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RESEARCH PAPER

Effect of technology-enhanced learning on the development of the procedural skill of 8th-semester students in the labour room

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***Background and aims:** Practical skills are an essential part of physicians' daily routine. Nevertheless, medical graduates' performance of basic skills is often below the expected level. Technology has been considered an influential tool in teaching and learning of skills. It assists students in gathering more information to solve the problems and master skills better. Enhanced medical trainee education, using new and emerging technologies for teaching and learning, may increase competency. **Materials and Methods:** In this study, Foley's female catheterisation is selected as a skill for undergraduate students of eight semesters when posted in Jorhat Medical College & Hospital's labour room for one month. 16 M.B.B.S. students of 8th semester who are posted in labour-room per month are the study population. The study was conducted from Nov 1 to Nov 30 2015. It is a comparative study on conventional (Sodoto) model of skills teaching and technology-enhanced (simulation) skills teaching. **Results:** The results indicate an increase in skill competency over time among the same group of students after technology-enhanced and self-directed learning of the skill to perform female catheterisation in the labour room. Feedback also increases the increasing interest of both faculty and students for this new teaching-learning tool. **Conclusion:** Technology-enhanced learning offers a novel pedagogical approach to enhance medical students' medical skill competencies levels. The outcomes of this study have shown an encouraging result.*

***Keywords:** Basic practical skills; clinical skills; physical examination; skills training; undergraduate medical education.*

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INTRODUCTION

A current approach in health profession education is the development of competency-based undergraduate curricula.[1] In Germany, a National Competence-Based Catalogue of Learning Objective for Undergraduate Medical Education (NKLM) came into effect in June 2015.[2] Many of the competences described in the NKLM include the acquisition

of basic practical skills. Regarding basic practical skills (i.e. accomplishing a task like a knot tying or cardiac auscultation), medical stakeholders have raised objections that medical graduates execute such skills below the expected level of performance.[3]

Furthermore, third-year undergraduate medical students reported their competence in core clinical skills like rectal examination or insertion of a nasogastric tube on average with 4.7 on a 6-point (1=excellent) Likert scale.[4] On the other hand, different basic clinical skills training programs seem to offer medical students different preparedness levels regarding physical diagnostic skills,[5] suggesting that some teaching methods for practical skills might result in better performance. An obstacle for teaching practical skills well has been identified in some teacher's lack of confidence in their own physical examination skills.[6]

The traditional apprenticeship model for teaching clinical skills is no longer feasible due to the shortage of faculty[7] however, this educational model may be augmented with simulation training, centralised skills training re centres, and Web/ Medicine 2.0 applications[8,9] support a constructivist approach to learning.[10] Technology has been considered an influential tool in teaching and learning. It assists students in gathering more information to solve the problems and master skills better. Enhanced medical trainee education, using new and emerging technologies for teaching and learning, may increase competency (performance and communication skill). Once the medical trainee is competent to perform a procedure like female bladder catheterisation, there is very little probability of adverse effects or medical errors. Furthermore, there is an ethical imperative to ensure optimal treatment without harming patients; therefore, technological advancements may provide a safe environment for medical students to practice.[11]

Medical video technology delivered via a PowerPoint/mobile device has great potential for cultivating a favourable learning landscape in medical schools. Educators know that millennial student, born between 1980 and 1994, are technologically adept, stressed, high-achieving, confident, and self-assured.[12] These students demand convenience and require specific educational direction and guidance while attending college. Therefore, the introduction of audiovisual technologies for this type of student is ideal because e convenience and the specific academic content they deliver. These students are accustomed to waking up and automatically having the current medical news, viewpoints, research, and education to listen to and perhaps view while commuting to the university, work, or the gym. This is made possible by podcasts and mobile video technologies. The procedural teaching skill in the use of the labour room with cutting-edge technology. It is the starting point of a better health care service provided by future doctors in turn. These competent doctors will play an essential role in bringing down maternal mortality rates. Teaching procedural skill better can best utilise the first in-hand clinical posting in the Obstetrics and Gynecology department.

Keeping the aim in mind to study the effectiveness of technology-enhanced learning on developing the procedural skill of 8th semester students in the labour room, students should perform Foleys catheterisation in the female after technology-enhanced teaching-learning in the labour room.

MATERIAL AND METHODS

This was a prospective study. The study sample consisted of 16 final-year medical students of Jorhat Medical College & Hospital. All the students are required to complete this clinical skill during the final year of medical school. The students were assured that participation in the study was voluntary and would not affect any course grades or employment at the concerned Sankardev University of Health Sciences, Assam. They were encouraged and given suggestions to try this method of learning for other clinical skills also. The counselling sessions were held in the labour room, which included the study's purpose, the study's exact procedure, and its implications at the very beginning of the study. Then consents were taken for participation. The students are counselled about the DOPS procedure.

Simultaneously, discussion with faculty of the department of Obstetrics and Gynaecology was held to sensitise them to the concept of this teaching-learning method and assess a student with DOPS.

Traditionally the students learnt Foleys female bladder catheterisation procedure by observing their seniors (S.O.D.O.T.O. Model). This is an essential and most frequently performed procedure in the labour room. Incorrect method of introduction of Foleys female catheterisation may lead to lot many complications. If the students are not taught this procedure in a structured way, this may invite many difficulties. In the traditional method, there was no structured way to teach the technique correctly. This study tried to introduce newer teaching-learning tools like simulator (dummy), video presentation, and YouTube links. With the use of these tools, we have taught the procedure in a structured way.

This study was conducted for one month (Nov 1 to Nov 30 2015) in the labour room J.M.C.H, Jorhat, Assam. DOPS and feedback Questionnaires were peer-reviewed before conducting the study by a few faculty members.

In the Control group (*conventional teaching*) first, 14 days student learnt by traditional way, i.e. they learn by observing their seniors performing the procedure (S.O.D.O.T.O.). On day 14, DOPS was conducted to assess their performance. On day 15, they were asked to attend a class describing the Foley's female catheterisation procedure, which was the side effects of Foley's female catheterisation procedure, assisted by demonstration in dummy and video presentation.

Our institute's video presentation has been recorded where

one of our M.B.B.S. interns performed the procedure in our labour room.

To better understand available staff and resources in our institute, the recording is done in our institute. This video has been transferred to the study group via blue tooth for later learning. A demonstration on the dummy followed this. They were suggested about the YouTube links for learning female catheterisation procedures and encouraging self-directed learning in that class. After this intervention, their skills were assessed with DOPS checklist by the involved faculties at the end of the next 14 days. Finally, feedbacks were obtained from both faculties and students. Students were asked whether they liked it or not, and reason for their like or dislike in the feedback form. Faculties were also given feedback in the questionnaire.

Discussion with faculty and sensitisation

The first session with the faculty members of the department of Obstetrics & Gynecology was a sensitisation session wherein the faculty was introduced to the various tools available for technology-enhanced study and about DOPS assessment which was a new method of evaluation for all the faculties.

Figure 1 The type of simulator used in this study

RESULTS

The results of the study are described below.

Table 1 Results of pre-test and post-test of the simulation the study

Students Serial no	Pre-test (series 1)	Post-test (series 2)	Mean & S.D. of pre-test	Mean & S.D. of post-test	Paired *t*-test value
1	5	13			
2	10	12			
3	8	11			
4	9	12			
5	11	12			
6	11	13			
7	10	12	9.0625 & 1.8	12.25 & 0.774	<0.0001
8	11	11			
9	6	12			
10	10	11			
11	8	13			
12	8	12			
13	10	13			
14	11	13			
15	8	13			
16	9	13			

Table 1 and **Figure 1** reveals 16 students of the eight semesters had undergone a DOPS test (pre-test) after 14 days of the traditional teaching of procedural skill in the labour room. After intervention with technology-enhanced teaching and self-directed learning for the next 14 days, students were reassessed with DOPS by the same faculty group (post-test).

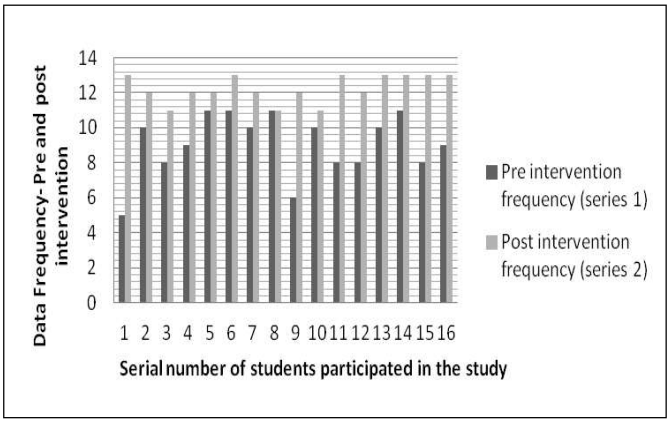

Figure 1 Comparison of series 1 (pre-intervention/Pre-test) with series 2 (Post-intervention/Post-test)

On analysing data obtained from the questionnaire yield a very positive response. Majority of students have scored well after the intervention was done. The pre-intervention mean score was 9.0625 with SD1.8, which was increased -post-intervention to 12.25 with SD 0.774. The results indicate an increase in skill competency over time among the same group of students after technology-enhanced and self-directed learning of the skill to perform female catheterisation in the labour room. Paired *t*-test results show the two-tailed P-value is less than 0.0001. By conventional criteria, this difference is considered to be extremely statistically significant.

While analysing the data obtained from feedback questionnaire, we concluded that 14/16 students had liked the process very much (circled 5) 2/16 students had liked it to a significant extent (circled 4) 8 students commented that they had learnt the procedure very nicely. They will not forget it ever. Two students have commented that the availability of gadgets for learning at the hostel made them spend a lot of time on the Internet. They have switched over to other sites also when tried to see the procedure in YouTube.

While analysing the data obtained from 7 faculties of our department 5 faculties had like the process very much and rest two faculties had liked it to some extent. (Data table and figure to be included)

DISCUSSION

Students in the health care professions have benefited from repeatedly listening to learning material at their convenience via mobile technology and have reported high satisfaction using audio and video formats in learning.[13,14] Social Web (Web 2.0) applications, such as podcasts/vodcasts, are becoming, typical technology applications in health care professional education and novel research are being conducted and published regarding learning outcomes.[15,16,17] While no one has clearly defined and agreed on what Medicine or Health 2.0 is, researchers have determined the term originated from the concepts of medicine and Web. 2.0.[18]

A podcast/vodcast may consist of an audio and video file distributed to a selected media player over the Internet, phones, phones, smartphones, phones, iPad-style notebooks, or downloaded to an iPod-like device. Video podcasts may then be referred to as Medicine/Health 2.0 tools to affect health care and education, and perhaps even in underserved countries where mobile health technology is expanding.[19]

Regarding the use of video iPods in higher education, audio and video formats enhance learning outcomes.[19-22] Health care professional students report satisfaction in listening to lecture material and viewing clinical skills.[21] This innovative pocket-sized mobile device is becoming part of the physician's repertoire of diagnostics, educational tools, and research interventions. However, there is a lack of evidence around how mobile technology, and using it as a platform for medical education, affects practitioner competence in clinical skills and procedures.

CONCLUSION

Technology-enhanced learning offers a novel pedagogical approach to enhance medical 'students' medical skill competencies levels. The outcomes of this study have shown an encouraging result. This study has also illustrated a need for further investigation to generalise to the medical school population. Further research in this area can probably prove that we need this new learning skill the teaching method to make our medical graduate competent to perform procedural skill better than conventional teaching methods. It was used as a starting point of new learning methods and they-learning methods to encourage them to try newer learning methods and learning methods and reported feeling benefitted from this change. The technology-enhanced learning and DOPS assessment may have a definitive role as a motivational tool

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