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Implementation of Teacher-Simulated Patient Pedagogy for Bachelor of Medicine and Bachelor of Surgery Undergraduate Students in Preoperative Assessment Learning

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Abstract

This study aims to investigate the impact of teacher-simulated patient (TSP) pedagogy on Bachelor of Medicine and Bachelor of Surgery (MBBS) students' preoperative assessment skills. MBBS students beginning their clinical practice in the Department of Anesthesiology were randomly assigned to either the interventional (TSP) or conventional (Standard Education, SE) groups. The SE participants completed a lecture-based learning module. In the TSP group, a teacher-simulated patient scenario was designed to provide MBBS students with a realistic simulated patient experience. The MBBS students' performance was evaluated by assessing their skills using the mini-Clinical Evaluation Exercise (Mini-CEX) tool. The MBBS students in the TSP group scored significantly higher in their Mini-CEX mean overall clinical competence scores (7.11±1.09 vs. 7.58±0.60; $p = 0.027$) and mean domain scores (6.88±0.54 vs. 7.65±0.48; $p = 0.000$). The implementation of TSP methodology has led to improved skill performance and enhanced domain-specific competencies among the MBBS students. Incorporating Team-Based Learning (TBL) pedagogy in medical education programs can be a valuable approach to enhance MBBS student learning outcomes and better prepare them for real-world clinical practice.

Keywords

Teacher Simulated Patient, Bachelor of Medicine and Bachelor of Surgery, Preoperative Assessment

1. Introduction

Preoperative assessment is a critical component of the perioperative care process. It involves the comprehensive evaluation of a patient's medical history, physical examination, and diagnostic test results to identify potential risks and optimize their medical condition before surgery. Failure to perform a thorough preoperative assessment can result in adverse patient outcomes, including surgical complications, prolonged hospital stays, and increased morbidity and mortality. In primary care or specialty settings, clinicians play a prominent role in these evaluations (Bodner et al., 2021).

China has emerged as a prominent global hub for international students, drawing a substantial influx of learners from across the globe. Western medicine has gained tremendous popularity among international undergraduates opting to

pursue their education in Chinese universities (Jiang et al., 2022). In contrast to other countries, MBBS students in China may face some unique challenges when studying preoperative assessment. Language barriers and cultural differences can make it difficult for MBBS students to effectively perform preoperative assessments and communicate with patients (Ma & Zhao, 2018). They may have limited hands-on experience and exposure to diverse patient populations. Educators should work to emphasize the importance of preoperative assessment in the medical education system and provide support and resources to help students develop the necessary skills and knowledge. There are several approaches to training, which can be classified into traditional methods, such as didactic lectures or handouts, and interactive or practical methods, such as case reports, problem-based learning, role-play, and interviewing a simulated patient.

Simulated patient (SP) methodology has been used throughout medical school curricula since Barrows' original description in the 1960s to teach and evaluate clinical skills. Simulated patients, often called standardized patients, or programmed patients, are trained individuals who simulate real-life patient scenarios to teach and assess learners in healthcare professions. SPs were introduced in China for medical education in 1991 by Paula Stillman and were officially implemented in 1994 (Yang et al., 2019). Since then, SPs have been widely utilized in medical education nationwide to promote teaching and train students' communication (e.g., interview and history-taking, deeper diagnostic reasoning, education, and counseling) and clinical skills (e.g., physical examination). However, the overall availability of English-speaking SPs in China might be relatively limited. The absence of English as a widely spoken language was an issue. Other potential reasons include cultural differences and a lack of infrastructure to support the training and use of SPs. Teacher-simulated patient (TSP) are teachers who have been trained to simulate patient cases and provide feedback to medical students in education programs. Teachers who speak English fluently can be used as a supplement to SP resources. The TSP methodology's application to anesthesiology and perioperative medicine is relatively unreported. This study aimed to investigate the effect of TSP in the context of preoperative assessments on MBBS students.

2. Method of the Research

This was a study conducted at the First Affiliated Hospital of Nanjing Medical University. Participants were recruited from Nanjing Medical University between November 2022 and July 2023. Eligible trainees included MBBS students entering their clinical practice in the Department of Anesthesiology. Randomization was done using a research randomizer program. They were randomized in a 1:1 ratio into either conventional (Standard Education, SE) or interventional (TSP) groups by a teaching assistant independent of the investigators.

In the SE group, the teaching method involved a lecture-based approach where instructors delivered a didactic presentation to the students, such as the importance of preoperative assessment, patient evaluation (preoperative history, examination, and routine investigations), and risk stratification. These instructors also provided the MBBS students with printed materials covering the same topics.

In the TSP group, a teacher independent of the investigators is trained to simulate the symptoms and behaviors of a patient before the course. This involved learning about the medical history, symptoms, and treatments associated with the condition, as well as practicing how to portray these symptoms and behaviors in a realistic manner. During the course, a simulated patient scenario was designed to provide the MBBS students with a realistic and simulated patient encounter. It involved a patient presenting with a history of relevant medical conditions for a specific surgical procedure. The scenario also included diagnostic test results, such as laboratory values and imaging studies, for the students to review and interpret. The students were then expected to perform a thorough preoperative assessment, which included taking a detailed medical history, performing a physical examination, and ordering additional tests or consultations as necessary. The students were also expected to develop a comprehensive anesthetic plan, which may involve optimizing the patient's medical condition prior to surgery, selecting and administering appropriate anesthetic medications, and managing any potential perioperative complications. After that, the instructor provided feedback to the students on their communication skills, clinical performance, and overall professionalism. This feedback was used to help the student identify areas where they needed to improve and to develop strategies to improve their clinical skills.

The effects of the two pedagogies were evaluated by assessing students' skill performance and self-assessed competence on preoperative assessment. The primary outcome was a Mini-clinical evaluation exercises (Mini-CEX) score in the skill performance on the preoperative assessment. The assessment part of the mini-CEX consists of six competencies (medical interviewing, physical examination skills, clinical judgment, counselling skills, humanistic qualities, organization/efficiency) and one overall clinical competency score. Each domain is scored on a nine-point rating scale. Data on self-assessed competence in preoperative assessment were collected using a questionnaire. The questionnaire consisted of five questions related to self-assessed competence. Participants were asked to rate their competence on a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The data was collected, put into Microsoft Excel 2021 (Microsoft Corporation), and submitted for further analysis

using SPSS version 26. Quantitative variables were described using mean and standard deviation, and qualitative variables were presented by frequency and percentage. These Chi-square and Fisher's exact tests were applied for the inferential analysis of qualitative variables. The independent samples Student's t-test or its nonparametric equivalents (the Mann–Whitney or Wilcoxon tests) were used accordingly. $P< 0.05$ was considered significant.

3. Findings

A total of 72 MBBS students received the assessments. All of the participants were assigned to randomly perform either the SE group (n = 36) or the TSP group (n = 36). The demographic information of the assessed participants, including sex, age, and nationality, is shown in Table 1. There was no statistical difference between the two groups on demographic information.

Table 1. The demographic information of the participants

	SE group	TSP group	p-value
Sex (Male/Female)	16/20	22/14	0.157
Age	23.36±1.59	23.69±1.56	0.373
Nationality			
India	18 (50.00%)	16 (44.44%)	
Thailand	7(19.44%)	6 (16.67%)	0.699
Mauritius	5 (13.89%)	9 (25.00%)	
Sri Lanka	6 (16.67%)	5 (13.89%)	

Table 2 shows the results of Mini CEX, which show that the mean overall clinical competencies core for the TSP group (7.58±0.60) was significantly higher than that of the SE group (7.11±1.09). For the medical interviewing, physical examination skills, clinical judgement, counselling skills, humanistic qualities, and organization competence, the scores were significantly higher in the TSP group than those in the SE group ($p<0.05$).

Table 2. Comparison of Mini-CEX scores after teaching

Mini CEX	SE group	TSP group	p-value
Medical Interviewing	6.89±1.37	7.67±1.17	0.012
Physical Examination Skills	6.56±1.23	7.72±1.08	0.000
Clinical Judgement	6.83±1.42	7.50±1.21	0.036
Counselling Skills	6.69±1.41	7.50±1.23	0.012
Humanistic Qualities	7.22±1.33	7.86±1.05	0.027
Organization Competence	6.89±1.47	7.72±0.81	0.004
Mean domain scores	6.88±0.54	7.65±0.48	0.000
Overall Clinical Competence	7.11±1.09	7.58±0.60	0.027

In terms of self-assessed competence in preoperative assessment, the mean scores of the 2 corresponding questions were significantly higher in the TSP group (3.28±1.13 vs. 3.86±0.99 for I had a good command of the skills for preoperative assessment) and (3.25±1.10 vs. 4.19±0.86for I had confidence in performing preoperative assessment during the test), respectively.

Table 3. Comparison of self-assessed competence

Self-assessed competence	SE group	TSP group	p-value
(1) I had a good command of the skills for preoperative assessment	3.28±1.13	3.86±0.99	0.023
(2) I had a good command of the knowledge for preoperative assessment	3.27±1.08	3.86±0.99	0.079
(3) I had enough time to finish preoperative assessment in the test	3.80±1.06	3.72±1.03	0.591
(4) I had confidence in performing preoperative assessment during the test	3.25±1.10	4.19±0.86	0.000
(5) I am willing to perform preoperative assessment clinically	4.08±0.81	4.16±0.88	0.676

4. Discussion and Implications

Graduates of MBBS programs are expected to possess extensive knowledge and clinical competence to perform successful preoperative assessments. To achieve this, appropriate education and training are necessary at the undergraduate level, including preoperative assessment knowledge, interview skills, and clinical reasoning. SPs provide an experiential learning environment that allows learners to simulate real-life clinical scenarios, thereby enhancing the realism of simulation-based learning methods. Previous works of literature on the medical educational utilization of SPs have attested to their value (Ma et al., 2023; Qureshi & Zehra, 2020). The use of SPs allows MBBS students to practice their clinical skills and engage in realistic scenarios before commencing clinical practice, without compromising patient comfort and safety or risking medical errors. By simulating real-world medical scenarios, SPs can challenge students to think critically and develop effective solutions to complex problems. SPs also help students develop the communication and interpersonal skills required to provide high-quality patient care, including empathy and cultural competence. In addition to their benefits, SPs offer simultaneous feedback, adjustable difficulty levels, repeated learning activities, and reduced stress associated with clinical practice (Altun & Tastan, 2022). They have been utilized to teach various areas, such as informed consent, delivering bad news, respecting patient autonomy, medical ethics, and more (Kowitlawakul et al., 2015). Furthermore, the use of SPs aids in developing a better understanding of how to assess patients and identify potential perioperative risks and complications.

Simulating anesthetic scenarios can be especially challenging due to their complex and potentially life-threatening nature, which requires rapid decision-making and effective communication between healthcare providers. In our study, the implementation of TSP is led by experienced educators with a wealth of teaching and clinical expertise, coupled with exceptional proficiency in the English language. In addition, TSP can be particularly valuable in situations where other forms of simulation training, such as high-fidelity simulations, standardized patients, or virtual reality simulations, may not be feasible or practical, especially when specific medical conditions or scenarios need to be simulated. TSP can fulfill the three fundamental roles of portraying roles, providing feedback, and completing assessment instruments while circumventing the substantial training time and expense associated with utilizing simulated patients without a health professional background. Therefore, the use of TSP can maximize training efficiency and cost-effectiveness, while still providing an effective simulation-based learning environment for students.

In our study, MINI-CEX was used to evaluate the performance of MBBS. Mini-CEX is a commonly used workplace-based assessments (WPBA) tool of potential value in anesthesia to assess and improve clinical performance. These results of this study show a significant effect of TSP methodology on the clinical competencies of MBBS students, according to the Mini CEX assessment tool. TSP group had a higher overall clinical competence score compared to the SE group (7.58±0.60 vs. 7.11±1.09), suggesting that TSP was successful in improving clinical skills among the participants. In addition to the overall score, there were significant differences in individual areas of competence. TSP group scored higher in medical interviewing, physical examination skills, clinical judgement, counselling skills, humanistic qualities, and organization competence. These findings indicate that TSP had a comprehensive impact on multiple facets of clinical competence, enhancing the students' abilities in these areas. Furthermore, the students in TSP group also showed significant improvement in their self-assessed competence in preoperative assessment. They reported feeling more skilled and confident in performing preoperative assessments compared to SE group, suggesting that the intervention also had a positive effect on the students' self-perception of their clinical skills. This is an important aspect, as confidence in one's abilities can enhance the quality of patient care and the student's future performance.

However, there are some limitations to the use of TSP in MBBS medical education. TSP may not fully reproduce the complexity and variability of real-life patients. Although TSP are trained to imitate patient scenarios, they may not fully capture the nuances and unpredictability of real-life patient encounters. The usual case only includes typical cases, and the simulation cannot include more complex clinical situations. these may limit the validity of TSP as an assessment tool for clinical skills. Furthermore, training on simulated patients may lead to formulaic thinking, potentially leaving students unprepared when confronted with complex real-life patients. TSP training may be time-consuming and expensive, and achieving superior training outcomes necessitates higher demands for case script writing and educator quality. TSP may not be available at all medical schools due to financial or logistical constraints. A large number of students and limited opportunities for repeated practice, coupled with restricted TSP personnel, can make scheduling challenging. Some medical schools may not have the resources to implement TSP in their curriculum, limiting the accessibility of TSP as a teaching and assessment tool. Medical schools should weigh the benefits and costs of implementing TSP in their curriculum, taking into consideration the limitations of TSP.

These findings could have significant implications for the design of Bachelor of Medicine and Bachelor of Surgery (MBBS)medical training programs. The teacher-simulated patient (TSP) pedagogy used in this study appears to be

effective in improving both the clinical skills and self-perceived competence of MBBS students, which could potentially enhance their performance in real-world clinical settings. Further research and implementation of TSP pedagogy in various medical disciplines can contribute to the continuous improvement of medical education and student training of MBBS students.

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