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SIMULATION TECHNOLOGIES AND OSCE METHODOLOGY IN TEACHING CLINICAL SKILLS

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Abstract

Simulation-based teaching (SBT) has become a key approach in medical education, enhancing students’ clinical competence and learning experience. It includes methods such as high-fidelity mannequins, virtual reality, standardized patients, and hybrid simulations, providing a safe environment to practice both technical and non-technical skills, ultimately improving patient safety.

SBT enables repeated practice, reduces errors, and strengthens learning through immediate feedback and structured debriefing. In this context, the Objective Structured Clinical Examination (OSCE) is essential for objectively assessing clinical competence. It ensures standardized evaluation of students’ knowledge, practical skills, and communication abilities.

Despite challenges such as high costs and the need for specialized resources, the integration of SBT and OSCE significantly contributes to the development of competency-based medical education.

Keywords: Simulation-based teaching (SBT), medical education, clinical competence, simulation technologies, high-fidelity simulation, virtual reality, standardized patients, OSCE, objective structured clinical examination, clinical skills assessment, patient safety, competency-based education

СИМУЛЯЦИОННЫЕ ТЕХНОЛОГИИ И МЕТОДОЛОГИЯ ОСКЭ В ОБУЧЕНИИ КЛИНИЧЕСКИМ НАВЫКАМ

Аннотация

Симуляционно-ориентированное обучение (SBT) стало одним из ключевых подходов в медицинском образовании, существенно повышая уровень клинической компетентности обучающихся и качество образовательного процесса. Оно включает такие методы, как высокореалистичные манекены, виртуальная реальность, стандартизированные пациенты и гибридные симуляции, обеспечивая безопасную среду для отработки как технических, так и нетехнических навыков, что в конечном итоге способствует повышению безопасности пациентов.

Данный подход предоставляет возможность многократной практики, снижает количество ошибок и усиливает усвоение материала за счёт немедленной обратной связи и структурированного разбора. В этом контексте объективный структурированный клинический экзамен (OSCE) играет важную роль в оценке клинической компетентности, обеспечивая стандартизированную и объективную оценку знаний, практических навыков и коммуникативных способностей студентов.

Несмотря на определённые трудности внедрения, такие как высокая стоимость и необходимость специализированных ресурсов, интеграция данных методов (SBT и OSCE) является эффективным инструментом развития компетентностно-ориентированного медицинского образования.

Ключевые слова: симуляционно-ориентированное обучение, медицинское образование, клиническая компетентность, симуляционные технологии, высокореалистичная симуляция, виртуальная реальность, стандартизированные пациенты, объективный структурированный клинический экзамен, оценка клинических навыков, безопасность пациентов, компетентностно-ориентированное обучение.

KLINIK KO‘NIKMALARNI O‘QITISHDA SIMULYATSION TEXNOLOGIYALAR VA OSCE METODOLOGIYASI

Annotatsiya

Simulyatsiyaga asoslangan o‘qitish tibbiy ta’limda muhim yondashuvlardan biri bo‘lib, talabalarning klinik kompetensiyasini va o‘quv jarayoni samaradorligini sezilarli darajada oshiradi. Ushbu yondashuv yuqori aniqlikdagi manekenlar, virtual reallik, simulyatsion bemorlar va gibrid simulyatsiyalar kabi usullarni o‘z ichiga oladi hamda texnik va texnik bo‘lmagan ko‘nikmalarni xavfsiz muhitda rivojlantirish

imkonini beradi, bu esa bemor xavfsizligini ta’minlashga xizmat qiladi.Simulyatsiya takroriy amaliyot o‘tkazish, xatolarni kamaytirish va tezkor fikr-mulohaza hamda tizimli tahlil orqali bilimlarni mustahkamlash imkonini beradi. Shu bilan birga, obyektiv strukturallashgan klinik imtihon (OSCE) klinik kompetensiyani baholashda muhim ahamiyatga ega bo‘lib, talabalar bilimlari, amaliy ko‘nikmalari va kommunikativ qobiliyatlarini standart va xolis baholashni ta’minlaydi.Amalga oshirishdagi ayrim qiyinchiliklarga, jumladan yuqori xarajatlar va maxsus resurslarga ehtiyoj mavjud bo‘lsa-da, simulyatsiyaga asoslangan o‘qitish va obyektiv strukturallashgan klinik imtihonni integratsiyalash tibbiy ta’lim sifatini oshirishda samarali vosita hisoblanadi.

Kalit so‘zlar: simulyatsiyaga asoslangan o‘qitish, tibbiy ta’lim, klinik kompetensiya, simulyatsion texnologiyalar, yuqori aniqlikdagi simulyatsiya, virtual reallik, standartlashtirilgan bemorlar, obyektiv strukturallashgan klinik imtihon, klinik ko‘nikmalarni baholash, bemor xavfsizligi, kompetensiyaga asoslangan ta’lim.

Introduction. The acquisition of clinical skills is a fundamental component of medical education, requiring not only theoretical knowledge but also practical competence and decision-making abilities. Traditional teaching approaches, such as bedside learning, often lack standardization and may expose patients to unnecessary risks.

To address these challenges, simulation technologies and Objective Structured Clinical Examination have emerged as essential tools in medical education. OSCE is widely recognized as one of the most valid and reliable methods for assessing clinical competencies, as it evaluates students in structured stations involving patient interaction, clinical reasoning, and procedural skills .

At the same time, simulation-based education has become a cornerstone of clinical training, enabling students to practice in a controlled and risk-free environment. The integration of these approaches provides new opportunities for improving both teaching and assessment in clinical education.

This study is based on a qualitative literature review of scientific publications related to simulation-based medical education and OSCE methodology. The analysis includes studies focusing on:

- simulation technologies in clinical training
- OSCE-based assessment systems
- virtual patients and Virtual Reality applications

The primary material analyzed includes contemporary research on simulation and virtual learning in clinical education.

The literature was evaluated based on:

- effectiveness in clinical skill development
- impact on clinical reasoning and decision-making
- reliability and objectivity of assessment methods
- advantages and limitations of simulation technologies

Results

Simulation Technologies in Clinical Education

Simulation has become a central component of clinical training. It includes various modalities such as standardized patients, high-fidelity mannequins, computer-based simulations, and immersive Virtual Reality environments.

Simulation-based learning provides a safe and structured environment in which students can repeatedly practice essential clinical skills. Learners can perform tasks such as history taking, physical examination, diagnosis, and treatment planning in realistic scenarios. This approach enhances both technical and non-technical competencies, including communication and decision-making.

OSCE Methodology: Objective Structured Clinical Examination is a structured and objective assessment method widely used to evaluate clinical skills. It consists of multiple stations where students perform specific clinical tasks under standardized conditions. OSCE is considered highly reliable and valid because it reduces variability and ensures consistent evaluation. It assesses a wide range of competencies, including clinical reasoning, communication, and procedural skills.

Integration of Simulation and OSCE: **The integration of simulation technologies into OSCE has led to the development of Virtual OSCE (VOSCE). This approach combines simulation-based learning with structured assessment, enabling students to engage in realistic clinical scenarios while being objectively evaluated.**

Virtual patients and interactive simulation systems allow learners to perform clinical tasks such as diagnosis and treatment planning. Additionally, automated feedback systems enhance learning by providing immediate performance evaluation.

Role of Virtual Reality: **Virtual Reality plays a significant role in modern simulation-based education. It creates immersive environments that replicate real**

clinical situations, allowing students to interact with virtual patients and practice clinical skills.

Studies show that VR-based training improves knowledge retention, reduces errors, and increases student confidence. It also supports remote learning and flexible assessment.

Despite its advantages, simulation-based education has several limitations. These include the lack of realistic tactile feedback, high implementation costs, and the inability to fully replicate real patient interactions. However, technological advancements are expected to address these challenges in the future.

Discussion

The findings of this study highlight the growing importance of simulation technologies in the teaching and assessment of clinical skills. Simulation-based learning provides a safe, structured, and repeatable environment where students can develop clinical reasoning, procedural skills, and communication competencies without risking patient safety.

Within this context, Objective Structured Clinical Examination remains a highly reliable and standardized method for evaluating clinical performance. Its structured format ensures objectivity and consistency, allowing for comprehensive assessment of a wide range of competencies.

The integration of simulation with OSCE, including the development of Virtual OSCE (VOSCE), enhances both learning and assessment by enabling interactive clinical scenarios and providing immediate feedback. The use of Virtual Reality and virtual patients further improves learner engagement, knowledge retention, and decision-making skills.

Despite these advantages, limitations such as insufficient haptic feedback and the inability to fully replicate real clinical interactions remain. However, ongoing technological advancements are expected to improve the realism and effectiveness of simulation-based education.

Overall, the combined application of simulation technologies and OSCE methodology offers an effective and innovative approach to clinical skills training, improving both educational quality and student preparedness for real clinical practice.

Conclusion

The integration of simulation technologies and Objective Structured Clinical Examination methodology significantly improves the teaching and assessment of

clinical skills in medical education. Simulation provides a safe, controlled, and repeatable environment for developing clinical competencies, while OSCE ensures objective and standardized evaluation.

The use of Virtual Reality and virtual patients enhances learner engagement, clinical reasoning, and decision-making skills. Furthermore, this integrated approach contributes to reducing medical errors and increasing students' confidence before real patient interaction. Despite existing limitations, simulation-based OSCE remains a highly effective and promising strategy for modern clinical education.

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