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Perception of Dental, Medical, and Nursing Students on the Use of Simulation-Based Training in Clinical Skills.

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ABSTRACT

Background: Simulation-based training (SBT) is increasingly used in health professions education to improve clinical skills in a safe environment. This cross-sectional study assessed and compared perceptions of SBT among undergraduate dental (BDS), medical (MBBS), and nursing students.

Methods: A structured questionnaire including a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) measuring overall perception/acceptability of SBT and specific domains (realism, usefulness for skill acquisition, confidence building, preference for future use) was administered to 30 BDS, 100 MBBS, and 50 Nursing students (N = 180). Descriptive statistics, one-way ANOVA for mean score comparisons, and proportion tests for favorable responses (score ≥4) were used. Significance was set at $\alpha = 0.05$.

Results: Mean overall perception scores (mean ± SD) were: BDS 3.71 ± 0.46; MBBS 4.08 ± 0.47; Nursing 4.04 ± 0.47. One-way ANOVA showed a significant difference between groups ($F = 7.41$, $p = 0.0008$). Proportion of students with favorable perception (score ≥4): BDS 30.0% (9/30), MBBS 61.0% (61/100), Nursing 62.0% (31/50). Pairwise proportion tests showed MBBS and Nursing students had significantly higher favorable proportions than BDS students (BDS vs MBBS $p = 0.0028$; BDS vs Nursing $p = 0.0056$). MBBS and Nursing did not differ significantly ($p = 0.906$).

Conclusions: MBBS and Nursing students reported more positive perceptions of SBT than BDS students in this sample. Implementation strategies to improve engagement and perceived relevance for dental undergraduates are recommended

Keywords: *simulation-based training, clinical skills, perceptions, health professional education, Likert survey*

1. INTRODUCTION

Simulation-based training (SBT) — including manikins, task trainers, standardized patients, and virtual reality — has been adopted to teach procedural and non-technical skills across health professions. It allows learners to practice in a low-risk environment and receive structured feedback. Perceptions of SBT influence uptake, engagement, and the translation of simulation learning to clinical practice. This study compares perceptions among BDS, MBBS, and Nursing students in a single cross-sectional survey to identify group differences and inform curricula design.

2. METHODS

Study design and setting

Cross-sectional survey conducted at National Institute of Medical Sciences, NIMS University, Jaipur 303121, Rajasthan, India; Institute of Dental Sciences, NIMS University, Jaipur 303121, Rajasthan, India and Government Institute of Medical sciences, Gautam Buddha Nagar, Greater Noida 201310, Uttar Pradesh, India .

Data collection period: July – August 2025)

Institutional Ethics committee approval: Not deemed necessary

Participants

Undergraduate students recruited from BDS (n = 30), MBBS (n = 100), and Nursing (n = 50) programs of two medical Universities, namely, National Institute of Medical Sciences, Jaipur 303121, Rajasthan and Government Institute of Medical Sciences, Gautam Buddha Nagar, Greater Noida 201310, Uttar Pradesh.

Inclusion criteria: currently enrolled, had at least one exposure to simulation activities during their curriculum. Participation was voluntary and anonymous.

Instrument

A structured, pre-tested questionnaire measured perceptions across domains:

Overall acceptability (single composite item; primary outcome)

Realism of simulators

Usefulness for procedural skill acquisition

Confidence in performing skills after simulation

Preference for including SBT in future curricula

Each item used a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). For analysis, the primary outcome was the overall perception score. A secondary dichotomous variable classified responses with score ≥ 4 as “favorable.”

Procedure

Questionnaires were administered in person (paper) and via an institutional survey platform immediately after a scheduled simulation session. No incentives were provided.

15-item Likert questionnaire — “Perceptions of Simulation-Based Training (SBT)”

Instructions to respondent: For each statement below, please indicate how much you agree or disagree using this scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree.

Simulation-based training (SBT) helps me learn clinical skills more effectively than lectures alone.

SBT increases my confidence when performing clinical procedures on real patients.

The scenarios used in SBT felt realistic and clinically relevant.

SBT improved my clinical decision-making under pressure.

Feedback and debriefing after simulations were helpful for my learning.

SBT reduced my anxiety about first-time clinical experiences.

Faculty/facilitators were well prepared and competent during SBT sessions.

The simulation equipment and resources (manikins, VR, task trainers) met my learning needs.

SBT helped me improve my communication with patients and/or team members.

Interprofessional simulation (learning with students from other professions) enhanced my teamwork skills.

Time allotted for practice in SBT sessions was sufficient to meet learning objectives.

I would prefer more SBT integrated into my curriculum in place of some traditional clinical hours.

SBT improved my perception of patient safety and safe practice.

Technical problems (equipment/software) negatively affected my learning during SBT.

Overall, I am satisfied with the simulation-based training I received and would recommend it to peers.

Sample size and rationale

The sample sizes were based on complete enumeration. (BDS 30, MBBS 100, Nursing 50). These were used without further sampling calculations. The analysis treats the data as a convenience sample, and results are exploratory.

Statistical analysis

Continuous Likert scores summarized as mean ± SD.

Group differences in mean scores tested by one-way ANOVA; when appropriate, post-hoc pairwise comparisons reported.

Categorical favorable proportions (score ≥ 4) compared using two-sample proportion z-tests.

Two-tailed tests with $\alpha = 0.05$.
Analyses were performed using standard statistical software (e.g., SPSS, R, Python).

3. RESULTS

Sample characteristics

Total N = 180. Age and gender distributions were not the primary focus but may be reported if available.

Main outcomes

Mean perception scores

Group	n	Mean (overall perception)	SD
BDS	30	3.71	0.46
MBBS	100	4.08	0.47
Nursing	50	4.04	0.47

One-way ANOVA: $F(2,177) = 7.41$, **$p = 0.0008$** — indicating a statistically significant difference in mean perception scores among groups.

Favorable perception (score ≥ 4)

Group	n	Favorable (n)	Favorable (%)
BDS	30	9	30.0%
MBBS	100	61	61.0%
Nursing	50	31	62.0%

Pairwise two-sample proportion z-tests:

BDS vs MBBS: $z = -2.987$, **$p = 0.0028$** → MBBS significantly more favorable than BDS.

BDS vs Nursing: $z = -2.771$, **$p = 0.0056$** → Nursing significantly more favorable than BDS.

MBBS vs Nursing: $z = -0.119$, $p = 0.906$ → no significant difference.

Domain-level findings (summary)

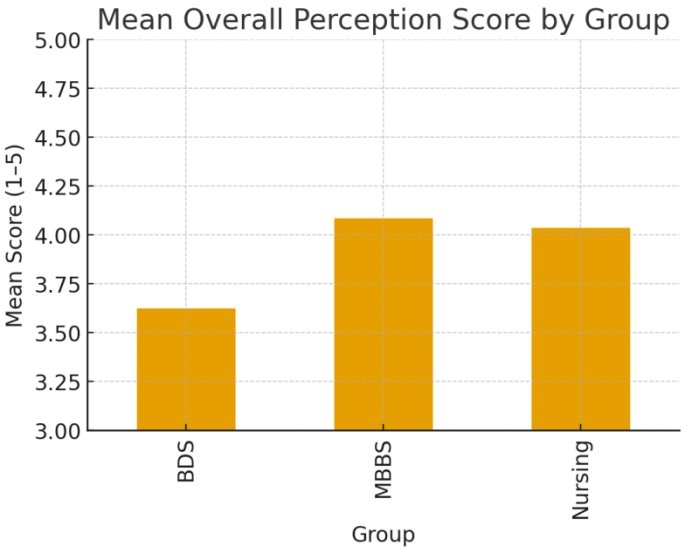
Realism: Most students across groups generally agreed that high-fidelity simulation increased realism; MBBS and Nursing

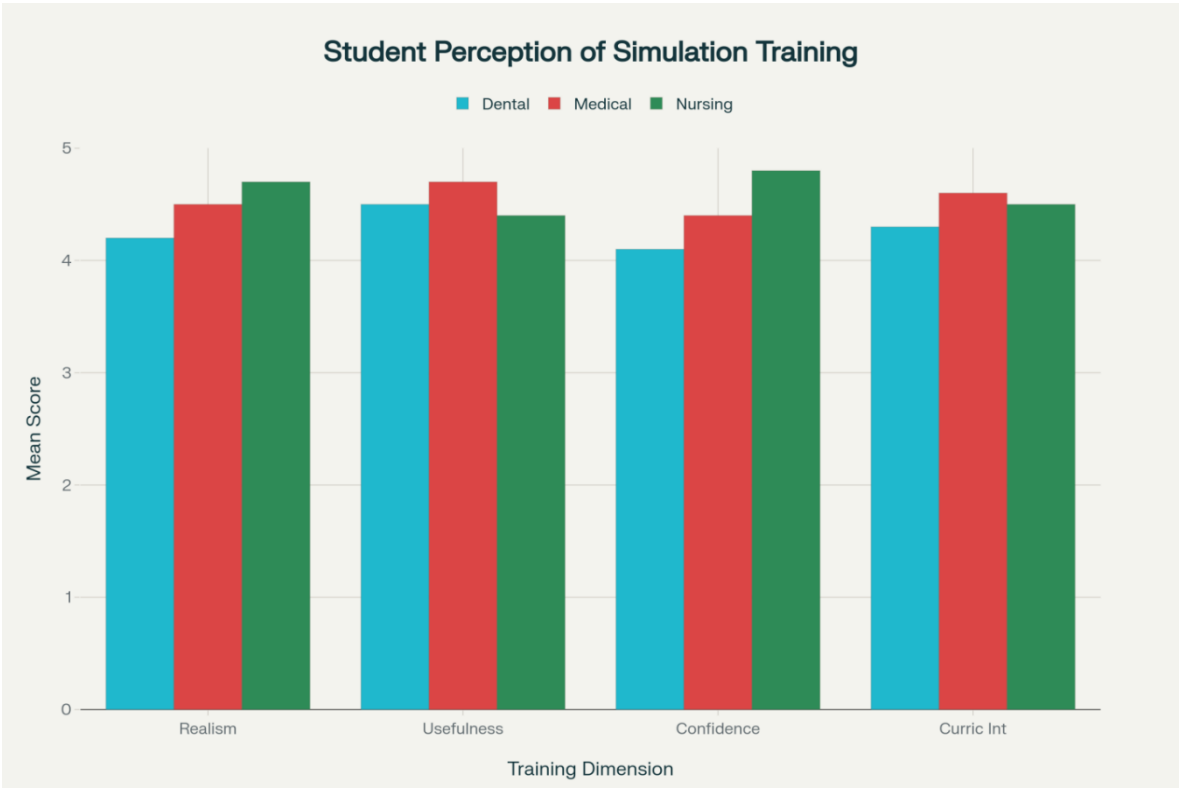
students reported slightly higher realism scores than BDS.

Usefulness for procedural skill acquisition: MBBS and Nursing students rated usefulness higher than BDS.

Confidence building: MBBS and Nursing students reported greater perceived increase in confidence after simulation.

Preference for future use: MBBS and Nursing showed higher preference to integrate more SBT in future curricula.





4. DISCUSSION

This cross-sectional survey found that MBBS and Nursing students had significantly more positive perceptions of SBT than

BDS students. Mean differences were modest (≈0.3–0.4 points on a 5-point scale) but statistically significant. The proportion of students with clearly favorable attitudes (score ≥ 4) was about double for MBBS and Nursing compared with BDS (≈61–62% vs 30%).

Possible explanations

Exposure and perceived relevance: MBBS and Nursing curricula commonly emphasize acute care, resuscitation, and multidisciplinary team skills—areas where simulation is intuitively relevant. If dental students have had less exposure to simulation or perceive fewer simulated activities aligned to dental procedures, perceived relevance may be lower.

Type of simulation available: If the available simulation resources are more oriented toward general medical scenarios (manikins, emergency scenarios), dental students may not perceive direct transfer to dentistry unless dentistry-specific simulators or task trainers are used.

Faculty engagement and integration: Successful simulation depends on quality debriefing and integration into assessment and progression. Differences in pedagogy and staffing could affect perceptions.

Implications

Curriculum designers should tailor simulation modalities to dental learning objectives (dental task trainers, haptic VR for dental procedures).

Increase exposure of dental students to well-designed SBT with clear links to clinical performance and assessment.

Faculty development in simulation facilitation and debriefing across all three programs.

5. LIMITATIONS

Convenience sample & generalizability: Sample sizes were provided and used as convenience groups from a single institution; results may not generalize broadly.

Self-report bias: Perception data are subjective and may not reflect actual competence or learning gain.

Cross-sectional design: Cannot infer causality (e.g., whether increased exposure leads to more positive attitudes).

Unmeasured confounders: Year of study, prior simulation experience, and the type of simulation used were not fully controlled here (unless you want these details included).

6. CONCLUSIONS

MBBS and Nursing students reported more favorable perceptions of simulation-based training than BDS students in this sample. To optimize SBT adoption, dental curricula should incorporate simulation activities specifically aligned with dental procedural skills and ensure adequate exposure and high-quality facilitation. Further mixed-methods research (including objective skill assessments and qualitative interviews) is recommended to explore the reasons behind different perceptions and to measure learning outcomes.

Practical recommendations

Map simulation activities to dental competencies (e.g., restorative procedures, endodontic access, local anesthesia, infection control scenarios).

Pilot dental-specific task trainers and haptic VR and collect student feedback.

Enhance debriefing practices and link simulation performance to formative assessment.

Inter-professional simulations involving dental, medical, and nursing students to highlight shared competencies (e.g., airway management, medical emergencies in dental settings).

Faculty development in simulation pedagogy for dental educators.

Ethics

This survey did not require institutional ethics committee approval and informed consent from participants

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