International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Poomalar GK et al. Int J Reprod Contracept Obstet Gynecol. 2023 Sep;12(9):2623-2627
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20232487

Original Research Article

E-learning as a tool to impart knowledge of surgical procedures in the undergraduate medical teaching

Poomalar G. K.*, Ilamathi S., Nivedita K., Bupathy A., Jayasree M.

Department of Obstetrics and Gynaecology, SMVMCH, Puducherry, India

Received: 20 July 2023
Accepted: 07 August 2023

***Correspondence:**
Dr. Poomalar G. K.,
E-mail: poomalarpragash@gmail.com

ABSTRACT

Background: E-learning is in a budding stage in developing countries. As present-day students are gadget-friendly, introducing a surgical e-learning module may create interest and help in understanding the surgeries easily. This study aimed to determine the effectiveness of E-learning in improving the knowledge component of surgical procedures for undergraduate students and to analyze students' feedback regarding its usefulness.
Methods: This quasi-experimental study was conducted among 67 final-year MBBS students, who had completed 1 week of operation theatre (OT) posting in obstetrics and gynecology. Recording of videos for must-know surgeries in gynecology was done. Video editing and audio description of surgical steps were done. A YouTube channel was created and surgical videos were uploaded. Links to 2 surgical videos and additional teaching materials were uploaded to the college learning management system daily for 2 consecutive weeks. A telegram group was formed for posting questions daily. Pre-test and post-test were conducted and the results were analyzed.
Results: The mean marks obtained in the pre-test were 6.567±1.9 and the post-test was 15.22±2.5 (Paired t test p=0.0001). Students mentioned that combining OT posting with an e-learning module helped them to build their knowledge of surgical procedures. Telegram quizzes helped them to increase their understanding of surgeries. 34 students wanted e-learning module to be conducted on other topics also.
Conclusions: E-learning is highly effective in improving knowledge component of surgical procedures for undergraduate students. E-learning can be made more effective by adding formative assessment. Combining surgical e-learning module with operation theatre posting can enhance knowledge and understanding.

Keywords: E-learning module, Learning management system, Surgical procedures, Undergraduate teaching, YouTube channel

INTRODUCTION

E-learning is well in use in Western countries. But still, it is in the embryonic stage in India for undergraduate (UG) medical teaching. E-learning encompass a wide variety of teaching modality including web-based learning, online learning, computer-assisted instruction, and virtual learning.[1] Though some of these e-learning modalities are used in our country, there are no specific e learning program for imparting knowledge on surgical procedures. Traditionally, operating theatre setup, clinical discussions, and books are the usual means of teaching surgical procedures. All the students cannot view the surgical field during the surgery. Students end up imagining the steps of surgical procedures. If a surgical procedure e-learning module is created, students can view it round the clock during leisure time. As present-day students are gadget-friendly, introducing a surgical module in the learning management system (LMS) may create interest and help in understanding the procedures well. If the surgical E-learning module is proven to be beneficial, it can be made compulsory in the UG curriculum. So, this study was done to determine the effectiveness of E-learning in improving the knowledge component of surgical procedures for

undergraduate students and to analyze the student's feedback regarding the usefulness of E-learning in understanding surgical procedures.

METHODS

This Quasi-experimental study was conducted among 67 final-year students over a period of 3 months between July 2021 to October 2021 in the department of obstetrics and gynecology (OG) of Sri Manakula Vinayagar medical college hospital, Puducherry, India.

Process of recording video and development of educational material

Video recording of must-know surgeries in gynecology (cervix biopsy, dilatation curettage, copper-T insertion, cryotherapy, diagnostic hysteroscopy, diagnostic laparoscopy, tubectomy, myomectomy, abdominal hysterectomy, vaginal hysterectomy, Ward Mayo surgery, Fothergill's repair, ectopic surgeries, laparoscopic ovarian cystectomy, WHO surgical safety checklist) was done after appropriate patient fully informed consent. Emphasizing was done on the point that they can withdraw their consent at any time. Surgeries were performed by faculties of our department of obstetrics and gynecology. Postgraduate students in our department recorded the videos of those surgeries. We respected the rights and dignity of the patients, and the minimum possible area of the body was video graphed. The face of the patient, her birthmarks, and hospital tags were avoided in the frame. We edited the videos to shorten the duration of surgeries with a maximum time limit of 15 minutes for major surgeries and 5 minutes for minor procedures. An audio description was added for better understanding. Videos were stored in a safe environment with controlled access. Additional teaching materials related to the surgical procedures such as indications for surgery, preoperative preparation, surgical instruments, postoperative care, and postoperative complications were prepared and validated. Editing the videos was done by us (the authors). The study was conducted after getting clearance from institutional ethics committee (SMVMCH-EC code no: 56/2020).

Data collection procedure

This e-learning module was conducted on the students who were in the last two weeks of the final MBBS OG posting, and who had completed 1 week of operation theatre posting. The pre-test was conducted for them to assess surgical procedural knowledge.

A YouTube channel was created to upload surgical videos. YouTube links and additional teaching materials were uploaded to the learning management system (google classroom). A telegram group was created with the students for posting questions daily (formative assessment), as it is user-friendly. To reduce the burden on the students, daily two videos were uploaded from Monday to Friday for two consecutive weeks. The video uploading time was fixed at evening 8 pm. Students were given time till the next day 7:30 pm to watch the videos in their leisure time. All students were instructed to come online in a telegram group at 7:30 pm for a telegram poll. MCQs related to the previous day's videos were posted at 7:30 pm. Students could check their answers instantly. Students were encouraged to ask doubts through telegram. MCQs were posted daily in the telegram group to assess their interest in using the module. After the completion of the module, a post-test was conducted. Kirkpatrick's first and second level of program evaluation was done. Pre-test and post-test questions were used to check the students' knowledge improvement on various surgeries. Feedback was collected from students regarding various aspects of the module such as videos posted, audio language, reading material, easiness of using the learning management system, technical issues encountered during accessing videos, telegram group polls conducted, and the usefulness of the e-learning module in university exams. Some open-ended questions regarding the strengths and weaknesses of the module and suggestions to improve the module were also collected in feedback. Validation of the module was done by all faculties of our department of obstetrics and gynecology.

Data analysis and interpretation

Data entered in Microsoft excel and analyzed. Improvement in knowledge based on pre-and post-test was analyzed using paired t test. Feedback from participants was plotted with the diverging stacked bar chart.

RESULTS

Our study results showed that there was a significant increase in the knowledge component of students on surgical techniques (pre-test score of 6.5/20; a post-test score of 15.22/20; p-value of 0.0001) (Figure 1). Even the student's self-rating of knowledge also increased from 2.5 to 4 (out of 5) (Figure 2). Feedback from the participants was plotted with the diverging stacked bar chart (Figure 3). Most of the students gave positive feedback for all the aspects of the e-learning module except for replacing the operation theatre posting with the surgical e-learning module. They suggested that combining operation theatre (OT) posting with an e-learning module helped them to build their knowledge of surgical procedures. Students listed many strengths and weaknesses of the e-learning module (Table 1). They could view procedures more clearly in videos than in OT. Telegram quizzes helped them to increase their understanding of surgeries. They could learn at a convenient time, pause, and view the videos in case of difficulty in understanding. Students suggested including vaginal deliveries and cesarean sections in the surgical E-learning module. 34 students wanted an e-learning module on other topics too. Some of the new modules suggested by them were normal deliveries and cesarean section, every topic in the book as an e-learning module, history taking and examination, and university question paper.

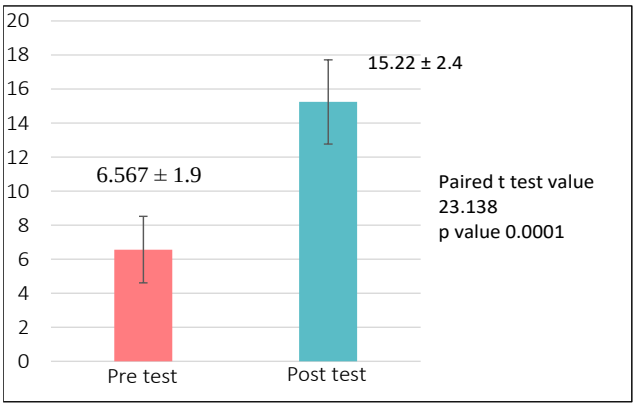

Figure 1: Mean marks obtained in pre-test and post-test (Mean ± SD).

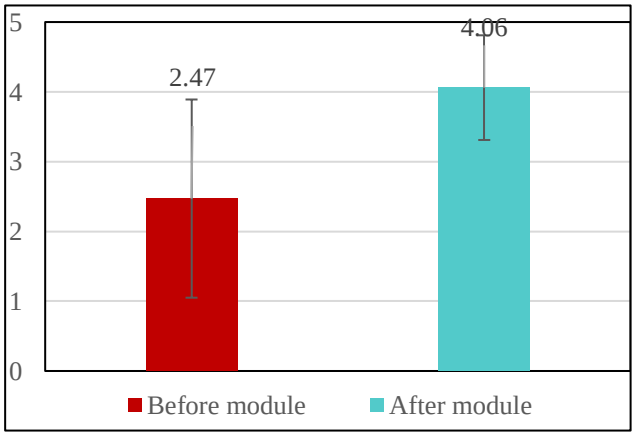

Figure 2: Self-rating of knowledge by students.

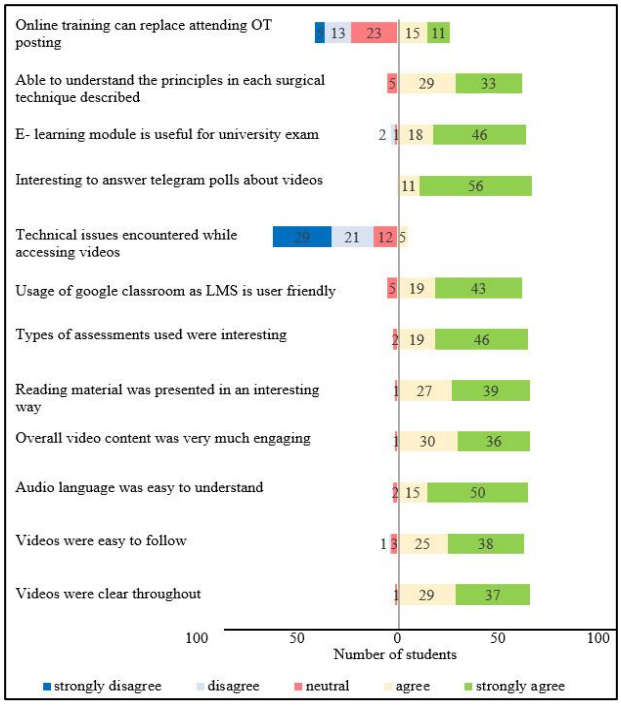

Figure 3: Diverging stacked bar chart on student's feedback about surgical e learning module.

Table 1: Strengths, weaknesses of e-learning module.

Variables	Percentages (%)
Students statement about strengths of this e-learning module	
Helps to build our surgical knowledge	22
We can view surgery more clearly than in operation theatre	7
Telegram quiz helps to increase our understanding of procedures	7
Videos were short and clear with audio explanation	31
Simple and interesting to learn	14
Learn at a convenient time	10
I can pause and view the steps if I don't understand	9
Students' statement about weaknesses of this e-learning module	N
Faced minor issues like not opening the video in first time	1
Cannot see the procedure from anaesthesia	2
Cannot match live experience in operation theatre	1
Sometimes it is difficult to distinguish ligaments	2

DISCUSSION

E-learning in the medical field can be done for case-based discussions through virtual patients, teaching theoretical knowledge of surgeries/ procedures, and skill teaching through videos or virtual reality.[2] In all these settings, e-learning plays a significant role. As patients' autonomy is not affected by e-learning, students can use it multiple times.

Present study results show that the surgical e-learning module helps in imparting knowledge on major and minor procedures in gynecology among undergraduate students. Before entering into this study, students completed 1 week of operation theatre posting, where they observed elective surgeries. Even after OT posting, their mean knowledge score was 6.5 out of 20. After attending this e-learning module, their mean score increased significantly. One of the reasons might be that students may not be exposed to all surgeries during 1 week of posting. Some surgeries might be commonly performed daily. They would have been exposed only to those surgeries repeatedly.

Additionally, providing surgical videos alone to students will be a didactic form of e-learning. E-learning can be made more effective by adding formative assessment. It helps by promoting motivation and steer-up learning, to complete the objectives on time.[3] Another way to cheer up students for e-learning is by making it enjoyable and sense the achievement at the end. A telegram group was formed to encourage interaction in this e-learning module.

Formative assessment was done daily on the videos and related documents uploaded. As there is an interaction between teacher and students at a pre-defined time, this e-learning is partially synchronous. Such formative assessments might help encourage a few uninterested students in the group. Presently we are dealing with Generation Z students, born and educated entirely within the digital era. Feedback received from students reveals that they are more comfortable with e-learning techniques than traditional teaching.

Various other studies that analyze the effectiveness of the E-learning module in undergraduate students also show promising results. Integrating E-learning into the curriculum provided a better outcome in imparting knowledge and skill component in reproductive health and family medicine.[4,5] E-learning in the surgical field on hemorrhoids and coloproctology has also shown to be significantly helpful.[6,7]

E-learning and traditional learning differ in different teaching modes, different interactive media usage, and different assessment methods.[8] E-learning modules are found to have various advantages over the conventional method by allowing students to work in a low-stress environment, and learn at a flexible time frame and own pace. As students have different learning paces, this e-learning helps slow learners pause, restart and repeat videos at their speed. E-learning does not cause any limitations on time, space, and person.[8] As there are no time constraints, student-teacher interaction can happen outside busy working hours, improving their relationship. It also helps introverted learners in eliminating social anxiety. As e-learning is no longer teacher-centered, students have complete control over learning without boredom. It also encourages self-directed learning.[9] Apart from teaching, evaluation of the competencies can be done objectively through online assessments, with personalized feedback for students.[10]

This surgical e-learning module is especially useful in CoViD times, as students were at home without much contact with friends and teachers. This telegram poll acted as a platform for bringing all the group members together and helped in interaction. Though unfamiliarity and reluctance to use technology for learning are disadvantages, this may not be the case in the present scenario of CoViD with more than one year of online classes from school to college students.[11] E-learning module creation and implementation may need initial cost. Later, it can be used for years together, making it a cost-effective and cheaper option. Creating an e-learning module is a tedious and time-consuming process. Once created, it can be implemented in successive batches with ease. Only minor modifications may be needed in the future to remain updated. E-learning also results in uniformity and consistency in teaching among all students.

Frehywot et al have mentioned in their review that implementing e-learning in selected topics will compensate for faculty shortage.[12] In most medical colleges in India, with 150-250 medical students enrolled in a year, it may be difficult for each student to visualize surgical procedures in an OT setup. This e-learning module helps to overcome this difficulty.

There are certain drawbacks to the e-learning module identified in studies. Students felt that there is a lack of face-to-face student-teacher interaction and in-depth group discussion on complex topics.[13,14] As suggested by Haagsman et al the addition of pop-up questions in the videos can overcome this problem partially. Blended learning is a potential option that combines features of traditional and e-learning.[15] Some other hurdles identified in the usage of e-learning are internet connectivity problems, financial issues, the need for technical support, and resistance among teachers and students to adopt changes.[16]

For successful implementation of e-learning, students and faculty need motivation, self-discipline, understanding of the process, time management skills, and availability of resources. Like flipped classrooms, flipped operation room gives a better orientation to the students before real-time exposure to the operation theatre.

Limitations

This study was done as a Quasi-experimental study. Including a comparator group would have thrown more light into our study. We did not perform subgroup analysis of improvement in knowledge between slow learner and fast learner. Such analysis would have helped in identifying the group of students who will benefit more from this e-learning module implementation.

CONCLUSION

E-learning is highly effective in improving the knowledge component of surgical procedures for undergraduate students. They are more comfortable with e-learning techniques than traditional teaching. E-learning can be made more effective by adding formative assessment. It helps to promote motivation and to steer the learning process. Though the surgical e-learning module cannot replace operation theatre posting, it can be used as a supplement to enhance knowledge and understanding.

ACKNOWLEDGEMENTS

Author would like to thank all our patients who gave consent to recording surgical procedures. We would like to extend our thanks to our post-graduate students and faculties in our department for helping in recording videos.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Cook DA, Levinson AJ, Garside S, Dupras DM, Erwin PJ, Montori VM. Internet-Based Learning in the Health Professions: A Meta-analysis. JAMA. 2008;300(10):1181-96.
2. Jayakumar N, Brunckhorst O, Dasgupta P, Khan MS, Ahmed K. E-Learning in surgical education: a systematic review. J Surg Educ. 2015;72(6):1145-57.
3. Larvin M. E-Learning in surgical education and training. ANZ J Surg. 2009;79(3):133-7.
4. Kulier R, Coppus SF, Zamora J, Hadley J, Malick S, Das K et al. The effectiveness of a clinically integrated e-learning course in evidence-based medicine: a cluster randomised controlled trial. BMC Med Educ 2009;9:21.
5. Wiecha JM, Vanderschmidt H, Schilling K. HEAL: an instructional design model applied to an online clerkship in family medicine. Acad Med. 2002;77(9):925-6.
6. Bhatti I, Jones K, Richardson L, Foreman D, Lund J, Tierney G. E-learning vs lecture: which is the best approach to surgical teaching? Color Dis. 2011;13(4):459-62.
7. Aryal KR, Pereira J. E-learning in surgery. Indian J Surg. 2014;76(6):487-93.
8. Gao H, Wu H, Wu X. Chances and Challenges: What E-Learning Brings to Traditional Teaching. 2018 9th International Conference on Information Technology in Medicine and Education. 2018;420-2.
9. Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. Acad Med. 2006;81:207-12.
10. Huynh R. The Role of E-Learning in Medical Education. Acad Med. 2017;92:430.
11. El Boghdady M, Ewalds-Kvist BM, Alijani A. A review of online platforms in training and surgical education. Eur Surg. 2019;51:41-8.
12. Frehywot S, Vovides Y, Talib Z, Mikhail N, Ross H, Wohltjen H et al. E-learning in medical education in resource-constrained low- and middle-income countries. Hum Resour Heal. 2013;11:4.
13. Bains M, Reynolds PA, McDonald F, Sherriff M. Effectiveness and acceptability of face-to-face, blended and e-learning: a randomised trial of orthodontic undergraduates. Eur J Dent Educ. 2011;15:110-7.
14. Armstrong P, Elliott T, Ronald J, Paterson B. Comparison of traditional and interactive teaching methods in a UK emergency department. Eur J Emerg Med. 2009;16(6):327-9.
15. Haagsman ME, Scager K, Boonstra JC, Koster M. Pop-up Questions Within Educational Videos: Effects on Students' Learning. J Sci Education Technol. 2020;29:713-24.
16. Dhir SK, Verma D, Batta M, Mishra D. E-Learning in Medical Education in India. Indian Pediatr. 2017;54(10):871-7.

Cite this article as: Poomalar GK, Ilamathi S, Nivedita K, Bupathy A, Jayasree M. E-learning as a tool to impart knowledge of surgical procedures in the undergraduate medical teaching. Int J Reprod Contracept Obstet Gynecol 2023;12:2623-7.