International Journal of Clinical Trials
Tripathi PC et al. Int J Clin Trials. 2024 Nov;11(4):260-265
http://www.ijclinicaltrials.com
pISSN 2349-3240 | eISSN 2349-3259
DOI: https://dx.doi.org/10.18203/2349-3259.ijct20242980

Original Research Article

Effectiveness of video making to enhance infection control skills by undergraduate MBBS students

Purti C. Tripathi[1]*, Himanshu R. Singh[1], Rahul K. Suryawanshi[2]

[1]Department of Microbiology, Chhindwara Institute of Medical Sciences, Chhindwara, Madhya Pradesh, India
[2]Department of Microbiology, Dr. Harisingh Gour Vishwavidyalaya, Sagar, Madhya Pradesh, India

Received: 04 September 2024
Revised: 23 September 2024
Accepted: 24 September 2024

***Correspondence:**
Dr. Purti C. Tripathi,
E-mail: drpurti@gmail.com

ABSTRACT

Background: Competency-based medical education (CBME) Microbiology second MBBS curriculum, infection control practices are core competencies for certification of the second MBBS student. E-learning through video making can help students to achieve these infection control skills upto certifiable level. Educational videos which are of short duration, created in a step wise manner have shown to improve skill acquisition and augment observational learning. The aim and objectives were to study the effectiveness of video making as a teaching learning tool, to enhance infection control skills in undergraduate second MBBS students through video making and to evaluate the students' infection control skills by giving them a prior checklist.
Methods: Second MBBS students after taking informed consent were enrolled for the study. Ten infection control and prevention topics were included in the study for video making. All the 100 second MBBS students in 5 groups of 20 students had made all the 10 videos of duration 2 minutes. A self-administered, validated pre-test and post-test, multiple choice question (MCQ) test and objective structured practical examination (OSPE) checklist were used.
Results: Mean post-test marks improved by a mean of 5.91 with significant p value (<0.001, using statistical package for the social sciences (SPSS) software version 29). Mean MCQ and OSPE scores also improved. In almost all the questions on feedback of student's perception and assessment feedback, percentage of students who agreed and strongly agreed were far more than those who disagreed.
Conclusions: Second phase MBBS students learning and performance of infection control skills greatly improved when they created their own videos.

Keywords: E-learning, Video making/creation, Second MBBS

INTRODUCTION

Globally, the wellbeing of all individuals is affected directly or indirectly due to coronavirus disease (COVID-19) pandemic and this has created many challenges for us.[1] Healthcare workers (HCWs) worldwide are in tremendous stress and this has led to the need for preventing the transmission of Corona virus by complying to strict infection control measures in health care facilities.[2] Keeping this in mind, it is necessary to train the undergraduate MBBS students from the very beginning and inculcate infection control practices in them so that when he becomes an Indian Medical Graduate i.e. the doctor of first contact he will be able to practice these skills in his routine practice.

According to competency-based medical education (CBME) Microbiology second MBBS curriculum, infection control practices are one of the core competencies for which the second MBBS student has to be certified. E-learning through video making can help students to achieve these infection control skills upto a certifiable level.

In the past, E-learning techniques have been increasingly used and applied. The e-learning educational intervention mediated electronically, has shown to have positive effects on learning performance when compared to no intervention or traditional learning methods.[3,4]

Infection control topics are positively promoted through E-learning.[5,6] Once these e-learning tools are developed, they can be further stored and used for institutional training purposes.

Educational videos which are of short duration, created in a step wise manner have shown to improve clinical skill acquisition and augment observational learning.[7,8] A controlled learning environment where demonstrated skills can be standardized can be created by video. Such videos can serve as introductory understanding of complex cognitive concepts.[8,9] Educational videos help us "to capitalize on the ability of moving images to teach procedures requiring skilled techniques and specialized physical examination".[10] Initial learning of clinical skills can be provided by video demonstration as a "best practice exemplar".[11]

In the development of educational videos two important overlapping educational theories can be considered: dual-channel processing and cognitive load theory. Woking memory uses two different channels audio and visual which process multimedia content such as video. According to dual-channel principle, visual and auditory/written information can be processed by humans simultaneously.[12]

Each channel is having a limited capacity to process information as stated by the cognitive load theory. Cognitive overload occurs and learning is inhibited when incoming information exceeds the limited capacity to process the information.[13,14] Social cognitive model of sequential skill acquisition states that observing a demonstration forms the first step of Peyton's approach which is followed by imitating the behaviour and leading to self-regulated performance of the behaviour.[15,16] This study was thus undertaken to determine the effectiveness of creating a video to enhance infection control skills.

Aim and objectives

The aim of this study was to study the effectiveness of video making in enhancing infection control skills in undergraduate second MBBS students. The objectives of the study include: to study the effectiveness of video making as a teaching learning tool; to enhance infection control skills in undergraduate second MBBS students through video making; and to evaluate the students' infection control skills by giving them a prior checklist.

METHODS

This prospective interventional study was reviewed and approved by the Institutional Ethical committee, Chhindwara Institute of Medical Sciences (CIMS), Chhindwara, Madhya Pradesh (IEC no. CIMS/Ethics Committee/2022/4704 dated 02/07/2022). All the second MBBS undergraduate 2020-21 batch students were included in this study. None or if any student remained absent on the day of intervention and assessment were excluded from the study. Informed consent was taken from all the students.

The study was done at the Department of Microbiology, CIMS, Chhindwara. Second phase MBBS students were enrolled for the study after taking informed consent. The study was done after the approval from the Institutional Ethical committee of CIMS, Chhindwara. Duration of the study was of one year.

Infection control and prevention topics/categories included in the study were – hand hygiene, donning of PPE kit, doffing of PPE kit, donning of gloves, doffing of gloves, biomedical waste discard bags and use, biomedical waste discard techniques, blood spill management, needle stick injury, and post exposure prophylaxis. These topics were already covered in theory lectures for the second MBBS 2020-21 batch students.

Before starting the study, the students were sensitised about the purpose of the research project and the intervention. They were informed that a video making competition would be there on the above 10 topics of infection control and prevention and that the videos of the first three positions will be uploaded on the social media i.e. YouTube channel.

A self-administered, validated pre-test containing 3 questions from each topic (total 30 question) were given to all of the students. Validation of pre-test was done by 3 external subject experts and 1 internal expert.

After the pre-test, the topics were refreshed through a lecture and demonstration. Students were instructed about the video making competition.

All the 100 students were divided into 5 groups of 20 students each. Each group had made all the 10 videos such that no 2 students were repeated in any of the video, thus each video were enacted by 2 students and other students helped in preparing it. Duration of the video was not more than 2 minutes for each topic.

Each group were provided a checklist of the sequential steps of the infection control procedure to be followed while preparing the video. This checklist was used at the time of judging them during the competition and assessment by OPSE.

Once the video was made and submitted in the department, all the students were given a self-administered, validated post-test.

This was followed by the video making competition. Judges were provided with the checklist and the marking system including the content relevance, correct procedure as per checklist, idea, presentation, time restriction. The assessment was done using a scoring sheet. The grading scale in the scoring sheet was set as 0-not done/ done incorrectly, 1- fairly well done/ done with minimum mistakes, 2- well done. The videos of the first three positions in each category were uploaded on the departmental YouTube channel.

Impact of video making on learning infection control skills was tested by a MCQ test and OSPE.

A self-administered, validated feedback form was given to all students to get the perception of their learning through video-based infection control skills.

Content validity of the pre-test, post-test, MCQ, checklist of OSPE and feedback questionnaire was calculated using Lawshe's content validity index. CVR of the questionnaire was 0.8 for most of the questions which was acceptable. In some necessary modification was done according to the suggestions by the faculties.

Data was collected through Google forms for pre-test, post-test and MCQs scores as well as Feedback Questionnaire on perception of students about effectiveness of video making to enhance infection control skills and assessment feedback.

Data collected for pre-test and post-test was processed and mean, standard deviation (SD) and p value was calculated using statistical package for the social sciences (SPSS) software version 29.

Data collected for MCQ and OSPE scores was processed and mean and SD was calculated.

For students' perception of their learning through video-based infection control skills feedback Google form data was processed by bar graphs.

Mean score, SD value, p value (all calculated using SPSS software version 29) were calculated. Feedback questionnaire for students through Google form using 5-point Likert scale were collected.

RESULTS

A total of 95 students had participated in the study out of 100 students of 2020-21 batch. 05 students were absent on the day of intervention and assessment and were not included in the study.

From Table 1, it is clear that post-test mean increased by mean of 5.91 with significant p value (<0.001).

Table 1: Pre-test and post-test scores.

S. no.	Scores	Mean±SD
1	Pre-test out of 30 marks (30 questions)	20.18±2.73
2	Post-test out of 30 marks (30 questions)	26.09±2.22

From the Table 2, it is clear that the mean MCQ score and mean OSPE scores were improved.

Table 2: MCQ and OSPE scores.

S. no.	Scores	Mean±SD
1	MCQ scores out of 25 marks (25 questions)	20.19±2.02
2	OSPE scores out of 20 marks (10 questions)	19.01±0.82

Table 3 shows that in almost all the 10 questions percentage of students who agreed and strongly agreed were far more than those who disagreed.

Table 4 shows that 81 % of students agreed that they were priorly informed about MCQ and OSPE. 80% students agreed that the questions were aligned with the learning objectives.

Table 3: Feedback form on student's perception of effectiveness of video making to enhance Infection control skills (n=95).

S. no.	Questions	Strong disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
1	The introduction to the topic and video making was explained well in simple words	0 (0)	1 (1.1)	10 (10.5)	55 (57.9)	29 (30.5)
2	The idea of video making generated interest	1 (1.1)	0 (0)	16 (16.8)	51 (53.7)	27 (28.4)
3	Video making generated enthusiasm to learn about the topic of Infection control	0 (0)	0 (0)	13 (13.7)	49 (51.6)	33 (34.7)
4	The video making strategies made me feel involved	0 (0)	2 (2.1)	10 (10.5)	50 (52.7)	33 (34.7)
5	The video making on infection control skills was intellectually stimulating	0 (0)	1 (1.1)	12 (12.6)	61 (64.2)	21 (22.1)

Continued.

S. no.	Questions	Strong disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
6	I am satisfied with the video making technique to learn Infection control skills and highly recommend it	0 (0)	0 (0)	19 (20)	52 (54.8)	24 (25.2)
7	Video making helped me in better learning the infection control skills	0 (0)	3 (3.1)	10 (10.5)	53 (55.9)	29 (30.5)
8	Video making helped me better retention of the infection control skills	0 (0)	1 (1.1)	18 (18.9)	49 (51.6)	27 (28.4)
9	I am more confident now in performing the infection control skills	0 (0)	1 (1.1)	18 (18.9)	50 (52.7)	26 (27.3)
10	Student's performance of infection control skills will be improved by video making activity	1 (1.1)	1 (1.1)	15 (15.8)	55 (57.8)	23 (24.2)

Table 4: Assessment feedback (n=95).

S. no.	Question	Yes	No	Not answered
1	The assessment method was priorly informed (OPSE and multiple-choice items)	77 (81)	7 (7.3)	11 (11.7)
2	The assessment tool was priorly informed (Google form for MCQ and OSPE in offline mode)	79 (83)	4 (4.3)	12 (12.7)
3	The questions were aligned with the learning objectives	76 (80)	4 (4.3)	15 (15.7)

DISCUSSION

Educational video for practical skills is of value and can provide a long-term investment in teaching practical skills. Videos are non-time bound, provides prior learning and is independent of the actual class.

Peyton's teaching approach is effective in acquisition of procedural skills. The four steps involved in this approach include demonstration (step 1), deconstruction (step 2), comprehension (step 3) and performance (step 4).[16] In our study, students were demonstrated the infection control skills and were further made to perform the skill. They were divided into groups and skill performance was done in the form of creating a video for the infection control skills. McIntosh et al in 2018 demonstrated in their study that when students themselves recorded their skill video and receive feedback from the instructor and peers, there was a significant rise ($p<0.001$) in their feeling of engagement and being supported within a learner's community.[17] They also demonstrated that there was an increase in student learning when they re-watched their own practice videos on skills in comparison with a control group which did not use the video.

Epstein et al in their review study also demonstrated several advantages of using smartphones and video tools for teaching and learning practice-based skills ranging from accommodating students with unique needs for new pedagogies which supports deeper thinking and more flexible assessment and feedback practices.[18]

With the introduction of competency based medical education (CBME), new teaching methods have been introduced to ensure the attainment of competencies by medical graduates. We have used creation of videos on various topics of infection control and prevention. MCQ based pre-test and post-test was done. Post test scores improved by mean of 5.91 with significant p value ($p<0.001$). For assessment we had taken a MCQ test and OPSE and students perception through feedback questionnaire and assessment feedback. OPSE stations were prepared and students were assessed using a prior checklist provided to them.

Hidayati et al conducted a study to determine the effectiveness of the audio-visual competition for health education media to improve the practice of washing hands in 6 stages in elementary school students.[19] In his study, the intervention group has a significant difference between knowledge and attitudes during the pre-test/before the intervention compared to knowledge and attitudes at the post-test or after the intervention. There was a significant increase in student's knowledge and attitude in pre-test and post-test when the video and educational competition model was used.

Brame et al has suggested three elements for video design, development and use of video as an effective educational tool which can help to implement instructor's maximize video's utility in biology classroom.[20] These three elements include cognitive load, student engagement and active learning.

CONCLUSION

Effectiveness of video making to enhance infection control skills was a very interesting activity which was conducted in the Department of Microbiology and its assessment was done by OSPE and a MCQ test. Infection control skills

greatly improved in second MBBS students following video making activity. There was a remarkable improvement in post test scores by 5.91 with a significant p value. The mean MCQ and OSPE scores were improved. Video making had helped in deeper learning and teaching the students. It also had several advantages of more flexible assessment and feedback practices. When students themselves perform a practical skill and receive feedback, the students have a feeling of engagement and belonging which increases their confidence and thus they can master the practical skill.

Recommendations

Not much existing literature is available in support for data security and practice and video ethics. Changing role of teacher as a coordinator of learning is a challenge for the teachers so as to change the way their students learn. Implementation of new assessment methods such as OPSE for demonstration of practical skills is a challenge as there is shortage in the number of faculties in the department and faculties are not sensitized and motivated. Limited number of studies are available, additional studies that evaluate the effectiveness of videos are suggested.

ACKNOWLEDGEMENTS

We are thankful to the Head of the Department, all the faculty members of the Department of Microbiology and undergraduate students of batch 2020-21. They are also thankful to the esteemed faculty members of the NMC Nodal centre for faculty development, PSMC Karamsad for their continuous guidance and support in shaping this project as a part of Advance Course in Medical Education (ACME). They also want to thank all the respected faculties of the NMC, Nodal centre P.S.M.C, Karamsad for guiding and motivating throughout this study and beyond

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

REFERENCES

1. Singhal T. A review of coronavirus disease-2019 (COVID-19). Indian J Pediatr. 2020;87:281-6.
2. Maina M, Tosas-Auguet O, English M, Schultsz C, McKnight J. COVID-19: an opportunity to improve infection prevention and control in LMICs. Lancet Glob Health. 2020;8:e1261.
3. 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.
4. Sinclair PM, Kable A, Levett-Jones T, Booth D. The effectiveness of internetbased e-learning on clinician behaviour and patient outcomes: a systematic review. Int J Nurs Stud. 2016;57:70-81.
5. Atack L, Luke R. Impact of an online course on infection control and prevention competencies. J Adv Nurs. 2008;63(2):175-80.
6. Bryce E, Yassi A, Maultsaid D, Gamage B, Landstrom M, LoChang J, et al. Elearning of infection control: it's contagious. Can J Infect Control. 2008;23(4):228.
7. Cardoso AF, Moreli L, Braga FTMM, Vasques CI, Santos CB, Carvalho EC. Effect of a video on developing skills in undergraduate nursing students for the management of totally implantable central venous access ports. Nurse Educ Today. 2012;32(6):709-13.
8. Krumm IR, Miles MC, Clay A, Carlos Ii WG, Adamson R. Making Effective Educational Videos for Clinical Teaching. Chest. 2022;161(3):764-72.
9. Jolley DF, Wilson SR, Kelso C, O'Brien G, Mason CE. Analytical thinking, analytical action: using prelab video demonstrations and e-quizzes to improve undergraduate preparedness for analytical chemistry practical classes. J Chem Educ. 2016;93(11):1855-62.
10. McMahon GT, Ingelfinger JR, Campion EW. Videos in clinical medicine — A new journal feature. NEJM. 2006;354(15):1635.
11. Hibbert EJ, Lambert T, Carter JN, Learoyd DL, Twigg S, Clarke S. A randomized controlled pilot trial comparing the impact of access to clinical endocrinology video demonstrations with access to usual revision resources on medical student performance of clinical endocrinology skills. BMC Med Educ. 2013;13:135.
12. Mayer RE. Applying the science of learning to medical education: applying the science of learning. Med Educ. 2010;44(6):543-9.
13. Mayer RE. Applying the science of learning: evidence based principles for the design of multimedia instruction. Am Psychol. 2008;63(8):760-9.
14. Mayer RE, Moreno R. Nine ways to reduce cognitive load in multimedia learning. Educ Psychol. 2003;38(1):43-52.
15. Schunk DH, Zimmerman BJ. Social origins of self-regulatory competence. Educational Psychologist. 1997;32:195-208.
16. Walker M, Peyton J. Teaching in theatre. In Peyton J, Editor. Teaching and learning in medical practice. Heronsgate Rickmansworth, Herts: Manticore Europe ltd. 1998;171-80.
17. McIntosh C, Patterson J, Miller S. First year midwifery students' experience with self-recorded and assessed video of selected midwifery practice skills at Otago Polytechnic in New Zealand. Nurse Educ Pract. 2018;28:54-9.
18. Epstein I, Baljko M, Thumlert K, Kelly E, Smith JA, Su Y, et al. A Video of Myself Helps Me Learn: A Scoping Review of the Evidence of Video-Making for Situated Learning. Int J Scholarship Teaching Learning. 2020;14(1):9.

19. Hidayati T, Suryanto. Primary School Student Online Video Competition Model to Improve Six Steps Handwashing Ability to Prevent Upper Tract Infection. Advances in Health Sciences Research. 2020;33:96-100.
20. Brame CJ. Effective Educational Videos: Principles and Guidelines for Maximizing Student Learning from Video Content. CBE Life Sci Educ. 2016;15:es6.

Cite this article as: Tripathi PC, Singh HR, Suryawanshi RK. Effectiveness of video making to enhance infection control skills by undergraduate MBBS students. Int J Clin Trials 2024;11(4):260-5.