	Blood pressure mean 75	

Quick Look: B1 unresponsive B2 not breathing B3 cyanotic

Initial clinical status (simulation)		**Monitor setup**	
A	clear airways	AB	Sp02 unmesurable
B	apnea		
C	without signs of life, central pulsations are not palpable	C	**once connected to monitor**: pulseless electrical activity - HR 30/min, BP 0/0, EtCO2 4 mmHg
D	GCS 3, AVPU - U, pupils 2-/2-		
E	cold and wet skin		

Expected actions:

1.	**stopping ongoing lay CPR - assessing the situation - resuming CPR**
2.	Checkin for signs of life when overtaking CPR from bystanders
3.	AB: C-spine protection
4.	AB: checking AW, jaw thrust, BMV, FiO2 100%
5.	C: chest compression (15:2)
6.	C: IV acces / IO acces
7.	Drying chest before attaching the electrodes of defibrilator
8.	Hearth rythm recognition (PEA)
9.	Once ROSC: ABCDE examination and interventions

Notes on the simulation process (simulation development):

peripheral venous catheter fails to be inserted

intraoseus acces is inserted OK

ROSC: after 4 minutes (2 cycles) of ALS **AND** administration of Adrenalin

ROSC: HR 84 /min (sinus rythm), RR 8 /min (need for BMV), SpO2 92%, BP 90/45, central pulsess palpatable

Start of the simulation:

Dispatcher from the radio to the ambulance driver:

"A 15-year-old boy, a jump into natural water, drowning, he is unresponsive. You've just arrived."

Take home message:

1.	Drowning Guidelines begins with 5 breaths.
2.	Risk of C-spine trauma. While CPR the priority is securing AW before the C-spine trauma
3.	Advanced Airway options while CPR

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Figure 3.2. An Example of Simulation Scenario Form – Page 2

S23en: Checklist for SIMU technician	
Simulation room + basic setting: Outdoor scene with ambulance	
Pacient:	**Simulator type:**
☑ patient simulátor:	Trauma Hal
☐ standardized patient	
☑ other simulator:	SkillQube
☐ figurant SIMU:	
setting	
Patient monitor: ☐ SpO2 ☐ EtCO2 ☐ EKG ☐ NIBP ☐ IBP ☐ TOF ☐ Temp. ☐ other:	
A: ☐ O2 nasal canule ☐ O2 mask ☐ O2 mask with reservoir ☐ hi-flow mask	
☐ airway ☐ LM ☐ OTI ☐ TSC ☐ NIV	vel.:
B: O2 ……… l/min	
parameters of ventilation:	
C: ☐ PVC 1. ☐ PVC 2. ☐ CVC ☐ Dialisys can. ☐ ART ☐ urin. cat. ☐ other:	
Camouflage:	
wet swimming suit, wet chest	
jackets for rescuers and bystander	
documentation	**claricitation**
☐ laboratory results in Simstation	
☐ laboratory results on the scene	
☐ multimedia in SimStation	
☐ other documentation on the scene	
within reach, ready beyond the basic setting	
bags for rescuers	
intraoseus acces device	
towel	
Date of revision: 24.1.2024	

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Figure 3.3. An Example of Simulation Scenario Form – Page 3

S23en - Participant 1 - EMS doctor

You are an EMS doctor. You get a call from the dispatcher who sends you to a nearby river (arrival within 8 minutes) - to the place where boys pulled Peter out of the water - as Peter jumped into the water and remained under the surface for about 5 minutes: He has not been responding. His friend immediately started chest compressions, the other called EMS in parallel. The simulation starts in the ambulance - you are immediately on the spot. You have a paramedic at hand.

S23en Participant 2 - paramedic

You get a call from the dispatcher to go to a nearby river (within 8 minutes) - to the place where Peter was pulled out of the water by his friends after jumping into the water. He remained under the surface for about 5 minutes: He has not been responding, his friend immediately started chest compressions, the other called EMS in parallel. You arrive at the site during the 4th cycle of lay CPR. The simulation starts in an ambulance.

You have a headset in your ear, that the lector can use to talk to you. Follow his instructions.

S23 Participant 3 - bystander

You are one of Peter's friends (15 years old) - you and your friends pulled Peter out of the water after about 5 minutes since he had jumped into the water and did not swim up. You know lay CPR and have started chest compressions - no breathing. After your other friend called EMS, you continue CPR as instructed by the dispatcher - 30:2 until the arrival of the EMS **(Mouth-to-mouth breaths are only imitated, they are effective)**. The mobile phone is placed on on the ground and uses loudspeaker (simulation only). The simulation has started for you from the loudspeaker in the form of TANR.

Technology Behind the Simulation Scenarios

Simulation education is closely linked to technology, especially within the context of medical education where it plays an unprecedented role. Unpreparedness or non-operational technical equipment (AV or IT) can significantly disrupt or completely prevent the delivery of simulation education. For the preparation of scenarios and the organization of teaching, it is sometimes appropriate, and sometimes entirely unavoidable, to use specialized systems and software.

The scenario preparation, as described in the previous chapter, is a key step during which the parameters of the scenario – including technical aspects – are clearly defined. The document, which optimally describes the needs of the simulation center both factually and graphically, contains all the key information that is then fed into the specialized simulation management systems, which are more generic. This document is made available to all persons concerned in all roles – from the course guarantor to the teacher, from simulation center management to the technicians responsible for the training. It is accessible both in digital form on shared storage and in paper form at the simulation control room.

After the scenario is updated by the lecturers, it is handed over to technicians who are trained in specialized software for controlling manikins and preparing scenarios for debriefing systems. Their role is to program and set up the systems (manikin control systems, debriefing systems) according to the supplied scenario.

In the control systems, the states that the manikin is expected to go through during the simulation are programmed. Such prepared states help the technician react quickly enough to the occurring events during the simulation. The debriefing system is prepared with the expected audio-visual material – e.g., radiological images, laboratory results, blood counts, etc., or alternatively, presentation or guideline to support the debriefing discussion. The audiovisual media are uploaded from a database of reusable learning objects (RLO), which the simulation center keeps on the premises.

Considering the number of people and roles involved in the preparation, development, and implementation of the teaching and simulation scenarios, the exchange of information must be appropriate to the digital era. Email is used for external communication, but chat supports active communication within the team as well as videoconferencing. To support teaching directly, a mobile phone (hotline) carried by two technicians at all times is set up. A task management system is also engaged. Mutual knowledge and availability of information for all members of the chain are of utmost importance.

The files – scenarios, organizational information, schedules and other necessary materials – are stored in a controlled manner in a centralized repository/storage area in a unified style. The centralized approach naturally leads to a sort of database of scenarios and additional valuable learning materials in a single location. When designing a new course, it is thus possible to build on material already created, which makes the work significantly more efficient.

The organization of teaching at the level of individual subjects, courses, and lessons in day-to-day classes, and also at the level of atomic blocks in one teaching unit, is a core area where software can help as well. For example, an application to divide a learning unit into separate time blocks, which sequentially counts down each block like a timer, has been developed. When such an application can run on multiple devices, for instance, tablets placed in several rooms at the same time, it becomes a teaching tool for time-sharing, i.e., lesson time management and synchronization of teaching blocks, which is advantageous not only in lessons where groups of students rotate between station.

How to Verify Learning Outcomes?

A paradigm of learning outcomes [1] in education, particularly in fields like medicine and healthcare, provides a structured framework for defining what students are expected to acquire through their educational experiences. It allows for a comprehensive approach, ensuring that graduates are well-prepared to meet the challenges of their professions. The structure of learning outcomes provides a clear, organized way to articulate what learners are expected to know, do, and value by the end of an educational program or course. Learning outcomes are designed to be measurable and directly related to the educational goals of a program, making them essential for both curriculum design and assessment. The fundamental part of each learning outcome is the action verb (based on Bloom's Taxonomy classification) [2] as a behavioral component, which specifies what the learner is expected to be able to do upon completing the learning process. The verb chosen should be observable and measurable, such as "explain", "demonstrate", "analyze", or "create." These verbs provide clear indications of the expected intellectual or physical activity. A content component, a subject of matter, clearly describes the content or context in which the action is applied. It answers the question of what the student will be engaging with. For instance, by the end of the course, students will be able to critically analyze peer-reviewed clinical research articles to determine the validity of the research findings and implications for clinical practice (action verb: "critically analyze", subject of matter: "peer-reviewed clinical research articles").

Linking learning outcomes directly to real-world practice is essential in assessing learning outcomes effectively. When defining requirements for students in the form of learning outcomes, it is recommended to have the review of interested experts to ensure that critical topics in the course are covered comprehensively. Additionally, it has proven helpful in practice to tag each learning outcome with an indicator of the form in which it is subsequently assessed (written form, oral exam, Objective Structured Clinical Examination, etc.). In addition to teacher feedback during and at the end of the educational cycle, verifying the correct formulation of each learning outcome can be significantly enhanced by the analytical processing of examination results.

Verification Methods: OSCE

The Objective Structured Clinical Examination (OSCE) answers the question, "How to assess students' clinical competencies?" Harden first described this method in 1975 [4,5]. It has been gradually and slowly integrated into actual practice and teaching, mainly due to the time-consuming nature of the entire complex process and the requirements for personnel capacity. Traditional approaches to testing and assessing students are often knowledge-based and can be influenced by a particular observer, thus becoming highly subjective. On the other hand, OSCE is a superior option to evaluate objectively, but also to assess the student's skills, which is beneficial in medical education for several reasons:

- Practical scenarios from real-life situations: OSCE focuses on practical aspects of medical training, preparing students for real-world clinical situations. This helps bridge the gap between theoretical learning and clinical practice.
- Structured and standardized method: OSCE provides a structured and standardized method to assess a range of skills, including clinical competencies, communication, problem-solving, and decision-making.
- Quality assurance: OSCE helps maintain high clinical competence standards among medical graduates.

Although it requires significant time and staff resources, introducing this method for testing students' skills is valuable. At the Faculty of Medicine of Masaryk University, the OSCE method was introduced in 2020, and since then, we have been constantly working on its improvement. Efforts and time were focused on creating an OSCE exam module in the in-house developed SIMUportfolio platform [3]. The SIMUportfolio is an online integration system initially used for curriculum management. It serves students, teachers, and faculty management as a support platform for teaching. The development of the OSCE benefited from extensive experience, workshops, and inspiration from abroad. The dedicated OSCE module is divided into four submodules (see Table 3.1), which can be used by different user roles (see Table 3.2).

Table 3.1. An Overview of OSCE Modules

Module	Description
Sketch	Enables users to create stations (checklist associated with a specific task) and exams (fundamental details, list of students for the exam, time, selected station(s), etc.).
Execute	Allows teachers to conduct exams and evaluate students using a pre-defined checklist on the platform.
Report	Provides real-time updates on student performances and exam results for a specific day, along with a comprehensive summary of all exams.
Stats	Offers advanced reporting with statistics and overviews for the entire learning period. Statistics are divided by type: (i) essential characteristics of student and exam success with an overview of examining teachers, (ii) analysis of the success of the checklists, and evaluation of individual questions.

Table 3.2. An Overview of OSCE User Roles

User role	Description
Designer	Creates OSCE checklists, detailed instructions, and materials for stations and exams.
Observer	Observer (or examiner) supervises exams, checks students according to a predetermined checklist, and completes the checklist based on student actions.
Guarantor	Responsible for the entire OSCE exam process, including design and evaluation.
Student	Students are the most essential part of the whole examination. They participate in the exams, with the goal to demonstrate knowledge and skills in specific situations.

This robust OSCE setup, which combines necessary modules and user roles, has implemented nearly 1,000 OSCE examination stations in first aid and propaedeutic courses. Implementing OSCEs in digital form allows for a complete online library of all operations (e.g., checklist completion) and results of individual stations and exams. Moreover, evaluating the success rate of personal items on the OSCE checklist has been introduced into practice to support data-driven decision-making in optimizing OSCE examinations.

Strategic Implementation and Rationale for OSCE Integration

The development of our OSCE framework was driven by a clear and multifaceted rationale: the need to evaluate the practical skills that are essential for medical students in an objective manner. Our learning objectives were tightly aligned with practical competencies, ensuring that students were tested on what they were taught, fostering a focused and relevant learning environment.

To achieve this, we have implemented OSCE exams at strategic points throughout the medical curriculum. One of the earliest implementations is the OSCE practical exam after the first semester of the First Aid course. This early integration ensures that students can provide high-quality first aid from the outset of their medical education, a critical skill for any medical professional. The rationale behind this early assessment is to build a strong foundation in essential emergency skills, emphasizing their importance and ensuring competency early in the students' training.

Given the legal implications where medical students in the Czech Republic can become nurse practitioners after eight semesters, the need for a rigorous and standardized assessment method became even more apparent. We are conducting an exam from the Clinical Introduction course in the sixth semester of the studies, ensuring that our students possess the necessary practical skills and competencies to meet these legal requirements.

We considered the option of implementing a final OSCE exam to conclude medical studies. However, we decided against this approach at present, recognizing the need for further development in several areas. These include comprehensive training for teachers, refining methodologies, and ensuring the robustness of the exam format. Currently, we are focusing on expanding OSCE exams to other critical areas of the curriculum, such as courses in Intensive Medicine and Obstetrics and Gynecology. This phased approach allows us to incrementally improve and adapt our methods while continuously training and preparing our examiners.

The decision to conduct partial OSCE exams throughout the study program, rather than a single final OSCE, has several advantages. It provides a more natural progression for students, allowing them to gradually build and demonstrate their competencies over time. This approach also offers opportunities for ongoing feedback and improvement, both for students and the educational program itself. Additionally, it allows for the continuous training and development of examiners, ensuring they are well-prepared and that the assessments are conducted to the highest standards.

Our goal is to ensure that each OSCE exam is a valuable learning and assessment tool, reflecting real-world clinical situations and providing an accurate measure of student competence. By implementing OSCEs at various stages of the medical education program, we aim to create a comprehensive assessment system that supports the development of skilled, competent, and confident medical professionals. This strategy not only upholds the integrity of the assessment process but also significantly enhances the learning experience, setting a high standard for medical education.

Center's Experience – Implementation of the OSCE Exam in the Course of Clinical Introduction

Each year, we evaluate approx. 420 students on two OSCE stations from the Clinical Introduction course, involving roughly 30 trained examiners, 40 to 50 simulated patients, and about 25 days of examining from 7:30 AM to 4:00 PM. Our OSCE development journey to this point was a highly demanding and rigorous process. In this part of the article, we will guide you through the intricate steps and challenges we faced, offering insights into our comprehensive approach and the lessons learned.

The first step in our process was blueprinting, which involves selecting and organizing the appropriate types of stations to comprehensively assess the targeted clinical skills and competencies. The blueprinting process was meticulous, ensuring comprehensive coverage of required skills. Each learning unit was broken down into specific objectives, categorized by knowledge and skill, and matched with appropriate assessment methods, including pre-tests, simulation exercises, and potential OSCE stations. For the OSCE exam, we chose to evaluate students on two types of stations: one focused on basic skills, such as drawing venous blood and surgical suturing, and the other on the physical examination of a patient. We chose a variety of different stations that students may go through, selected randomly. This detailed blueprint ensured that all critical aspects of clinical practice were assessed thoroughly.

Designing the OSCE stations involved creating didactic checklists used in lessons and later condensed into exam checklists with assigned point values and critical points. This step ensured that the stations were both comprehensive and practical for examiners to use. The design process was iterative, involving two pilot tests: the first with the organizational team to refine logistics, and the second with actual students to validate the station's efficacy. These pilot tests were crucial for ensuring that each station provided sufficient time, clear instructions, appropriate difficulty levels, and the necessary equipment.

Training the teachers to act as OSCE examiners was another critical component. Only those who completed a workshop could serve as examiners. These workshops, lasting 1–2 hours, included a simulated OSCE exam and joint evaluation sessions, fostering a deeper understanding of the OSCE process and its significance. Discussions during these workshops focused on the nuances of objective assessment and the impact of OSCEs on students' learning experiences.

Recruiting simulated patients presented unique challenges, particularly regarding cost and motivation. To address these challenges, we strategically targeted senior university attendees, leveraging their free time, high motivation, and sense of purpose. This demographic was chosen because they often have flexible schedules and a strong desire to contribute to educational initiatives. The recruitment process involved distributing leaflets through academic departments and conducting workshops at the Simulation Center. During these workshops, potential simulated patients were given practical demonstrations of the exam process and comprehensive explanations of their roles. This approach ensured that recruits were well-prepared and understood their responsibilities during the OSCE exams. This strategy proved effective, as these individuals demonstrated technical proficiency and a high degree of commitment, enhancing the exam realism. The senior university attendees showed a remarkable ability to follow instructions and provide consistent, reliable interactions for the examinees. Their involvement significantly contributed to creating a realistic and immersive examination environment, which is crucial for the validity of the OSCE.

The operational aspects of the OSCE began well before exam day. Informing students and examiners about the guidelines was essential to ensure smooth execution. Technical preparations included both digital and physical setups, such as configuring the SIMU portfolio system and preparing the necessary equipment.

On the day of the OSCE, clear signage and effective timing were crucial. Frequent breaks and the presence of an on-call technician/helper for both digital and physical needs ensured that the exam proceeded without issues. Providing catering for simulated patients helped maintain a comfortable environment, contributing to the overall success of the exam.

After the OSCE, students' results were delivered via the Information System and email, allowing for follow-up questions. The exam design ensured that students had multiple attempts to pass, with the majority succeeding on their first try. Detailed analysis of the results provided insights into the effectiveness of the OSCE and highlighted areas for further improvement.

Looking ahead, we are planning to expand our OSCE framework to include a greater variety of stations, covering a wider range of clinical skills and scenarios. This expansion will ensure a more comprehensive assessment of students' competencies and better reflect the diverse situations they will encounter in their professional practice.

Implementing the OSCE in our Simulation Center has been a transformative experience, offering valuable lessons in creating robust assessment frameworks. The careful planning, training, and execution have established a model for best practices, ensuring that our medical students are well-prepared for their clinical roles. This structured approach not only upholds the integrity of the assessment process but also significantly enhances the learning experience, setting a high standard for medical education.

About the Center

- Full name of the Medical Simulation Center (in original language):
  Ústav simulační medicíny a Simulační centrum Lékařské fakulty Masarykovy univerzity
- Full name of the Medical Simulation Center (in English):
  Department of Simulation Medicine, Faculty of Medicine, Masaryk University; Simulation Center, Faculty of Medicine, Masaryk University
- Names and academic titles of Center's heading:
  Prof. Štourač Petr, PhD, MBA, FESAIC (Head of Department of Simulation Medicine)
  Assoc. prof. Kosinová Martina, PhD, FESAIC (Vice head of Department of Simulation Medicine)
  Dvořáček Jan, MA (Head of Simulation center)
  Kratochvílová Petra, BA (Vice head for teaching of Simulation center)
  Travěnec Jiří, MSc (Vice head for technology of Simulation center)
- Names and academic titles of Center's team members:
  Assoc. Prof. Schwarz Daniel PhD; Komenda Martin, PhD, MBA; Růžičková Petra, MSc; Harazim Hana, MD, PhD; Djakow Jana, PhD; Janků Martin, MD; Žižlavská Martina, MD; Prokopová Tereza PhD; Vafková Tereza, MD, Barvík Daniel, MD; Skříšovská Tamara MD, DESAIC; Vafek Václav, MD; and numerous other lecturers, technicians and administrative staff.

List of Medical Fields/Specialties taught at the Center:

First aid, anatomy, clinical introduction, intensive care medicine, anesthesiology and analgesia, applied and clinical pharmacology, surgery and surgical suturing, diagnostic imaging methods, cardiology, physiology, medical psychology, neurology, neurosurgery, ophthalmology, orthopedics, otorhinolaryngology, pediatrics, gynecology and obstetrics, urology, stomatology, theoretical bases of clinical medicine, forensic medicine, pneumology, nursing, emergency medicine and dentistry.

Description of the Center

The Simulation Center of the Medical Faculty at Masaryk University opened in October 2020 and received support from the European Union. It includes rooms for high-fidelity simulations (an emergency department, an ambulance, a CT scanner room, operating theatres, rooms for intensive care and standard hospital care, and a helipad), numerous debriefing rooms, basic skills training laboratories, and classrooms for cooperative learning methods. Various teaching methods are used in the simulation center: low-fidelity and high-fidelity simulations, simulations with live actors, skills training on simulators, team-based and problem-based learning using virtual patients, and Objective Structured Clinical Examination (OSCE).

In addition to the Simulation Center as a facility, the Department of Simulation Medicine was established as an academic subject in 2021. From September 2022, the Faculty of Medicine has expanded its offer of doctoral studies with a new study program in Healthcare Simulation, which received accreditation in November 2021. The aim of the program is to train independent researchers and academics in the newly emerging field of medical education.

The primary objective of the simulation center is to teach undergraduate students. The range of subjects taught at the simulation center is extensive, with over 150 taught subjects in total and more than 380,000 student-hours taught in SIMU per year.

In the field of postgraduate education, SIMU offers a diverse range of courses for physicians, nurses, paramedics, and other healthcare professionals specializing in anesthesia, critical and intensive care, gynecology, surgery, otorhinolaryngology, and ultrasonography. Additionally, SIMU provides training courses for educators, or “train-the-trainers,” in these same fields.

In May 2022, the Simulation Center was granted SESAM accreditation, becoming one of eleven simulation centers worldwide to receive this distinction.

Masaryk University is based in Brno, Czech Republic. It is one of the fastest-expanding universities in Europe with a total student body of more than 40,000 and over 7,000 international students enrolled in programs in over 200 different departments, institutes, and clinics.

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CHAPTER 4

TEACHING COMMUNICATION USING SP – THE USE OF STANDARDIZED PATIENTS (SP) IN SIMULATION-BASED MEDICAL EDUCATION

DOI: 10.26399/978-83-66723-75-7/j.tyminska/o.aniolek/a.czerwinska

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What Does a Standardized Patient Mean? Who Is It?

In 1963, Dr. Howard Barrows introduced the concept of standardized patients (SPs). An SP is a person who has been directed to portray a patient and all the patient's characteristics. This implies that the SP takes on the role of a patient, presenting as a character or person other than themselves. They are used in medical education, assessment, and training to provide a realistic and controlled learning environment for healthcare students. Standardized patients are an essential tool in medical education, helping to bridge the gap between theoretical knowledge and practical application.

A standardized patient (SP) can represent anyone, as they are selected to reflect the diversity of real patients in terms of age, gender, ethnicity, and physical appearance. There is no specific physical profile for an SP; they are chosen to match the demographic characteristics required for the medical scenarios they will portray.

Key points of standardized patients:

- **Diversity:** Crucial for providing realistic training that mirrors the variety of patients healthcare professionals will encounter.
- **Health:** Generally, SPs should be in good health and able to reliably perform the required scenarios.
- **Professional Appearance:** While simulating patient encounters, SPs may need to dress in hospital gowns or specific attire that fits the medical scenario.
- **Neutrality:** An SP's appearance should not distract from the learning objectives. They should avoid noticeable personal identifiers like distinct tattoos or piercings.
- **Communication Skills:** Clear and effective communication is crucial. SPs must convey symptoms and respond to questions in a way that mimics real patient interactions. This includes verbal and non-verbal communication, such as body language and facial expressions.
- **Observation and Feedback:** SPs should be observant and able to provide constructive feedback on the trainee's performance. This feedback often focuses on communication skills, empathy, and clinical techniques [1].

In our medical simulation center, we prioritize the following SP criteria: people aged 18–65 with a minimum of secondary education, who have not been diagnosed with mental disorders. No prior experience is necessary; all that is required is a willingness to work with young people, availability, conscientiousness, and good memory. People with acting skills or aspirations are welcome.

Goals of Education Using SPs

Using standardized patients (SPs) in medical education serves several key goals, all aimed at enhancing the training and evaluation of healthcare professionals. Here are the primary goals:

Enhancing Clinical Skills: SPs provide a safe and controlled environment for students to practice clinical skills, including history-taking, physical examinations, and diagnostic reasoning. This hands-on practice helps students build and refine these essential skills.

Improving Communication Skills: Interacting with SPs helps students develop effective communication techniques, such as active listening, empathy, and clear explanation of medical conditions and treatment plans. These skills are crucial for building patient rapport and ensuring patient understanding.

Providing Consistent and Standardized Assessment: Using SPs ensures that all students are evaluated on the same cases under the same conditions, allowing for fair and standardized assessment of their clinical skills and knowledge. SP encounters are often part of Objective Structured Clinical Examinations (OSCEs), which are critical for licensing and certification.

Offering Constructive Feedback: SPs can provide immediate, personalized feedback from the patient's perspective, focusing on communication, empathy, and bedside manner. This feedback is invaluable for students to understand their strengths and areas for improvement.

The main goal of medical simulation using SP resources is to improve clinical reasoning, communication and motivation to act [2].

Advantages and Disadvantages of Working with SPs

Advantages

Realistic and Safe Learning Environment:

- SPs provide a realistic simulation of clinical scenarios, allowing students to practice in a controlled, safe environment. Students can make mistakes and learn from them without risking real patients health or well-being.
- Students often overcome the barrier of shame during their first contact with SPs and have the opportunity to analyze themselves through adequate feedback on their beliefs, habits, language use, tone of voice, and whether they communicate understandably versus using medical jargon.

Standardized Assessment:

- Provides a reliable and objective way to assess students' clinical skills, communication, and professionalism.
- In assessing teaching effectiveness, this is a key factor in professional medical education. Properly designed classes using SPs allow for the implementation of such programs early in the curriculum, and in crisis situations – such as the COVID-19 pandemic – SP programs made it possible to deliver key content in safe conditions.

Disadvantages

Cost and Resource Intensive:

- Expenses: Training and employing SPs can be expensive, including costs for training, compensation, and facilities. Significant time and resources are required to organize and implement SP programs.
- It is important to start the recruitment process with a thorough analysis of the needs of the university and the subjects in which SPs will be used. A preliminary decision is often made regarding the estimated number of SP employees needed, their age, gender and fitness levels.
- During recruitment, we received only few applications, most likely due to the little-known concept of SPs.
- Importantly, certain physical symptoms and findings cannot be realistically replicated by SPs. Participating in scenarios where actors play the role of patients is associated with more emotions and stress than working with other students who play short roles for each other.
- Students may behave differently knowing they are interacting with an SP rather than a real patient, potentially reducing the authenticity of the encounter.

Best Practices for Using SPs in the Classroom

Early in Training:

- Introduction to Clinical Skills: Use SPs to introduce students to basic clinical skills, such as history-taking and physical examination, in a low-stakes environment.
- Communication Skills: Early exposure to SPs helps students develop effective communication and empathy from the beginning of their training.

Throughout Clinical Education:

- Skill Reinforcement: Regular sessions with SPs throughout the curriculum can reinforce and build upon students' clinical skills.

Comprehensive Training for SPs:

Each standardized patient undergoes initial training, which includes dialogue, non-verbal communication, and practical training based on the implemented scenario.

Student Preparation:

- **Pre-Session Briefing:** Offer pre-session briefings to help students understand what to expect and how to approach the encounter.
- **Guidelines for Interaction:** Students have the right to touch the SP, excluding intimate areas, and are required to inform the SP of their next steps.

Additionally: If the scenario includes examinations of intimate areas such as the breasts, rectal examinations (*per rectum*), or gynecological examinations (*per vaginam*), it is necessary to use the trainers available at the Center. This type of simulation, which combines SP (Standardized Patient) classes with low-fidelity simulation, is referred to as hybrid simulation.

Curriculum Design: Integrate SP encounters into the curriculum in a way that aligns with learning objectives and complements other teaching methods.

Creating a realistic characterization for a standardized patient (SP) involves careful attention to detail and thorough preparation. We use high-quality prosthetics, makeup, and moulage techniques to create realistic representations of wounds or skin conditions.

Summative Assessments: SPs are essential for high-stakes summative assessments, such as Objective Structured Clinical Examinations (OSCEs), to evaluate students' competencies in a standardized manner [3].

OSCE Fields:

- Gynecology and Obstetrics
- Psychiatry
- Pediatrics
- Internal Medicine
- General Medicine
- Surgery

Example of an SP Simulation Scenario

During a meeting in Warsaw, participants had the opportunity to observe how communication classes are conducted with the participation of a standardized patient at the Faculty of Medicine of the Lazarski University in Warsaw.

One of the scenarios implemented during the winter semester in classes at the Medical Simulation Center with third-year students, as part of the Doctor-Patient Communication course, was presented.

The scenario chosen to teach the delivery of unfavorable information using the SPIKES protocol was selected for its structured nature and difficulty. This allowed the development of as many good practices as possible to support the execution of similar activities in the future. A standardized patient cooperating with the Medical Simulation Center and a sixth-year medical student at the Faculty of Medicine of Lazarski University were involved in implementing the scenario. Below is the content of the scenario, which consists of three elements: a part for the student, the SP, and the trainer.

Student Scenario

- LEARNING OBJECTIVES
  D.U5: Knows how to conduct conversations with adults, children, and families using active listening techniques and empathy, and can discuss the patient's life situation.
  D.U6: Knows how to inform the patient about the aim, risks, and course of proposed diagnostic and therapeutic methods, and can obtain informed consent for them.
  D.U8: Provides the patient and their family with information about an unfavorable prognosis.

- TECHNICAL INFORMATION
  Setting: Doctor's office at the Internal Medicine ward
  Your Role: Doctor during Internal Medicine specialization

- CASE STUDY

You are a doctor specializing in Internal Medicine at the Internal Medicine ward of Public City Hospital. Three weeks ago, you were the attending physician for Hanna Zabielska, a 54-year-old patient admitted to your ward for the diagnosis of chronic abdominal pain and a weight loss of 9 kg within the last three months. During her hospitalization, the patient underwent laboratory tests, an ultrasound examination, and a gastroscopy.

The laboratory tests showed slight anemia, the ultrasound results were normal, and the Helicobacter pylori test was negative. However, during the gastroscopy, the doctor decided to take biopsies for histopathological examination. The patient was discharged from the hospital and asked to return for a follow-up visit in three weeks to receive the results of the histopathological examination.

A colleague of yours performed the gastroscopy and mentioned that they took biopsies because they were concerned about the appearance of the gastric mucosa. Unfortunately, the results confirmed their concerns: diffuse-type gastric adenocarcinoma localized in the corpus.

The patient is now waiting in the corridor outside the physicians' room in the ward. You are inside the room with two of your colleagues.

- STUDENT'S TASKS:

1. Provide the patient with information about the unfavorable diagnosis using the SPIKES protocol.
2. Conduct a conversation with the patient using active listening techniques and empathy, and discuss her life situation.
3. Inform the patient about available diagnostic and therapeutic methods.

- USEFUL INFORMATION [4,5,6]

  <u>GASTRIC CANCER</u>:

  Types based on histopathology: intestinal and diffuse-type

  <u>RISK FACTORS</u>:

  - Heliobacter pylori infection
  - Family history of gastric cancer, especially diffuse-type
  - Precancerous lesions observed during gastroscopy: atrophic gastritis, metaplasia, dysplasia
  - Age > 45 years old
  - Male gender
  - High salt intake
  - Smoking

  <u>SYMPTOMS</u>:

  Decrease/loss of appetite, weight loss, and malnutrition, early satiety, vomiting, dysphagia/odynophagia, persistent epigastric pain, gastrointestinal hemorrhage, presence of an epigastric tumor, enlarged supraclavicular lymph node(s).

  <u>DIAGNOSIS</u>:

  Histopathological examination of the gastric mucosa taken during gastroscopy. ≥ 6 biopsies are recommended.

  <u>STRATEGY IN THIS CASE</u>:

  This patient should be consulted by an oncologist as soon as possible. Therefore, you should set up a quick oncologic diagnostic card (called DILO in Polish) for her. She should undergo a CT scan with contrast to assess the staging of the cancer. This will allow the oncologists to choose the best treatment method.

The methods used in treating gastric carcinoma include surgical resection, chemotherapy, and radiotherapy.

Surgical resection is a significant operation. Good nutrition is a crucial aspect of the preparatory period before surgery. The most important factor is protein levels, which is why products like Nutridrinks or Protifar are recommended.

After surgery, problems such as nausea and vomiting may occur; therefore, eating small portions of food is recommended. Over time, larger portions of food may become possible. In cases of vomiting, special medications may be necessary.

The prognosis depends on the staging. The more advanced the cancer, the worse the prognosis. The 5-year survival rate is up to 10% in cases of distant metastases, and 95%-100% in cases of carcinoma limited to the gastric mucosa without lymph node metastases.

- QUESTIONS YOU MAY BE ASKED BY THE PATIENT:
  "Will I be able to eat pizza?"
  "Is surgery necessary? Is it possible to avoid it?"
  "How much time do I have left?"
  "How did this happen? I was eating 'healthy food'."
  "Will I be able to work in the garden and in the Housing Estate Council?"

- END OF SCENARIO
  The student will stop the conversation.

Simulated Patient Scenario

- LEARNING OBJECTIVES
  D.U5: Knows how to conduct conversations with adults, children, and families using active listening techniques and empathy, and can discuss the patient's life situation.
  D.U6: Knows how to inform the patient about the aim, risks, and course of proposed diagnostic and therapeutic methods, and can obtain informed consent for them.
  D.U8: Provides the patient and their family with information about an unfavorable prognosis.

- TECHNICAL INFORMATION
  Setting: Doctor's office at the Internal Medicine ward
  Student's role: Doctor during Internal Medicine specialization
  Your role: Patient coming for a follow-up visit to receive the results of the histopathological test taken during the gastroscopy three weeks ago

- CASE STUDY
  Your name is Hanna Zabielska, and you are 54 years old.

Three weeks ago, you were admitted to the Internal Medicine ward for the diagnosis of chronic abdominal pain and a weight loss of 9 kg within the last three months. You underwent laboratory tests, an ultrasound examination, and a gastroscopy. Afterward, you were discharged from the hospital. During the gastroscopy, the doctor took a fragment of your gastric mucosa using forceps, which was sent for histopathological examination.

Your attending physician asked you to return to the ward in approximately three weeks to receive the results of the histopathological test.

Today, you arrived alone to meet with your attending physician, who will invite you into the doctor's office.

- PERSONAL HISTORY

You are a history teacher at a high school, and your husband works in the IT sector. You live with your husband in a small house in the suburbs of Warsaw. You enjoy working in your garden and riding bicycles with your husband. You are an active member of your Housing Estate Council and are pleased to have an influence on your neighborhood.

You have grown-up children: a 20-year-old son and a 25-year-old daughter. Your son is studying in England, and your daughter is studying in Denmark. Your daughter is pregnant, and in a few months, you will become a grandmother to a granddaughter. You are looking forward to it.

- MEDICAL HISTORY
  Chronic diseases: None
  Medication: None
  Allergies: None
  Surgeries: None
  Drugs/stimulants: None

- EXPECTED ATTITUDE

You are afraid that the result of the histopathological examination may be unfavorable. You have been nervous since the day you were discharged from the hospital three weeks ago. You are aware that it could be gastric cancer. Your grandfather had gastric cancer, and you remember that he suffered a lot and died soon after the diagnosis.

The story of your grandfather had a significant impact on your whole family. Everyone paid attention to what they ate – eating "healthy food" was very important. Naturally, you also paid close attention to your diet. That is why you hope it is only peptic ulcer disease, but nevertheless, you have many dark thoughts, thinking, "What if it is cancer?"

Since your children study abroad, you have a lot of free time for yourself. You are afraid that oncological treatment will change your life. You are worried about your garden – who will take care of it as well as you do now? Gardening is physical work, and you may not have enough strength to do it. You are also actively involved in the Housing Estate Council, and are currently busy with a European project to build a new playground for children. You are anxious that you might not be able to attend every meeting. Moreover, you planned to visit your daughter next month. You bought the tickets a long time ago, and are eager to go not only because of the money spent on tickets but also because you miss her dearly. The last time you saw her, she was not even aware that she was pregnant.

In the event of a cancer diagnosis, you are unsure what to expect – surgery, chemotherapy, or radiotherapy are all daunting prospects. Unfortunately, your diagnosis will indeed be bad – gastric cancer.

Breaking bad news is a challenging task for any doctor, which is why there are specific tools to do so. We expect the student to use the SPIKES protocol while providing you with information about this unfavorable diagnosis.
Protocol SPIKES consists of specific elements [7].

- SETTING
  - Arrange for privacy.
  - Involve significant others.
  - Establish a connection with the patient.
  - Manage time constraints and minimize interruptions.

- PERCEPTION/PERSPECTIVE
  - Assess the patient's perception of the situation/disease.
    "What have you been told about your medical situation so far?"
    "What is your understanding of the reasons we did the tests?"

- INVITATION
  - Assess how much information the patient wants to hear.
    "How would you like me to give you the information about the test results?"
    "Would you like me to provide all the details, or would you prefer a brief overview and then spend more time discussing the treatment plan?"

- KNOWLEDGE
  - Begin with introductory information – refer to what has already been done.
    "During the gastroscopy, the doctor decided to take some material for histopathological examination. He noticed some abnormalities. I have the result of your histopathological test that we sent for analysis three weeks ago."
  - Provide a warning shot – prepare the patient for the bad news.
    "Unfortunately, I've got some bad news to tell you…"
    "I'm sorry to tell you that…"
    "I wish I had better news for you…"
  - Deliver the bad news – use short, direct language.
    "It appears you have gastric cancer."

- EMOTIONS/EMPATHY
  - Allow time for emotions – it is crucial for the student to remain silent for a moment to let the patient process the diagnosis.
  - Observe the patient's emotions and attempt to name them.
    "I see you are…"
  - Respond to the patient's emotions.
    "All your emotions are completely understandable. It must be difficult for you."
    "I know this isn't what you wanted to hear."
    "I wish the news were better."

- STRATEGY/SUMMARY
  - Check if the patient is ready to discuss the next steps – if the student moves too quickly, the patient may not fully absorb the message.
  - Provide information in small portions and discuss the next steps.
  - Answer questions, offer solutions, and be helpful.
  - Ensure there are no remaining questions at the end.

- CONVERSATION TIPS

Student uses SPIKES protocol	Student does not use SPIKES protocol
Student invites you and shows you where to sit down.	Student doesn't invite you, or show you where to sit.
YOU SIT, feeling nervous, looking at the student and trying to read the diagnosis from their face. You wait until they start talking.	YOU STAND feeling nervous, looking at the student and trying to read the diagnosis from their face. You wait until they start talking, and they continue speaking while still STANDING.
Student asks if you have any close person with you.	Student doesn't ask if you have any close person with you.
You came alone. Your husband is at work, and your children live abroad.	You say nothing about your family.
Student wants to know your perception.	Student doesn't inquire about your perception.
You share that you were nervous after being discharged from the hospital and are worried that the results might be bad. You are afraid it could be gastric cancer. Your grandfather had gastric cancer, and you remember how much he suffered and how quickly he passed away after the diagnosis.	You become increasingly nervous that it could be cancer. You look at the student more intently.
Student asks to find out how much information you want to hear.	Student doesn't try to find out how much information you want to hear.
You want to know the details.	You become increasingly nervous that it could be cancer. You look at the student more intently.
Student provides a warning shot before delivering the diagnosis and uses short, clear words.	Student tells you about the cancer WITHOUT providing a warning shot.
You fall silent and become very sad. Dark thoughts start flooding your mind.	You cannot believe it is true. It feels like a nightmare. You reject this information. *"Are these really my results? I ate healthy food all my life – it cannot be true."*
Student gives you TIME for emotions.	Student doesn't give you time for emotions.
You start to verbalize your thoughts. *"What am I going to do now?"* *"I have to work in the garden."* *"What about the Housing Estate Council?"*	You cannot believe it is true. It feels like a dream. You reject this information. *"Are these really my results?"* *"I ate healthy food all my life – it cannot be true."*

Student uses SPIKES protocol	**Student does not use SPIKES protocol**
Student responds to your emotions" *"I can see you are sad."* *"All your emotions are completely understandable."* *"It must be difficult."*	Student doesn't respond to your emotions" *"It is not a big deal."* *"There is no need to worry."* *"Everything will be fine."*
You can burst into tears or remain silent. After a while, you start asking about the next steps – and the possible treatment. Show the student that you want their help And that you are open to discussing the next steps.	You speak less, feeling that the student doesn't understand you. You feel an overwhelming urge to leave the office. You feel like crying but you hold back because you don't feel comfortable with this student. You consider showing the results to another doctor – you may mention this to the student but it is not necessary. You feel like leaving. You can show this through your body language or you can say something like *"Maybe I should go now; you must have a lot of work…"*
Student discusses the next steps with you.	Student doesn't tell you about the next steps.
You listen to what they say and assure them that you will follow the instructions. If they advise psychological consultation, agree. If they asks you to talk to your husband about the diagnosis, agree.	You know you will seek another doctor. You wait until they finish speaking so you can leave. You don't actively listen to what they tell you. If they advise psychological consultation – say *"I will think about it."* If they want to talk with your husband – say *"I will handle that myself."*

- QUESTIONS YOU MAY ASK THE STUDENT
  "Will I be able to eat pizza?"
  "Will I have to eat mashed food for the rest of my life?"
  "How much time do I have left?"
  "How did this happen? I was eating 'healthy food'."
  "Will I be able to work in the garden and in the Housing Estate Council?"
  "Is surgery necessary? Is it possible to avoid it?"

- END OF SCENARIO
  The student will stop the conversation.

Trainer Scenario

- LEARNING OBJECTIVES
  D.U5: Knows how to conduct conversations with adults, children, and families using active listening techniques and empathy, and can discuss the patient's life situation.
  D.U6: Knows how to inform the patient about the aim, risks, and course of proposed diagnostic and therapeutic methods, and can obtain informed consent for them.
  D.U8: Provides the patient and their family with information about an unfavorable prognosis.

- TECHNICAL INFORMATION
  Setting: Doctor's office at the Internal Medicine ward
  Student's role: Doctor during Internal Medicine specialization
  SP role: Patient coming for a follow-up visit to receive the results of the histopathological test taken during the gastroscopy three weeks ago

- CASE STUDY

The student is currently specializing in Internal Medicine at the Internal Medicine ward of Public City Hospital. Three weeks ago, he was the attending physician for Hanna Zabielska, a 54-year-old patient admitted for the diagnosis of chronic abdominal pain and a weight loss of 9 kg over the last three months. The patient underwent laboratory tests, ultrasound, and gastroscopy. There was slight anemia in the laboratory tests, and the ultrasound results were normal. The Helicobacter pylori test was negative, but during the gastroscopy, the doctor decided to take biopsies for histopathological examination.

The patient was discharged from the hospital and asked to return to the student after three weeks to receive the histopathological examination results.

A colleague of the student performed the gastroscopy and mentioned taking biopsies because he didn't like the look of the gastric mucosa. Unfortunately, his concerns were valid. The result is diffuse-type gastric adenocarcinoma localized in the corpus.

The patient is now waiting in the corridor outside the physicians' room at the ward. The student is inside with two colleagues.

The patient is a high school history teacher, and her husband works in IT. They live together in a small house in the suburbs of Warsaw. She enjoys gardening and riding bicycles with her husband. She is also an active member of her Housing Estate Council and is proud of her influence on the neighborhood. She has grown-up children: a 20-year-old son and a 25-year-old daughter. Both are studying abroad – her son in England and her daughter in Denmark. Her daughter is pregnant, and in a few months, the patient will become a grandmother of a granddaughter. She is looking forward to this.

- STUDENT'S TASKS:
  Using communication skills:
  1. Provide the patient with information about the unfavorable prognosis using the SPIKES protocol.
  2. Conduct a conversation with the patient using active listening techniques and empathy, and also discuss the patient's life situation.
  3. Inform the patient about the diagnosis and therapeutic methods.

- POSSIBLE QUESTIONS & ANSWERS
  - *"Will I be able to eat pizza?"* Yes, but not immediately. You may need to wait until after the initial recovery period.
  - *"Will I have to eat mashed food for the rest of my life?"* Initially, yes, but later on, you may not need to.
  - *"How much time do I have left?"* There's no definitive answer to this question. It varies from person to person. I know patients who have lived long, professionally active lives.
  - *"How did this happen? I was eating 'healthy food'…"* It's great that you ate healthy food, and you should continue to do so. However, a family history of gastric cancer was likely a significant risk factor in your case.
  - *"Is it my fault?"* No, of course not. A family history of gastric cancer was likely one of the risk factors in your case.
  - *"Will I be able to work in the garden and in the Housing Estate Council?"* It varies from person to person. Everyone is different. I know patients who have remained professionally active after being diagnosed with gastric cancer.
  - *"Is surgery necessary? Is it possible to avoid it?"* The treatment method depends on the stage of the cancer – it could involve surgery, chemotherapy, or radiotherapy. This is why it is very important to undergo a CT scan with contrast now, so the oncologist can determine the best treatment strategy for your case.
  - *"Can I go to Denmark and visit my daughter?"* I would recommend asking the oncologist this question. I believe they will be able to provide more information after the CT scan with contrast. Therefore, it is now very important to consult with oncologist as soon as possible.

- END OF SCENARIO
  The student will stop the conversation.

Figure 4.1. Scenario with SP

Figure 4.2. Scenario with SP

Figure 4.3. Scenario with SP

Center's Experience

Teaching Communication Skills with the Participation of Standardized Patients

During the six-year course of general medicine studies at the Faculty of Medicine of Lazarski University, communication skills are taught at various classes. The Medical Simulation Center is one of the places where students learn how to use those skills in practice. There, carefully prepared scenarios, focused on the manner of conducting conversations with patients, are realized with the participation of SPs.

Organization of the Classes

Classes are part of the Doctor-Patient Communication course that is obligatory for third-year general medicine students in the winter semester. The classes are conducted by a qualified trainer in a group of a maximum of 10 students. During the classes, 5 scenarios are realized with the participation of one SP. Some scenarios are realized twice, so that each student can interact with the patient. The order of the interlocutors is decided by a draw. The simulation may be stopped either by the student if help is needed (maximum twice) or by the trainer if the scenario is realized in a way that may lead to negative consequences both for SP and for the students [8,9].

Prebriefing

Students get familiar with the scenario in the class before starting each conversation and then discuss it with the trainer. At this stage, it is possible to ask questions to the trainer. While one of the students is realizing the scenario, the other participants are asked to note down both verbal and non-verbal communication skills, including specific phrases used by their colleague during the conversation, which is very useful at the debriefing [9].

Scenario Realization

During the scenario, it is very important for the trainer to obtain as much information as possible about the observed conversation in order to properly conduct the debriefing. At this stage, in addition to notes, the checklist presented below may be helpful [9].

EXAMPLE OF A CHECKLIST FOR GASTRIC CANCER

Communication skills	Execution	Points
WELCOME	*Welcome* *Self-introduction* *Explaining the role*	
SETTING	*Privacy arranging* *Involving significant people* *Adequate location* *Managing interruptions*	
PERCEPTION	*"Did you receive any information so far?"* *"What is your understanding of why we conducted the tests?"*	
INVITATION	*"How detailed would you like the information to be?"* *"How would you prefer I deliver the test results to you?"*	
KNOWLEDGE	**Initial information** *"We did the tests to…."* **Warning shot** *"Unfortunately, I've got bad news…"* *"I'm sorry to tell you that…"* *"I wish I had better news for you…"* **Telling bad news: exact, clear words** *"The gastroscopy revealed that you have gastric cancer."*	
EMOTIONS/ EMPATHY	**Time for emotions** **Naming emotions** *"I see you are…"* **Responding to emotions** *"I understand how you are feeling."* *"Your emotions are completely understandable."* *"This must be difficult for you."*	
STRATEGY/ SUMMARY	**Discussing the next steps** **Making sure the patient understood provided information** *"Is there anything that needs explanation?"* **Ensuring there are no more questions** *"Do you have any questions?"*	
Providing information in small, manageable portions		
Answering the questions	Offering explanations	

Communication skills	Execution	Points
Adequate language	Avoiding medical jargon	
Body language	Nodding, maintaining eye contact, leaning forward	
Clarification	Making sure they understand the patient *"Just to make sure I understand you correctly, did you mean…"*	

Debriefing

The aim of this stage is to determine how the participants of the conversation felt, both the student and the standardized patient (SP). It is also a time to answer questions such as "What is worth repeating?" and "What could have been done better?" These questions are addressed to all simulation participants, including other students and the trainer. It is important that the discussion occurs in a safe and non-judgmental environment [10].

Best Practices in Teaching Communication Skills with Participation of SP

The aim of the Warsaw study visit was to develop best practices for teaching communication skills to general medicine students. The discussion took place both among foreign guests from centers participating in the V4 project and guests from Polish institutions: MD PhD Tomasz Szafrański, Head of the community treatment team of the Wolski Mental Health Center at the Wolski Hospital in Warsaw; MD PhD Dorota Bulsiewicz, Deputy Head of the Department of Neonatology and Neonatal Intensive Care, The Children's Memorial Health Institute in Warsaw; PhD Antonina Doroszewska, Head of the Department of Medical Communication, Medical University of Warsaw; MD PhD Joanna Seliga-Siwecka, Assistant Professor at the Department of Neonatology and Neonatal Intensive Care, Medical University of Warsaw; PhD Marek Dąbrowski, Head of Department of Medical Education, Poznan University of Medical Sciences; PhD Maria Nowosadko, Head of Centre for Foreign Language Tuition, Poznan University of Medical Sciences; MD PhD Izabela Stefaniak, Content Manager at Psychotherapy Academy Interego in Warsaw; MD Zuzanna Sitarska, Institute of Psychiatry and Neurology in Warsaw.

Conclusions

During the study visit, the following conclusions were drawn:

1. Best Time to Start Teaching Communication Skills
Undoubtedly, the earlier communication skills are integrated into the curriculum of general medicine studies, the better. However, effectively conversing with a patient requires medical knowledge from the student, making the third year of studies optimal for this type of class [11].

2. Teaching Methods with the Participation of Standardized Patients
There are numerous methods for teaching communication skills with the participation of SPs. The method described above focuses solely on communication skills, but it is considered good practice to teach communication using a combination of scenarios that target learning both soft and hard skills. These scenarios can be implemented either sequentially or simultaneously. In the first approach, it is advisable to conduct a high-fidelity scenario followed by a communication-focused one. For example, a student who was the resuscitation team leader might then talk to a patient's wife to inform her about her husband's health condition. In the second approach, a standardized patient is integrated into a high-fidelity simulation. For instance, a wife might enter the room where her husband (represented by a manikin) is being resuscitated and begin to express distress, requiring the team to manage her emotions while continuing their medical tasks. Combining these scenarios is challenging and requires experience in simulations from all participants [11].

3. The Number of Standardized Patients
The number of standardized patients (SPs) required to conduct classes depends on the university's needs, including the number of students, classes, trainers and the available facilities. It is advisable to have slightly more SPs than necessary, to account for potential absences due to personal commitments. Many SPs work part-time, so having a reserve allows for flexibility in scheduling and ensures that classes are not disrupted by unexpected absences.

4. Situations that Prevent Cooperation with the SP
Working as a standardized patient requires specific skills, so SPs are selected through a recruitment process and undergo specialized training [9]. However, situations may arise that make it difficult to continue working with an SP. These situations can include inappropriate behavior (such as laughing during a physical examination),

misunderstanding their role, difficulties in communication, or failure to respond to feedback. Additionally, sudden cancellations without arranging a replacement can be problematic. In such cases, it is good practice to first discuss the issue with the SP. If no improvement is observed, termination of cooperation should be considered.

5. Conditions for Realizing Communication Scenario

The environment in which simulation takes place is crucial to its success. The more the environment resembles a real situation, the easier it is for participants to immerse themselves in their roles. Therefore, it is advisable for students to wear medical aprons to enhance the realism of the scenario. In scenarios set in a doctor's office, basic equipment like a desk, chairs, a stethoscope, manometer, or otoscope is sufficient. In hospital-based scenarios, a couch may be necessary. If highly specialized equipment is not required, it is best to remove it from the room or separate it with screens to minimize distractions [9].

It is also good practice for the trainer to stay in the same room where the conversation takes place to closely observe both verbal and non-verbal communication skills. However, their presence may cause stress for the student and negatively impact the quality of the conversation. In such cases, a room with one-way glass can be used to allow observation without adding pressure. Regardless of the trainer's location, it is important that all students experience the scenario under the same conditions to ensure fairness and consistency [9].

6. Scenario Duration

The duration of communication classes is strictly defined according to the study program, with each session lasting approximately four hours. Effective planning is essential to ensure that all planned scenarios are completed within this timeframe, including necessary breaks [9]. On average, a single scenario takes approx. 40 minutes to execute, which includes several minutes for the conversation itself and the remainder for debriefing. Tools such as timers and alarms are valuable in maintaining the schedule and ensuring that the time is managed efficiently.

7. Scope of Communication Scenarios

Currently, the scope of communication scenarios includes protocols for delivering bad news, understanding the patient's perspective, recognizing and responding to self-destructive behavior, and managing aggression. It is also important to prepare simpler scenarios, such as those focused on conducting medical interviews. These could be integrated into the curriculum before students begin practical classes in clinics, better preparing them to interact with patients during these practical sessions.

8. Scenario Modification

Introducing additional elements to existing scenarios is a good practice, especially when aiming to increase the difficulty level of the scenario. For instance, you could introduce unexpected events, such as a nurse entering the office suddenly during a conversation or the doctor's phone ringing. By making slight modifications to a scenario, it is possible to achieve new, sometimes completely different learning objectives. However, it is advisable to implement such scenarios after students have already mastered the basics of communication skills, perhaps as part of optional classes [9].

9. Choosing Scenarios and the Order

Drawing lots is an effective and fair method for determining the order in which students will participate in scenarios. This approach generally prevents misunderstandings and limits discussions about scenario selection. However, there are instances where a student might draw a scenario closely related to a personal or family health situation, such as the death of a relative due to cancer. In such cases, the trainer must be flexible. It is good practice to allow the student to exchange the scenario with another student or to skip the scenario entirely, if necessary.

10. Getting Familiar with the Scenario

While it may be beneficial for scenarios to be available to students before the classes so they can familiarize themselves with them, this does not guarantee effective participation in the conversation. Knowing the expectations is one thing; executing the task correctly is another. Given that communication scenarios can be extensive, there is a risk that students may not read all of them, especially if they have to read several at once because their scenario is assigned by lot on the day of the class. Therefore, it is good practice to discuss the scenarios and clarify any doubts students may have during the classes [9].

11. Students Assessment Method

Opinions on communication skills assessment methods are divided. On one hand, we aim to foster a non-judgmental environment, while on the other, we require assessments for communication scenarios conducted during OSCE exams. It is crucial that the assessment methods and rules are consistent for all students, regardless of the trainer, and are clearly included in the curriculum. Additionally, it is a good practice to remind students of these rules before the simulation to prevent any misunderstandings.

Assessment can be conducted using a binary system, where a score of one indicates a communication skill was demonstrated, and zero indicates it was not. However, a 0-1-2 point system is often more effective, as it allows for more nuanced evaluations based on how well the student completed the task. This method provides a more precise assessment of the student's skills.

It is also important to consider that the trainer's experience may impact the assessment. During the study visit in Warsaw, participants were asked to assess a student during a scenario using the checklist described above. Interestingly, inexperienced participants tended to give the student an average of 3 points more than their experienced counterparts, who were more critical in their evaluations.

12. Critical Points

The scenario serves as a tool for achieving specific learning objectives. The trainer's responsibility is to ensure that students acquire the necessary skills during the sessions. For this reason, it is good practice to establish "critical points" – elements that must be executed correctly for the student to pass. In the scenario presented above, critical points might include delivering a warning shot and allowing silence after breaking bad news. Establishing critical points is especially important in scenarios prepared for OSCE exams.

13. Checklist

A checklist is a valuable tool for trainers. It helps verify whether the student has completed the task correctly and facilitates the collection of necessary information for debriefing [9]. A checklist formatted as a table with space for writing down points and taking notes is particularly useful. Additionally, providing an extra table with two columns titled "Correctly Performed" and "Incorrectly Performed" allows the trainer to take notes on the observed conversation, making it easier to conduct a debriefing based on specific phrases used by the student and the SP.

In communication scenarios, it is better to avoid situations where students use the checklist during their conversation with the SP. There is a risk that focusing on the checklist during the conversation could lead to an inappropriate and artificial interaction, such as not maintaining eye contact with the patient.

14. Debriefing

Debriefing is the most important element of any simulation, including communication scenarios. The order in which participants speak during debriefing, as determined by the trainer, is crucial. A good practice is to have the student first comment on how they felt during the conversation, what they did well, and what could have been improved. The SP should follow with their feedback, then the other participants, and finally the trainer [9].

Feedback from the SP is crucial for achieving the learning objectives and is therefore the most important for students. Providing feedback skillfully requires appropriate training. It is beneficial if the feedback is given by the SP using the DESC method: Describe the behavior, Express your feelings, Specify your expectations, and explain the Consequences of the behavior [12]. It is also good practice to invite simulated patients to participate in debriefing sessions so they can gain experience and understand trainers' expectations, enabling them to become standardized patients over time.

15. Safety of Students and Standardized Patients

Teaching communication with the participation of standardized patient is about dealing with emotions. That is why safe environment is very important, and the trainer is responsible for that [9]. It may turn out that the topics discussed during classes will provoke participants to share very intimate issues. A careful and professional trainer takes care of the situation respecting the feelings of the person and/or all participants, and sometimes offer psychological support. Therefore, in such cases, free psychological consultation available at the university is a good practice.

During the study visit in Warsaw international experts focused on the topic of good practices in teaching communication with participation of Standardized Patients. The participants agreed that the conclusions drawn at the meeting are worth implementing in practice to standardize and improve the quality of communication education at medical faculties.

Description of the Center and Project

The "MedExcellence Simulation Center: Excellence in Education" project is co-financed by the European Union through the European Social Fund. Anna Gostyńska from Wolski Hospital in Warsaw partners with the University on this project. Medical simulations within this initiative enable students to refine their skills and procedures in controlled environments, with the Medical Simulation Center replicating clinical conditions at both hospital and pre-hospital levels.

The implementation of the "MedExcellence Medical Simulation Center: Excellence in Education" project is supported by co-financing from the European Social Fund under the Operational Programme Knowledge Education Development 2014–2020, Action 5.3 High-Quality Education at Medical Faculties. Lazarski University, in collaboration with Anna Gostyńska from Wolski Hospital, an Independent Public Health Care Institution, is responsible for executing the project.

Among the resources available at our Simulation Center are an ambulance simulator, a hospital emergency ward, an intensive care unit, and an operating theater. Classes at the Simulation Center are led by experienced medical staff who utilize cutting-edge equipment. During simulation sessions, students engage in repeated clinical scenarios using advanced simulators and trainers.

This controlled classroom environment enables students to address clinical challenges safely, fostering critical thinking, clinical reasoning, and clinical judgment. Practical sessions at the Medical Simulation Center help students master clinical procedures and prepare for quick decision-making in real patient scenarios. The variety of simulators, trainers, and clinical tools allows students to practice both individual procedures and manage complete diagnostic and therapeutic processes.

In addition to these simulations, classes involving Standardized Patients are integrated to enhance soft skills, history-taking, and physical examination techniques.

Standardized Patients interact with students during classes, portraying scenarios that involve resolving clinical issues in doctor/nurse-patient interactions, such as medical history-taking, providing health information, and conducting physical examinations, as well as in team interactions between doctors and nurses, based on the simulation scenario and specific disease. These Standardized Patients simulate distinct symptoms through appropriate reactions, verbal cues, and role-playing various characters, such as patients, parents of ill children, or family members of patients.

Interacting with Standardized Patients ensures that participants experience consistent scenarios designed by experienced professionals, allowing each student to develop essential skills in a standardized environment. Graduates from our university will be well-prepared to practice as doctors and nurses, equipped with knowledge, skills, and advanced social competencies.

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PHOTO REPORT FROM STUDY VISITS

1st Study Visit to the Center of Simulator and Virtual Medicine, Faculty of Medicine, Pavol Jozef Šafárik University in Košice, Slovakia (September, 20–21 2023)


BODY INTERACT
CLINICAL EDUCATION

2nd Study Visit to the Clinical Skills Centre, Albert Szent-Györgyi Medical School, University of Szeged (November, 29–30 2023)

3rd Study Visit to the SIMU Department of Simulation Medicine and Simulation Centre, Masaryk University, Czechia (January, 29–30 2024)


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4th Study Visit to the MedExcellence Medical Simulation Center, Faculty of Medicine, Lazarski University in Warsaw, Poland (February, 21–22 2024)


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ISBN 978-83-66723-75-7

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DOI: 10.26399/978-83-66723-75-7