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PERCEPTIONS OF MEDICAL STUDENTS ABOUT SIMULATION-BASED MEDICAL EDUCATION

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ABSTRACT

This cross-sectional descriptive study was conducted on 92 medical students: 54 females (58.69%) and 38 males (41.31%), in a metropolitan city in Western India to determine their perceptions about simulation training. The mean age of the female and male respondents was 20.87 +/- 1.49 years and 20.95 +/- 1.63 years, respectively, without significant gender difference (Z=0.240; p=0.810). A significantly higher number of female respondents opined that simulation would be a useful additional learning tool (Z=3.170; p=0.001); would make the subject more interesting (Z=2.437; p=0.014); that they would personally prefer simulators (Z=2.432; p=0.015) and that simulators would improve confidence and competence (Z=2.482; p=0.013). Though simulation-based training cannot replace clinical exposure, its use is growing globally with its capability to improve competence of health professionals, augment their confidence levels and reduce intrinsic risks to patients. The hands-on aspect of simulation-based training provides an opportunity for repetitive practice in a low-risk environment, which can surmount the constraints of traditional training. Since high-fidelity simulators are expensive, more studies are required before adopting simulation-based medical education as a standard tool for training and assessing medical students.

KEYWORDS: Competence, Perceptions, Simulation-based medical education, Simulators.

INTRODUCTION

In simulation, (derived from Latin word "simulō" = imitate, copy, feign) a specific set of conditions is created artificially in order to study or experience a real-life situation.[1,2] Simulators have been used for medical education and training since birthing mannequins were first developed in the 17th century.[3] However, medicine has traditionally relied on an apprentice-style of learning, which unavoidably exposed patients to inexperienced healthcare professionals and increased the cost of medical treatment.[4] The term "learning curve" has been used to justify higher complication and mortalities, as well as longer procedure times, among inexperienced health care professionals and teams.[5] Simulation-based training is one of the methods that ensure that the steep learning curve is not climbed by trial and error and that health professional training does not expose patients to preventable errors.[6] Simulation-based education is an expansion of Kolb's theory of experiential learning, which emphasizes a method of learning by building on concrete experiences.[7]

Simulators are extensively used in education and training in diverse high-risk professions including the armed forces, aviation and aerospace industry and nuclear power plants.[8] In simulation-based medical education, simulation tools are used to imitate clinical scenarios and as a substitute for the real patient so that errors by trainers or trainees would not distress the patient.[9] The simulated scenarios of rare or unusual cases can give realistic exposure to students and inexperienced junior doctors and ensure that students and trainees gain clinical experience without having to depend on chance encounters of certain cases.[10] Simulation-based learning augments the effectiveness of the learning process in a controlled and safe environment.[11,12]

Scenarios can be practiced individually or by a uni-speciality or multi-speciality team in a simulated environment in order to engage students in a near real-life experience.[13,14] Video recording of the scenario is also used to provide immediate feedback to participants during the debriefing sessions, to initiate discussion and to ensure that all learning objectives were covered. Debriefing is conducted after each simulation training

session as formative assessment to evaluate the ability of the learners to identify the clinical situation and apply rules and appropriate responses in a stressful situation.[15] During the scenario-based training, the learner can acquire such important skills as interpersonal communication, teamwork, leadership, decision-making, the ability to prioritize tasks under pressure, and stress management.[2] It is essential to amalgamate simulation training with actual clinical practice since simulation cannot replace authentic learning in the clinical environment. Thus, simulation-based training is a supplement and not a replacement for learning with real patients.[16]

On the basis of their semblance to reality, simulators can be categorized into low-fidelity, medium-fidelity and high-fidelity simulators.[17] The term "fidelity" describes the degree to which a simulation represents reality. [18] Low-fidelity simulators, such as, the intravenous insertion arm, are typically used to teach beginners the basics of technical skills. Moderate fidelity simulators, such as the cardiology simulator, are relatively more realistic with pulse, heart sounds, and respiratory sounds and can be used by beginners as well as advanced learners for attaining multifaceted competencies. High-fidelity simulators are manikins with built-in computers that produce physical signs and feed physiological signs to monitors. Since high-fidelity simulators can talk, breathe, blink, and respond to physical and pharmacological interventions, they resemble reality. Virtual reality, which is incorporated into the simulators to enhance learning and is often used in endoscopic and laparoscopic skill training, varies considerably according to its degree of realism and the user's interaction with the virtual environment.[19]

In future, evidence-based practices can be implemented by means of protocols and algorithms, which can be subsequently included in simulation training, which is integrated into traditional education. Though simulation-based medical training is potentially expensive, its cost-effectiveness should be assessed in terms of improvement of clinical competence and its effect on patient safety.[10]

The objective of the present study was to determine the perceptions of medical students about simulation training.

MATERIAL AND METHODS

This cross-sectional descriptive study was conducted in a metropolitan city in Western India using snow ball sampling. A pre-tested and pre-validated online questionnaire was administered, via Google forms to medical students of either gender. Informed consent was taken on the Google forms. The data were adapted to Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA) and analyzed using SPSS statistical software Windows Version 25.0 (IBM Corporation, Armonk, NY, USA). For discrete data, the percentage of responses and the standard error of difference between two sample proportions were calculated. For continuous data, the standard error of difference between two means was calculated. 95% Confidence interval (CI) was stated as: [Mean-(1.96)*Standard Error)] - [Mean+(1.96)* Standard Error)] and the statistical significance was determined at $p<0.05$.

RESULTS AND DISCUSSION

There were a total of 92 respondents – 54 females (58.69%) and 38 males (41.31%).

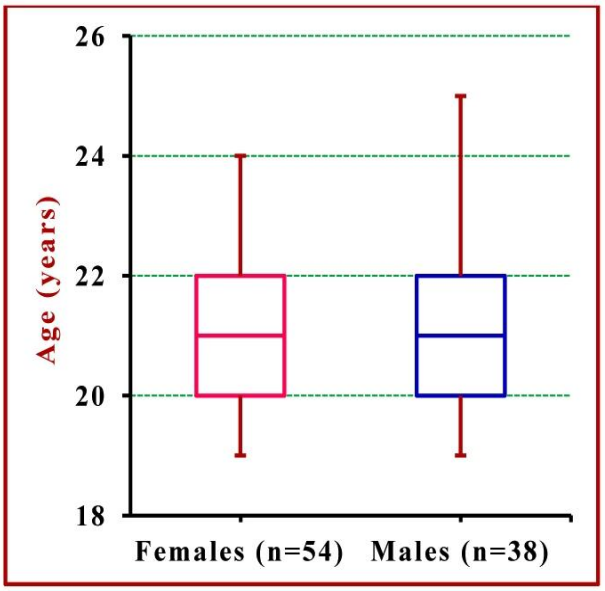

Fig: Box plot of age distribution of respondents

Demographics: The mean age of the female and male respondents was 20.87 +/- 1.49 years (95% CI: 20.47–21.27 years) and 20.95 +/- 1.63 years (95% CI: 20.43–21.46 years), respectively, without significant gender difference (Z=0.240; p=0.810). The minimum, first quartile, median and third quartile of the age distribution was identical for both genders, but the maximum age was higher for male respondents (Fig.). 52 (96.30%) females and 27 (71.05%) males were permanent residents of urban areas, with highly significant gender difference (Z=3.422; p=0.0006).

Gender difference in perceptions: As depicted in the Table, significantly higher number of female respondents opined that simulation would be a useful additional learning tool (Z=3.170; p=0.001); would make the subject more interesting (Z=2.437; p=0.014); that they would personally prefer simulators (Z=2.432; p=0.015) and that simulators would improve confidence and competence (Z=2.482; p=0.013). Other studies[20,21] have also reported that female students had significantly more favourable perception towards simulation-based learning as compared to their male counterparts.

Table: Gender differences in perceptions regarding simulation training

Parameter	Females (n=54)	Males (n=38)	Z value	'p' value
Useful additional learning tool	52 (96.30%)	28 (73.78%)	3.170	0.001 *
Would make the subject more interesting	54 (100.0%)	34 (87.49%)	2.437	0.014 *
Personally prefer simulators	47 (87.04%)	25 (65.79%)	2.432	0.015 *
Should be included from First MBBS	41 (75.93%)	27 (71.05%)	0.524	0.603
Helps hands-on learning of invasive procedures	52 (96.30%)	33 (86.84%)	1.684	0.092
Procedures cannot be replicated on live patients	47 (87.04%)	27 (71.05%)	1.902	0.574
Would minimize risk to patients	52 (96.30%)	35 (92.11%)	0.873	0.384
Would improve exam scores	46 (85.19%)	30 (78.95%)	0.777	0.435
Would improve confidence and competence	53 (98.15%)	32 (84.21%)	2.482	0.013 *
Would stop killing of laboratory animals	46 (85.19%)	34 (89.47%)	0.601	0.548

Z=Standard error of difference between two proportions

CONCLUSION

In the present study, significantly higher number of female respondents opined that simulation would be a useful additional learning tool, would make the subject more interesting, indicated a preference for simulation-based training and opined that simulators would improve confidence and competence. Since high-fidelity simulators are expensive, more studies are required before adopting simulation-based medical education as a standard tool for training and assessing medical students.

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