The Effectiveness of Online Teaching Method Between Video Demonstration and Written Module Material to Enhance Clinical Skills of Refractive Error Management Among Medical Students

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ABSTRACT
INTRODUCTION: In this pandemic period, offline teaching methods had to be transformed into online teaching methods so medical students could acquire basic skills and competencies in ophthalmology. This study purposed to compare the effectiveness of the online learning method between video demonstration and written module material among medical students in refractive error management.
METHODS: This interventional study was placed in a teaching hospital and involved 46 medical students. The students were divided into two groups. Each group watched the clinical skill video or read a written module about refractive error management. The student's skills in refractive error management were assessed by an objective structured clinical examination (OSCE) test on the following day.
RESULTS: The mean score of the OSCE test between the video demonstration group and written module material was 84.38 $\pm$ 14.21 and 82.60 $\pm$ 17.97, respectively (p=0.710). In video group, students who are in initial clerkship rotation had higher score test (88.37 $\pm$ 10.96) than students in final rotation (76.91 $\pm$ 17.22, p=0.064). While in the module group, both initial and final clerkship students had similar score tests (82.40 $\pm$ 21.25 and 82.90 $\pm$ 12.43, respectively, p=0.951).
CONCLUSIONS: This study's results emphasized that both online teaching methods, video demonstration and written module material, are equally effective in improving medical students' basic ophthalmology skills, especially in refractive error management. Details procedures demonstration accompanied by a good explanation in the video and module content should be applied to ensure the students can understand and perform essential competencies in ophthalmology.
KEYWORDS: clinical clerkship, ophthalmology, online teaching method, online learning, refractive error.

1. INTRODUCTION

In this pandemic period, many universities worldwide had suspended their face-to-face academic learning, including clinical clerkships, to prevent COVID-19 transmission. This suspension will greatly impact medical education because the students can not achieve the essential clinical skills and knowledge as general practitioners. Lack of clinical exposure and practical management of ocular diseases will make the medical students graduate with insufficient competencies needed. This will contribute to a higher rate of

misdiagnosis and mismanagement in ophthalmology cases [1,2].

The online learning method is a good alternative for temporarily substituting conventional face-to-face learning. Although it cannot replace real encounters with the patients, it can help the medical students continue their academic learning process and pursue the skills and competencies they need in these pandemic times [3,4].

Many studies have investigated the effectiveness of online learning and medical students' perception of it. Many of these study results encourage the use of online learning in this pandemic period because of its flexibility of time and place and the ease of use. The majority of this study uses video and social media as the learning source and platform. However, only a few studies compare the effectiveness of video demonstration and other online learning resources [5,6]. Therefore, we conducted this study to evaluate the effectiveness of the online teaching method between video demonstration and written module material among medical students. This study will give an insight into the effectiveness of online learning in achieving clinical skills in refractive error management for medical students.

2. METHODS

This study design was an interventional study and took place at the outpatient clinic of the teaching hospital from June to October 2021. Forty-six medical students participated in this study during their clinical clerkship in ophthalmology rotation. All students included in this study were never undergone any online learning previously. Students who did not attend the OSCE test were excluded.

The students in the video group were instructed to watch the clinical skill video of refractive error management in the faculty online learning platform, while the module group, instructed to read the written module material about refractive error management in the online learning platform. The following day, all the students underwent the OSCE test in the outpatient clinic. The assessment was done by the author of this study using a standardized assessment form.

All data collected were analyzed using the *t*-test, which $p<0.05$ considered significant statistically. University Review Board waived the ethical clearance because this study purposed for academic quality improvement.

3. RESULTS

This study results show that the online teaching method can be effective and helpful in improving the clinical skill of medical students in refractive error management. The characteristics of the medical students involved in this study are shown in table 1. The majority of the students are female and entered the university in 2017. The students who entered the university in 2017 undergo the

first rotation of clinical clerkship in ophthalmology rotation.

Table 1. Medical students characteristics

Characteristics	
Age (Mean ± SD)	22.28 ± 1.148
Sex (n)	
Male	5 (10.9%)
Female	41 (89.1%)
Year of university entrance (n)	
2014	1 (2.2%)
2015	9 (19.6%)
2016	7 (15.2%)
2017	29 (63%)

Table 2 shows that the group with video intervention had a better OSCE score than the group with module intervention, although statistically not significant. This result suggests that the online teaching method in video demonstration is more effective than written module material to improve medical students' refractive error management skills.

Table 2. Comparison of mean OSCE score between video and module group

Group	Mean ± SD	p
Video	84.38 ± 14.21	0.710
Module	82.60 ± 17.97	

Table 3 shows that medical students who entered the clinical ophthalmology clerkship in the initial rotation had higher OSCE scores than students in the final rotation, although statistically not significant. Students who are in initial rotation commonly have a less stressful state than students in the final rotation, and they can receive and understand new information better, as shown in this result.

Table 3. Comparison of mean OSCE score between medical students in initial and final ophthalmology clerkship rotation.

Clerkship Rotation	Mean ± SD	p
Initial	85.49 ± 16.70	0.275
Final	80.08 ± 14.71	

In the video group, medical students in the initial rotation had higher OSCE scores than students in the final rotation, although statistically insignificant, as shown in table 4. While in the module group, both medical students in the initial and final rotation had similar OSCE scores. This result suggests that the online teaching method in video demonstration had a better result than written module material to improve refractive error management skills in medical students, especially students who are still in initial clerkship rotation.

Table 4. Comparison of mean OSCE score between medical students in initial and final ophthalmology clerkship rotation, in each group

Group		Mean ± SD	p
Video	Initial Clerkship Rotation	88.37 ± 10.96	0.064
	Final Clerkship Rotation	76.91 ± 17.22	
Module	Initial Clerkship Rotation	82.40 ± 21.25	0.951
	Final Clerkship Rotation	82.90 ± 12.43	

These results show that video demonstration delivery is an effective strategy of online teaching method to improve the understanding and clinical skills of medical students, especially in the topic of refractive error management. Written module material delivery had also shown satisfactory results, although slightly inferior to the video demonstration.

4. DISCUSSION

The COVID-19 pandemic had led to a deterioration of the education level of medical students, including in ophthalmology. Because of the lockdown and physical distancing rules, the academic processes in universities worldwide were suspended, and medical students could not attend in-person clinical clerkship in the teaching hospital. This will cause the students to have the lower achievement of basic skills and knowledge in ophthalmology regarding ocular disease diagnosis and management. Modifying and transforming conventional teaching methods must be done promptly, so medical students will have opportunities to achieve essential competencies in ophthalmology, which had been targeted, during these challenging times. This action will allow the students to continue their educational processes without losing precious time [7–9].

In normal times, the students will undergo four weeks rotation in the ophthalmology clerkship. The learning activities include bedside teaching and clinical examination of patients in the ophthalmology clinic and ward. The learning activities were shifted into half online case presentations and half in-person clinical clerkship in teaching hospital during this pandemic period, so the student's number in the hospital was reduced, and there was still space for physical distancing.

This study shows promising results about implementing the online teaching method in ophthalmology clinical clerkship rotation. Overall, both medical students in video and module groups showed an excellent mean score of the OSCE test in refractive error management.

Refractive error examination was one of the complicated basic ophthalmology skills for medical students to achieve. Nonetheless, it is one of the mandatory competencies in ophthalmology according to the National Standard of Indonesian Medical Doctor Competencies [10]. The students in the video group

yielded higher test scores than in the module group, although not significant statistically. The video shows the condition resembles actual examination with the patients and can be understood within a short amount of time. The video can also be watched repetitively until the students master the competencies. Written module materials also yield good results on understanding refractive error management, but the medical students will need much time to understand. This can be quite difficult as in this study, the students only have one day to apprehend the material before they are assessed on the following day, and the results show higher test scores in the video group than in the module group [8,11,12].

One of the strategies to effectively and significantly improve medical students' skills and knowledge is to prepare them with a list of textbooks and audiovisual resources prior to entering the clinical clerkship. Provision of selected materials by the academic staff will help the students selectively concentrate on certain topics required for them as general practitioners [12]. The application of online learning using virtual patients will also increase their clinical skills before they practice on real patients. This is suggested for a complicated clinical skill such as refractive error examination. This procedure needs patience and accurate analysis and measurement so the students will have high self-esteem and confidence when encountering real patients for the first time [13].

A combination of online and offline learning, which is called blended learning, will provide the students with various opportunities to enhance their competencies and clinical skills because certain cases need an encounter with real patients to practice their skills and knowledge [1,14].

This study shows that students who were still in the initial rotation had better OSCE scores than students in the final rotation, especially in the video group. It can be due to higher stress levels in final year rotation students because they must face the national competencies board examination soon. The responsibilities to master the various clinical skill in medicine besides ophthalmology possibly made them have difficulty apprehending the educational material in a short period [15]. Higher academic workloads, bad study habits, and poor time-management skills contribute to higher stress levels, leading to poor academic performance. In clinical settings, the students' poor team dynamic and the experienced of many complex clinical events were found to be more stressful. This is possibly due to the higher stress of being evaluated periodically, subordinate role in the hierarchy of the medical education system, and vulnerable position as a medical student [16,17].

Transformation to online learning in these pandemic times is not without shortcomings. Despite its ease of use, the flexibility of time and place, and repeatability of learning resources based on students' own pace, online learning cannot permanently replace offline clinical clerkship. Non-cognitive domains such as interprofessional teamwork, communication skills, professionalism, and leadership must be observed and obtained in the real-life situation by the medical students in the hospital [2,11,18–20].

To determine the effectiveness of online learning in clinical ophthalmology clerkship, we assess two different strategies of online teaching methods, video demonstration and written module material given to medical students on the first day of their rotation. The results were encouraging that all students, whether given video demonstration or written module material, had good comprehension about refractive error management and could practice it well in front of the simulated patient. Providing them with the material before they entered the clinical clerkship rotation could yield a better understanding of clinical skills due to a lower level of stress. As a supportive method to traditional face-to-face learning, online learning had many benefits and could offer various ways to improve clinical skills for medical students in the future [1,21–24].

Limitations of this study include the relatively small sample size and no control group that did not give intervention. So, the magnitude of skill improvement can not be measured precisely. Future studies with larger sample sizes, comparison with a control group, and more diverse intervention methods and assessment could give us insight and encouragement to transform to the online learning method.

5. CONCLUSION

This study results support that delivery of video demonstration before the medical students enter their clinical ophthalmology clerkship can help acquire clinical skills. Online learning resources with video demonstration and written module material are equally effective for medical students to understand how to perform refractive error examinations. Details procedures demonstration accompanied by a good explanation in the video and module content should be applied to ensure the students can understand and perform essential competencies in ophthalmology.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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