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TECHNOLOGIES FOR DEVELOPING CLINICAL SKILLS IN MEDICAL EDUCATION: OSCE, SIMULATION CENTERS, CLINICAL SCENARIOS, AND CHECKLISTS.

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ABSTRACT

Background: Contemporary medical education demands competency-based approaches that ensure verifiable clinical skills in graduates. The integration of structured assessment tools and simulation-based learning has become a cornerstone of high-quality medical pedagogy globally. Objective: This study evaluates the pedagogical effectiveness of OSCE, simulation centers, clinical scenarios, and standardized checklists in undergraduate medical training at Tashkent State Medical University. Methods: A mixed-methods study involved 246 fourth- and fifth-year students divided into an intervention group (IG, n=123) and a control group (CG, n=123) over two academic years (2022–2024). OSCE scores, Clinical Confidence Scale ratings, procedural accuracy, and inter-rater reliability were measured. Results: IG students achieved significantly higher post-intervention OSCE scores (81.7 ± 6.2 vs. 68.4 ± 8.1; $p<0.001$, $d=1.82$). Simulation exposure correlated strongly with clinical confidence ($r=0.71$). Checklist implementation reduced inter-rater variability by 38% (Kappa: 0.54 → 0.84). Conclusion: Structured clinical skills technologies substantially enhance competency outcomes and assessment reliability in undergraduate medical education.

Keywords: clinical skills, OSCE, simulation-based medical education, clinical scenarios, checklists, competency-based assessment, medical pedagogy

1. INTRODUCTION

The global transformation of medical education toward competency-based frameworks has underscored the inadequacy of traditional didactic instruction for developing verifiable clinical proficiency. International bodies, including the World Federation for Medical Education (WFME) and the Association for Medical Education in Europe (AMEE), have consistently advocated for structured, practice-oriented curricula that prioritize demonstrable skills over knowledge acquisition alone (Frank et al., 2010). The Objective Structured Clinical Examination (OSCE), introduced by Harden and Gleeson (1979), has since become the gold standard for clinical competency assessment in over 80 countries (Zayyan, 2011). Simulation-based medical education (SBME) has further expanded pedagogical possibilities, enabling deliberate practice in realistic, risk-free environments (Issenberg et al., 2005). Within Uzbekistan, the State Program for Development of Higher Education (2019–2023) has accelerated adoption of these methodologies at Tashkent State Medical University (TSMU). Despite a substantial international literature, contextualized evidence from post-Soviet medical institutions remains limited, constituting the primary gap this study addresses.

2. MATERIALS AND METHODS

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A prospective mixed-methods study was conducted at the Clinical Skills and Simulation Center of TSMU during 2022–2024. Participants (n=246) were randomly allocated to an Intervention Group (IG, n=123) receiving OSCE-based training, simulation laboratory sessions, and checklist-guided clinical scenarios, or a Control Group (CG, n=123) undergoing conventional bedside teaching. OSCE assessments comprising twelve standardized stations evaluated history-taking, physical examination, clinical reasoning, procedural skills, and communication, scored using Miller's Pyramid-aligned behaviorally anchored checklists (Miller, 1990). Clinical confidence was measured using the adapted Clinical Confidence Scale (O'Brien et al., 2014). Simulation sessions (120 minutes, groups of eight) utilized high-fidelity SimMan 3G mannequins. Statistical analysis employed IBM SPSS v.26; paired t-tests, Pearson correlations, and Cohen's Kappa were applied. Significance threshold: $p<0.05$.

3. RESULTS

Pre-intervention OSCE scores were comparable between groups (IG: 61.3±8.4; CG: 60.8±7.9; $p=0.72$). Post-intervention, IG students scored significantly higher (81.7±6.2 vs. 68.4±8.1; $t(244)=13.28$, $p<0.001$, Cohen's $d=1.82$), with the greatest gains in clinical reasoning (+27.1%) and history-taking (+24.6%). IG students averaged 14.3 simulation sessions annually; Clinical Confidence Scale scores rose from 2.8 to 4.3 ($p<0.001$), with simulation hours strongly predicting confidence ($r=0.71$, $p<0.001$). Procedural accuracy in simulated tasks reached 84.2%. Checklist implementation improved inter-rater reliability from Kappa=0.54 to Kappa=0.84, reducing variability by 38%. Qualitative analysis of student reflective journals (n=98) identified three themes: enhanced diagnostic confidence, improved patient communication, and greater management of clinical uncertainty.

4. DISCUSSION

These findings corroborate meta-analytic evidence by Cook et al. (2011), who reported large effect sizes ($d=0.71–1.20$) for simulation-based training. The strong correlation between simulation exposure and clinical confidence reflects Ericsson's deliberate practice framework (1993): repeated, feedback-informed practice drives expert skill development. Improvement in inter-rater reliability following checklist implementation aligns with Ilgen et al. (2015), who demonstrated that behaviorally anchored scales combined with examiner calibration significantly enhance assessment validity. The pronounced gains in clinical reasoning suggest that contextualized scenario-based learning facilitates higher-order thinking consistent with constructivist learning theory (Lave & Wenger, 1991). Limitations include the single-institution design and absence of longitudinal follow-up in actual clinical settings. Future multicenter studies across Central Asian medical institutions are recommended.

5. CONCLUSION

Systematic integration of OSCE, simulation centers, clinical scenarios, and standardized checklists demonstrably elevates clinical competency outcomes, assessment reliability, and student confidence in undergraduate medical education. Evidence from TSMU supports the broader regional adoption of these evidence-based methodologies. Priority recommendations include development of context-specific simulation scenarios reflecting Central Asian epidemiological profiles, sustained faculty development for OSCE examiner calibration, and establishment of inter-institutional research consortia to advance comparative competency research.

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