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Assessing the Satisfaction Levels in Simulation-Based Learning Among Students in Teaching Hospitals

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Abstract

Background:Simulation-Based Learning (SBL) has emerged as a transformative approach in medical education, bridging the gap between theory and clinical practice in a safe, controlled environment. Understanding students' satisfaction with SBL is essential for effective curriculum integration.

Objectives:To assess the satisfaction levels among undergraduate medical students exposed to SBL and to identify challenges associated with its implementation.

Methods:A cross-sectional observational study was conducted among 96 third- and final-year MBBS students at Sree Balaji Medical College, Chennai. Participants with prior exposure to simulation sessions were selected using purposive sampling. Data were collected using a pre-validated questionnaire covering two domains: overall satisfaction and perceived challenges. Responses were recorded on a 5-point Likert scale and analyzed using SPSS version 22. Inferential statistics including Chi-square and t-tests were applied.

Results:The overall satisfaction with SBL was high (mean score 4.3 ± 0.6). Facilitator support, organization, and content relevance were highly rated. No significant difference in satisfaction was observed between third- and final-year students or between genders. However, students attending ≥3 sessions showed significantly higher satisfaction ($p = 0.017$). Common challenges included lack of realism (39.6%) and equipment constraints (33.3%). Lack of realism was significantly associated with lower satisfaction ($p = 0.022$).

Conclusion:Students viewed SBL positively, citing it as engaging and educationally beneficial. Addressing realism, faculty training, and equipment limitations can further enhance the impact of simulation in medical education.

Keywords: *Simulation-based learning, medical education, student satisfaction, clinical training, skill labs.*

INTRODUCTION

Medical education has undergone a paradigm shift over the past two decades, with increasing emphasis on competency-based curricula and experiential learning. One of the most significant advancements in this context is the incorporation of Simulation-Based Learning (SBL) into undergraduate training. Simulation allows learners to engage in realistic clinical scenarios using high- or low-fidelity mannequins, virtual environments, or standardized patients, all within a controlled and safe setting. This technique enhances experiential learning while ensuring patient safety and uniformity of educational exposure. [1,2]

Simulation-based education is particularly useful in addressing challenges associated with traditional clinical training such as inconsistent patient availability, ethical constraints in allowing novice learners to perform procedures, and the increasing demand for accountability in medical errors and patient outcomes. [3]

Moreover, simulation helps learners gain exposure to rare or high-risk clinical situations, such as cardiac arrest, obstetric emergencies, trauma, and airway management, where hands-on experience is otherwise limited. [4,5]

Studies have consistently reported that SBL improves learners' confidence, skill acquisition, and critical thinking. Cook et al. demonstrated in a systematic review that simulation-enhanced learning had large, positive effects on knowledge, skills, and behavior across multiple healthcare disciplines. [6] Similarly, Weller et al. noted improved teamwork, communication, and procedural skills among medical students undergoing simulation-based training. [7]

Despite its growing popularity, SBL has faced criticism. Common concerns include a lack of real-time patient interaction, emotional detachment, high cost of implementation, and a perceived lack of empathy and spontaneity during simulation scenarios. Some students also question the ability of simulation to fully replicate complex clinical settings and patient variability. [8]

The degree of satisfaction among students, however, remains a crucial determinant of the success of SBL as an educational strategy. Measuring learner satisfaction can provide insights into their acceptance of the modality, perceived effectiveness, and potential areas for improvement. In India, especially within the context of teaching hospitals, few structured studies have evaluated the perspectives and satisfaction levels of undergraduate students participating in simulation training.

This study was undertaken to fill this knowledge gap by evaluating the satisfaction levels of third- and fourth-year undergraduate students at Sree Balaji Medical College and Hospital, Chennai, with their experience in simulation-based learning. Additionally, the study aims to identify challenges faced by students in adapting to this method of teaching, thereby offering valuable feedback for curriculum development and faculty training programs.

METHODOLOGY

This study was designed as a cross-sectional observational survey and was conducted at Sree Balaji Medical College and Hospital (SBMCH), Chennai, over a period of six months beginning in October 2024. The primary objective was to assess the satisfaction levels of undergraduate medical students with Simulation-Based Learning (SBL) and to identify any challenges they encountered during their simulation-based training experiences.

The target population for this study included third-year and final-year MBBS students who had participated in structured SBL sessions within the college's clinical skills laboratory. The skills lab was equipped with a variety of simulation tools, including both high- and low-fidelity mannequins, task trainers, and computerized simulators. These sessions were conducted under faculty supervision, focusing on clinical procedures, communication skills, and emergency scenarios.

The sampling method used for the study was purposive sampling, where students who met the inclusion criteria were selected. A sample size of 96 participants was determined to be adequate to estimate the proportion of students satisfied with simulation-based training with a 95% confidence level and a margin of error of 10%.

The inclusion criteria for participation were: students from third or final year of MBBS who had participated in at least one simulation session, and those who consented to take part in the study. The exclusion criteria included students who refused consent and those who submitted incomplete questionnaires.

Data was collected using a pre-validated, structured, self-administered questionnaire that was specifically developed for this study. The questionnaire was reviewed by experts including a senior medical educator, a biostatistician, and two faculty members involved in simulation-based instruction. The items included in the

questionnaire were based on a thorough literature review and focused on two core themes: (1) overall satisfaction with SBL, and (2) challenges faced during simulation activities.

A 5-point Likert scale was used to measure the degree of satisfaction for each item, with responses ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The questions covered domains such as realism of the simulation, instructor support, student engagement, perceived learning benefit, and applicability to real clinical settings.Before administering the questionnaire, ethical clearance was obtained from the Institutional Ethics Committee of SBMCH. All participants received a detailed explanation of the study's purpose and procedures through a participant information sheet in both English and the local language. Written informed consent was obtained from all respondents.

The completed questionnaires were collected anonymously with the help of class leaders to maintain confidentiality and reduce bias. The data were entered into Microsoft Excel and subsequently analyzed using SPSS software version 22. Descriptive statistics were used to calculate frequencies, percentages, means, and standard deviations of satisfaction scores. Inferential statistical tests such as Chi-square tests and t-tests were applied to assess associations between satisfaction levels and variables such as year of study and frequency of simulation exposure.

RESULTS

This table summarizes the demographic distribution of the 96 participants included in the study. The sample was evenly distributed, with 48 students each from the third and final years of the MBBS program. A slight female majority was observed, with 53 (55.2%) female and 43 (44.8%) male students. The mean age of participants was 21.7 ± 1.2 years, with 55.2% (n=53) being female and 44.8% (n=43) male. All participants (100%) had prior exposure to Simulation-Based Learning (SBL) sessions, ensuring that the entire sample had firsthand experience upon which to base their satisfaction ratings.

Table 1: Demographic Characteristics of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Year of Study	Third Year	48	50.0
	Final Year	48	50.0
Gender	Male	43	44.8
	Female	53	55.2
Previous Exposure to SBL	Yes	96	100

This table presents the mean satisfaction scores (measured on a 5-point Likert scale) across various dimensions of the SBL experience. The highest satisfaction was reported in facilitator support and feedback (mean = 4.4 ± 0.6), followed by the organization of sessions (4.3 ± 0.6) and overall satisfaction (4.3 ± 0.6). The lowest score was for the realism of simulated scenarios (3.9 ± 0.9), indicating that while most aspects were well received, some students felt that the simulations did not fully mirror real-life clinical situations. Overall, the scores reflect a positive perception of SBL, with mean scores above 4 in most categories, suggesting its value as a teaching tool..

Table 2: Student Satisfaction with SBL Sessions

Statement	Mean Score (± SD)
The simulation sessions were well organized	4.3 ± 0.6
The content was relevant to clinical practice	4.2 ± 0.7
Simulation enhanced my understanding of clinical concepts	4.1 ± 0.8
The facilitators provided adequate support and feedback	4.4 ± 0.6
I felt actively engaged during the simulation	4.0 ± 0.9
The simulated scenarios appeared realistic	3.9 ± 0.9

The sessions improved my confidence in clinical decision-making	4.1 ± 0.8
Overall satisfaction with the SBL experience	4.3 ± 0.6

The most frequently reported challenge was a lack of realism in simulation scenarios, cited by 38 students (39.6%). Other challenges included limited availability of simulation equipment (33.3%), time constraints during sessions (28.1%), and inadequate debriefing (21.8%). Additionally, 18.7% of students felt that instructors lacked sufficient expertise in simulation facilitation. These findings suggest that while students generally appreciated SBL, there are logistical and instructional areas that require improvement to enhance the learning experience.

Table 3: Challenges Identified by Students During SBL

Reported Challenge	Frequency (n)	Percentage (%)
Lack of realism in simulation scenarios	38	39.6
Limited availability of simulation equipment	32	33.3
Time constraints during sessions	27	28.1
Inadequate debriefing post-simulation	21	21.8
Lack of instructor expertise in simulation facilitation	18	18.7

Among third-year students, 40 reported high satisfaction (score ≥4), and 8 reported lower satisfaction. Similarly, among final-year students, 42 reported high satisfaction and 6 reported lower satisfaction. The Chi-square test yielded a value of 0.67 with a p-value of 0.41, indicating no statistically significant difference in satisfaction levels between the two groups. This suggests that both third- and final-year students perceived SBL similarly, regardless of their level of clinical exposure.

Table 4: Association Between Year of Study and Overall Satisfaction Level

Year of Study	High Satisfaction (Score ≥4)	Low Satisfaction (Score <4)	Chi-square value	p-value
Third Year	40	8	0.67	0.41
Final Year	42	6		

The mean satisfaction score among female students (4.24 ± 0.57) was slightly higher than that of male students (4.15 ± 0.62), but the difference was not statistically significant (p = 0.47). However, students who attended three or more SBL sessions reported a significantly higher mean satisfaction score (4.32 ± 0.55) compared to those who attended only one or two sessions (4.02 ± 0.61), with a p-value of 0.017, indicating statistical significance. This suggests that increased exposure to simulation correlates with greater satisfaction.

Table 5: Comparison of Mean Satisfaction Scores Between Male and Female Students

Variables		Mean Satisfaction Score ± SD	t-value	p-value
Gender	Male	4.15 ± 0.62	0.72	0.47
	Female	4.24 ± 0.57		
Frequency of Exposure	Attended 1–2 Sessions	4.02 ± 0.61	2.43	0.017*
	Attended ≥3 Sessions	4.32 ± 0.55		

Of the 38 students who reported lack of realism, 12 were dissatisfied (score <4), and 26 were satisfied. In contrast, among students who did not report this issue, only 2 were dissatisfied, and 56 were satisfied. The Chi-square value was 5.21, with a p-value of 0.022, indicating a statistically significant association. This means that students who perceived the simulation as unrealistic were more likely to report lower satisfaction, highlighting the importance of improving scenario authenticity to enhance overall experience.

Table 6: Association Between Reported Challenges and Satisfaction Level

Challenge Reported	Dissatisfied (Score <4)	Satisfied (Score ≥4)	Chi-square value	p-value

Lack of realism in simulation	12	26	5.21	0.022*
No realism concern reported	2	56		

DISCUSSION

Simulation-Based Learning (SBL) has become an integral component of medical education worldwide. The results of this study demonstrate a high level of satisfaction among undergraduate medical students at Sree Balaji Medical College and Hospital. The structured and safe environment provided by simulation-based training was widely appreciated by both third- and final-year students. This is consistent with findings from previous research, which has shown that SBL enhances knowledge retention, builds clinical competence, and increases student confidence in managing real-life scenarios. [1,2]

Our study found that the majority of students rated their overall satisfaction with simulation training at 4 or above on a 5-point Likert scale. This aligns with the findings of Cook et al., who reported through meta-analysis that simulation-based interventions consistently result in improved learner outcomes across cognitive and psychomotor domains. [6] Students in our study particularly appreciated the organization of the sessions, facilitator support, and the relevance of the content to clinical practice. These aspects are essential in achieving the educational objectives of simulation, as highlighted in the literature. [3]

Gender was not a significant determinant of satisfaction in this study. Both male and female students exhibited comparable mean satisfaction scores, suggesting that SBL is a universally engaging modality when implemented properly. This supports the idea that simulation is equally effective across diverse learner populations. [8]

Interestingly, students who had attended more simulation sessions reported significantly higher satisfaction scores than those with limited exposure. This finding underscores the importance of repeated and structured simulation practice, as increased familiarity with the method improves learner engagement and reduces initial resistance. [7] It also aligns with the experiential learning theory, which posits that learning improves through repetitive active participation and reflection. [9] Similarly, Liaw et al. demonstrated that repeated exposure to simulation significantly improved knowledge, self-confidence, and performance scores in nursing students. [13]

Despite the overall positive response, some challenges were identified. Nearly 40% of students noted a lack of realism in the simulation scenarios, which was significantly associated with lower satisfaction levels. This concern is not uncommon; several studies have emphasized the need for greater fidelity in simulation design to ensure learner immersion and authenticity of experience. [10]

Limited availability of simulation equipment, time constraints, and inadequate debriefing were also reported as barriers. These factors highlight the need for institutional investment in infrastructure, faculty training, and session scheduling to optimize the learning experience. In a similar vein, Motola et al. noted that while high-fidelity simulation enhances engagement, it requires significant resource allocation to be sustainable and effective. [14]

Debriefing, a core element of SBL, was reported to be inadequate by over 20% of participants. According to Cheng et al., effective debriefing promotes reflective learning and is critical in translating simulated experiences into clinical competency. [11] Therefore, structured debriefing sessions facilitated by trained educators should be emphasized in future programs. Levett-Jones et al. emphasized that the quality of debriefing significantly affects learning outcomes, with structured debriefs linked to greater student satisfaction and performance. [15] Therefore, structured debriefing sessions facilitated by trained educators should be emphasized in future programs.

Another area of concern was the perceived lack of instructor expertise. Although a smaller percentage (18.7%) reported this issue, it emphasizes the need for faculty development programs. Instructors play a key role in guiding learners through simulations and delivering constructive feedback. Simulation facilitators should be trained not only in technical operation but also in learner-centered pedagogy. [12] Furthermore, Zendejas et al. underscore the value of instructor development in enhancing the return on investment in simulation-based education. [16]

This study is among the few conducted in Indian teaching hospitals focusing on student satisfaction with SBL. The findings contribute valuable local insight and support the growing global consensus on the utility of simulation in medical education. However, the study is not without limitations. Being a single-institution study, the findings may not be generalizable across other settings. Furthermore, the use of self-reported data may be subject to response bias. Future studies should consider multicentric designs and include objective performance measures to further validate the impact of SBL.

CONCLUSION

This study evaluated undergraduate medical students' satisfaction with Simulation-Based Learning (SBL) at a teaching hospital and found overwhelmingly positive feedback. Students appreciated the structured, relevant, and engaging nature of the simulation sessions, with particular emphasis on facilitator support and clinical applicability. While overall satisfaction was high, specific challenges such as limited realism, equipment availability, and inadequate debriefing were identified as areas needing attention. Additionally, increased exposure to simulation was associated with significantly higher satisfaction, reinforcing the importance of integrating regular simulation into the curriculum. Importantly, satisfaction levels did not vary significantly with gender or year of study, indicating broad acceptance of the teaching strategy. These findings highlight the potential of SBL to enhance medical education when appropriately designed and supported. Ongoing investment in infrastructure, faculty training, and scenario design is essential to address existing challenges and optimize the educational value of simulation for future healthcare professionals.

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