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Research Protocol

Education Section

Comparison of Intermediate Fidelity Simulation with PowerPoint Presentation and Video Lectures for Imparting the Skills of Normal Delivery to Undergraduate Students- A Research Protocol

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ABSTRACT

Introduction: In the modern era, which is heavily driven by multimedia, traditional ways of teaching medical students are insufficient. Techniques based on simulations might be crucial in closing this educational gap that exists. A curriculum built on the cognitive, psychomotor, and emotional learning domains, which were first introduced about 50-year-ago, is receiving more and more attention in medical education. The highest standards of care, patient safety and error prevention, patient autonomy, and resource allocation are the main goals of these reforms. Experiential (or "hands-on") learning is becoming more and more popular in medical education, however, using real patients to conduct this type of learning raises ethical and legal issues and is less socially acceptable. With the help of simulation, learning possibilities like immersion, reflection, practice, and feedback can be offered without the hazards associated with a similar real-life experience. The precise artificial recreation of a difficult real-world process is called simulation.

Need of the study: Despite the many benefits of fidelity-based learning, it is not widely incorporated as an excellent learning tool in many institutions and Obstetrics and Gynaecology Departments. Hence, authors plan to study the effectiveness of an intermediate fidelity simulator in improving the skills of normal delivery in medical students.

Aim: To assess skill development and teaching for normal delivery through PowerPoint presentation and video lectures, then compare it with skill development through Intermediate fidelity simulation in undergraduate medical students.

Materials and Methods: The cross-sectional, observational study after due ethical approval will be conducted in Department of Obstetrics and Gynaecology, Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College, Sawangi (M), Wardha, Maharashtra, India from September 2022 to August 2023. An introductory lecture will be taken for a batch of 160 students of 3rd year. Pre-Objective Structured Clinical Examination (pre-OSCE) will be conducted and then two groups of students will be formed. Group A will be taught with video PowerPoint presentation-based lectures meanwhile intermediate fidelity will be used as a method for teaching normal delivery for Group B. Post-OSCE will be conducted for both groups. Results will be analysed using student's paired t-test for statistical significance.

Keywords: Birth simulation, Labour, Medical education, Objective structured clinical examination

INTRODUCTION

Simulation training has emerged as an innovative teaching approach for better education of medical students with a stronger emphasis on the development of clinical skills [1]. Before interacting with patients, simulation enables convenient, frequent practice and targeted learning. It has been demonstrated that using a simulator helps medical students feel more confident about their ability to carry out a normal delivery. The fundamental principle of medicine has not changed since the time of Hippocrates: first, not harm. According to studies, the patient safety movement emphasises the significant number of preventable patient injuries caused by medical treatment. This has revived the principle of "first, do no harm" in discussions and policy debates [1]. Simulation provides a practical and appropriate substitute for the hazards associated with patient safety. In a labour room, learning to deliver a baby is stressful and can compromise the mother's and the new-born's safety. Furthermore, many women in our traditional society do not typically agree to get examined by male doctors. This educational gap has been addressed by suggesting medical simulation as a method [2].

Simulation training has become an innovative teaching approach in the third-year clerkship training of medical students. Birth Simulation (involving labour and vaginal birth) can facilitate repeated practice, risk-free experience, and learning before engaging with patients. It has been demonstrated that using a simulator helps medical students feel more confident about performing vaginal births [3-5]. Additionally, simulation has been shown to motivate third-year clerkship students to take part in childbirth [5]. Third-year medical students' oral and written exam results are improved through simulation [6]. A complex real-world process that is artificially (and usually often simplified) represented with enough fidelity to accomplish a specific aim, such as training or performance assessment, is called a simulation. With less risk than a comparable real-life experience, the goal is to promote learning through immersion (being "immersed into the clinical scenario"), reflection, feedback, and practice [7].

Although most of the earlier research employed more complex, pricey electronic simulators, they all produced identical results [3,5,6]. Even though the usage of simulators is still relatively new, it has regularly led to an improvement in students' knowledge and confidence. The application of electronic, computerised, high-fidelity simulators may be constrained by their expensive cost. A 2006 study shows that students' confidence in vaginal birth has grown due to simulation training [8]. In a scientific setting, a

high-fidelity simulation depicts the precise circumstances of a human patient. Low-fidelity simulation refers to something which is utilised to instruct physical assessment and psychomotor skills [9].

Thus, intermediate fidelity is a bridge between both low and high fidelity. Hence, this study, "Teaching normal delivery to undergraduate students for skill development through intermediate fidelity simulation," is undertaken. The term "fidelity" is frequently used in the simulation field to characterise the level of technical complexity and realism of models [1]. The application's requirements will determine this; the more complex the task, the more accurate the model must be. The current study aims to assess how well an intermediate-quality birth simulator can teach medical students about normal vaginal birth. Primary and secondary objectives are:

Primary objectives:

- To determine the effectiveness of intermediate fidelity simulation in improving the skills of normal delivery in undergraduate medical students.
- To compare the skill development and teaching of normal delivery through PowerPoint presentation and video lectures with that of intermediate fidelity simulation in undergraduate medical students.

Secondary objective:

- To explore the potential of intermediate fidelity simulation as a learning tool for Obstetrics and Gynaecology Departments and Institutions.

Null hypothesis: There is no significant difference between intermediate fidelity simulation and powerpoint presentation and video lectures for imparting the skills of normal delivery to undergraduate students.

Alternate hypothesis: There is significant difference between intermediate fidelity simulation and powerpoint presentation and video lectures for imparting the skills of normal delivery to undergraduate students.

REVIEW OF THE LITERATURE

The study conducted by Shah N et al., demonstrated the time constraints in a real-world clinical setting frequently prevent effective and comprehensive learning opportunities, simulation offers the option to study gradually and at one's own pace [10]. The value of simulation in improving clinical skills and experience at both the behavioural and technical levels in obstetrics and gynaecology units [11]. In an assessment of obstetrics and gynaecology students, 80% of respondents agreed that simulation training improved their surgical skills, which they then applied to real-world situations [12]. According to a recent systematic study in 2020, 86% of studies demonstrated the value of virtual simulation in education for improving learning outcomes [13]. Simulators are thought to be time efficient. It allows one to practice at their own pace without feeling stressed.

The superiority of simulation-based medical education over conventional clinical medical education for focused practice is another shown benefit that emerged from this study [14]. Regular practice improves knowledge in a natural setting or a realistic simulation and is well-recognised. With the help of this undergraduate medical course, students can improve their skills benefiting the interdisciplinary team, the individual learner, and the hospital.

MATERIALS AND METHODS

This cross-sectional observational study will be conducted in Department of Obstetrics and Gynaecology, Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College, Sawangi (M), Wardha, Maharashtra, India from September 2022 to August 2023, after obtaining ethical approval from the Institutional Ethical Committee (Ref. No: DMIMS (DU)/IEC/2022/214).

Sample size calculation: Using Krejcie and Morgan's formula for sample size calculation [15]:

$S=\chi^2*N*P*(1-P)/(D^2*(N-1)+X^2*P*(1-P))$

Where;

χ^2 is Chi-square tabulated value for 1 degree of freedom at the desired confidence level of 5%=3.841

'N' is the total number of MBBS students in 3rd Year=250

'P' is the population proportion (assumed to be 0.50 since this would provide the maximum sample size)

'D' is the margin of error as a proportion (5%)=0.05

Therefore, S=151.65

Thus, **160** students would be needed for the study.

Study group A-80 students in 3rd-year MBBS

Study group B-80 students in 3rd-year MBBS

Inclusion and Exclusion criteria: Third-year students who will be willing to participate in the study, will be included; and the participants not belonging to 3rd year and who will not give the consent to participate will be excluded.

Methodology

Informed consent will be obtained from all participants. An introductory lecture will be taken for a batch of 160 students in 3rd year regarding how the study will be conducted and modality of skill impartation.

Pre-OSCE will be conducted after the introductory lecture over 30 minutes, and then the students will be divided into two groups:

Group A-Lecture in the form of a powerpoint presentation with a video of normal delivery to be used as a learning method.

Group B-Intermediate fidelity to be used as a learning method.

Group A will come first for powerpoint lectures with a video of normal delivery, followed by Group B going for intermediate fidelity simulation (on the SimMom Birthing Simulator, Laerdal Medical India Pvt., Ltd.,) The powerpoint presentation along with video of normal delivery will be prepared by the primary researcher regarding general physical and antenatal assessment, per abdomen examination and pelvic assessment, mechanism and stages of normal labour, episiotomy, and active management of labour over 120 minutes (2 hours) in a classroom.

Post-OSCE will be conducted for both groups of students over 30 minutes. Students will have to effectively communicate with a virtual patient who is an intermediate-fidelity simulator and carry out the steps of a typical delivery while being directly supervised by the teacher. This procedure will be marked as per a checklist designed by the primary researcher [Table/Fig-1]. Students will be graded on a scale of 1-5 per checklist point where 5 is the maximum score per with a total possible score of 50 at the end of the checklist and another self-designed questionnaire on how the students perceived their educational experiences [Table/Fig-2].

As neither group should be deprived of any teaching methods, the student groups will be interchanged after the abovementioned procedures so as not to lose out on any form of learning viz., lectures and the simulation modality. This will have no bearing on the study results. After the simulation training program, it is anticipated that significant skill improvement will occur in conducting normal delivery.

STATISTICAL ANALYSIS

The results of pre and post OSCE stations will be analysed for statistically significant differences with the help of student's paired t-test for intergroup comparison using Statistical Package for Social Sciences (SPSS) 27.0 Version (Microsoft Corporation).

S. No.	Check list OSCE station	Max. Marks	S. No. of participants									
			1	2	3	4	5	6	7	8	9	10
1	Techniques of history taking and general physical examination i) Asking complaints ii) Asking menstrual history and obstetrics history iii) Recording blood pressure iv) Examining for pallor, pedal oedema v) Examining pulse	5										
2	Methods of per abdominal examination i) Measuring the height of the uterus ii) Demonstrating Leopold first manoeuvre: Fundal palpation iii) Demonstrating Leopold second manoeuvre: Lateral grips iv) Demonstrating Leopold third manoeuvre or Pawlick grip or second pelvic grip v) Demonstrating Leopold fourth manoeuvre first pelvic grip	5										
3	Pelvic assessment skills i) Measuring the diagonal conjugate ii) Palpating for sacral curve iii) Knowing the transverse diameter between two ischial spines iv) Measuring the subpubic angle v) Measuring the transverse diameter of outlet	5										
4	Mechanism of labour i) Defining mechanism of labour ii) Knowing the engaging diameters in normal labour iii) Defining engagement of head iv) Defining crowning of head v) Knowing the principal movements of normal labour	5										
5	Skill of observing the 1st stage of labour i) Enumerating characteristics of true labour pains ii) Knowing duration of first stage of labour iii) Knowing the full dilation of cervix iv) Monitoring the fetal heart sounds and maternal pulse v) Assessing progress of labour by 4 hourly PV examination	5										
6	Skill of conducting 2nd stage of labour i) Knowing duration of second stage of labour ii) Knowing how to deliver head of baby iii) Knowing how to deliver shoulders iv) Knowing how you deliver trunk v) Knowing the timing of clamping of cord	5										
7	Skill to manage the 3rd stage of labour i) Knowing the duration of third stage of labour ii) Knowing the signs of placental separation iii) Enumerating methods of separation of placenta iv) Examining placenta v) Knowing how haemostasis occurs in third stage of labour	5										
8	Skill of active management of 3rd stage of labour i) Knowing how much reduction is there in blood loss after third stage ii) Knowing principles of active management of third stage of labour iii) Knowing components of active management of third stage of labour iv) Knowing the oxytocic drugs used v) Knowing which oxytocics are commonly used	5										
9	Skill for performing an episiotomy i) Knowing which anaesthesia is given for episiotomy ii) Knowing the time of giving episiotomy iii) Knowing the structures which are cut in episiotomy iv) Knowing how episiotomy is stitched v) Knowing the after care of episiotomy	5										
10	Skill of management of the 4th stage of labour i) Knowing the duration of fourth stage of labour ii) Knowing parameters observed in this stage iii) Knowing when to advise breastfeeding iv) Knowing when fourth stage of labour starts v) Knowing the importance of fourth stage of labour	5										
	Total marks	**50**										

[Table/Fig-1]: Check list for assessment.

S. No.	Course component	1 Strongly agree	2 Disagree	3 No opinion	4 Agree	5 Strongly disagree
1	Individual attention was provided during learning and practice.					
2	The course content was sufficient and helpful for my practice.					
3	There was sufficient time scheduled for planning the classroom learning activities and skill demonstrations.					
4	There was sufficient time for skill practice and managing normal labour.					
5	This course will be useful for conducting normal deliveries in real patients.					

[Table/Fig-2]: Questionnaire of student perceptions regarding their educational experiences.

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