Impact of virtual education on urology education during the COVID-19 pandemic

Jesse T.R. Spooner, Wyatt MacNevin, John Grantmyre
Department of Urology, Dalhousie University, Halifax, NS, Canada

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Corresponding author: Dr. Jesse T.R. Spooner, Department of Urology, Dalhousie University, Halifax, NS, Canada; jesse.spooner@dal.ca

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ABSTRACT

Introduction: The coronavirus pandemic changed the way urology education was delivered. At Dalhousie University, third-year medical students (clinical clerks) undergoing a two-week urology elective had the historic in-person seminars changed to virtual seminars with pre-recorded lectures by staff. The academic abilities of the clerks were measured via a standardized written exam and clinical score assigned by a staff preceptor. This study aimed to measure the impact of virtual education on student performance.
Methods: Clerk clinical and exam scores have been recorded since 2014. The in-person seminar (pre-COVID) cohort included students from January 2014 to March 2020 (n=109), while the virtual seminar (post-COVID) cohort was recorded from April 2020 to August 2022 (n=60). Independent T-test was used to compare clinical, exam, and total scores between the pre-COVID student groups after ensuring normality.
Results: Students in the virtual seminar group (mean ± standard deviation 88.69±6.50%) performed better than the in-person seminar student groups (86.32±6.33%) in terms of clinical performance gradings (p=0.02). There was no statistically significant difference in written exam scores between the in-person seminar and virtual seminar cohorts (77.34±10.94% vs.

KEY MESSAGES

- COVID-19 pandemic resulted in the change of education format from in-person to virtual education for third-year medical students (clerks) undergoing their two-week urology elective at Dalhousie University.
- The lack of in-person didactic teaching did not negatively impact Dalhousie clinical clerk urology education.
- Through implementing virtual education sessions for clinical clerks, students can engage in more in-person clinical activities without educational detriments.

78.75±11.37%, p=0.43). Cumulative scores were higher for virtual seminar student groups vs. in-person seminar cohort (86.70±5.40% vs. 84.52±5.44%, p=0.01).
Conclusions: Clinical clerks undergoing virtual education during a two-week urology elective had improved clinical and cumulative score performances when compared to the in-personal seminar cohort; virtual seminars did not statistically negatively impact exam scores.

INTRODUCTION

The emergence of the coronavirus (COVID-19) pandemic in 2020 impacted all aspects of life. Strict implementation of social distancing had limited the ability to give in-person lectures and seminars which has long been a key part of post-graduate teaching.[1-3] Many medical schools had reduced clinical placements due to fear of contracting COVID-19 with unknown effects on students' exam performances and clinical acumen.[4] To overcome this obstacle, some programs have used virtual clerkship, showing promising results on engagement and learning from real life patients, with limited risk of contracting COVID-19.[5] Advantages have been reported of virtual medical education which include accessibility and lability of resources.[6-12] A meta-analysis analyzing the effectiveness of virtual medical education during COVID-19 found some potential disadvantages including difficulties in teaching technical abilities, confidentiality issues, decreased in-person teaching with subsequent loss of clinical attachments, and a potential lack of professional/clinical growth with limited accesibility to role models.[13]

At Dalhousie University, Nova Scotia, Canada, clinical clerks in their third year of medical training have the option of going through a two-week clinical urology rotation. Prior to the pandemic, staff urologists provided thirteen, one hour in-person seminars to educate the clinical clerks. With social distancing implementation, this was replaced by pre-recorded urology lectures covering the same topics, with students able to email presenters with questions if needed. There were no changes with the structure of the optional urology rotation aside from education delivery. With the change in delivery in didactic teaching associated with limitations imposed by the COVID-19 pandemic, it is crucial to evaluate the impact of virtual education on medical student learning. The primary objective of this study is to assess the change in medical student clinical performance and exam scores through implementation of a virtual education model during a urology clerkship rotation.

METHODS

Study design

During the clinical clerk rotation, clerks are assigned to a staff urologist who assigns them a clinical score at the end of their rotation based on clinical knowledge and performance. Furthermore, clinical clerks write a urology-based written exam based on the seminars provided. After obtaining institutional research ethics board approval, written and clinical scores from clinical clerks who completed urology rotations from 2016-2022 were retrospectively reviewed. No demographic data pertaining to the participants were recorded. Due to the retrospective nature of this study, preceptors in the pre-COVID and post-COVID groups were unaware of this study during student evaluation.

Data collection

Students were assessed through a subjective clinical assessment provided by their preceptor, as well as through a standardized written urology-based exam. The clinical score was given to each student based on their clinical acumen shown throughout the two-week elective by their respective preceptor. The evaluating preceptors were the same for both the pre-COVID and post-COVID groups. The written exam was completed at the end of the clinical clerk's two-week rotation and covered introductory urology content including: general urology, stone disease, obstructive uropathy, and kidney transplantation (Table 1). The introductory content presented was the same for both groups. Exam scores were scored out of a potential 20 marks and were combined with a clinical score out of 80 marks to form a composite score evaluated out of 100.

Statistical analysis

Utilizing IBM® SPSS® Statistics Version 27, the clinical, exam, and total scores of clinical clerks were collected and analyzed. Descriptive statistics were performed to identify mean scores within groups. Independent T-Test was used to compare clinical, exam, and total scores between the pre-COVID and post-COVID students' groups after ensuring normality. A 95% significance level ($p < 0.05$) was used in this study.

RESULTS

One hundred and nineteen participants were included in the study, with 59 participants in the pre-COVID group who received in-person didactic lectures, and 60 participants (post-COVID) included who received virtual seminar-based teaching. No demographic data was collected.

Students in the post-COVID group (Mean ± Standard Deviation (STD): 88.69 ± 6.50%) did not perform better than the pre-COVID student groups (88.16 ± 5.63%) in terms of clinical performance gradings ($p = 0.64$) (Table 2; Fig 1). There were no statistically significant differences in standardized exam scores between the pre-COVID and post-COVID student groups (74.92 ± 12.68% vs 78.75 ± 11.37%, $p = 0.09$) (Table 1; Fig 1). Total rotation scores

were higher for post-COVID student groups when compared to student groups prior to COVID but was not statistically significant: 86.70 ± 5.40% vs 85.51 ± 5.12%, p = 0.22) (Table 2; Fig 1).

DISCUSSION

In this study, we assessed the impact of the implementation of a virtual seminar-based approach to providing urology education to medical students in the context of the COVID-19 pandemic. We were able to show that the transition to virtual based learning showed no reductions in written-based urology exam scores and clinical performance by medical students. With these results, the implementation of virtual learning for medical students rotating through urology clerkship may prove to be beneficial for knowledge translation compared to in-person didactic teaching as students receive more in-person clinical exposure.

The COVID-19 pandemic has drastically altered medical education globally and has resulted in a shift for most medical education institutions to online media. Urology education during the pandemic has seen a rise in massive open online courses (MOOCs), which are easily accessible online courses.[3,14-15] The Karolinksa Institute, utilizing EdX, and Johns Hopkins University via Coursera have been ahead of the curve in providing introductory urology education.[3,16-17] The presence of widely available MOOCs provides further educational material for clinical clerks to utilize in addition to the pre-recorded seminars at Dalhousie University, and may increase clinical clerks learning and retention despite the lack of in-person seminars.

A recent meta-analysis suggested that virtual education for medical students can be effective and can foster independence, we have seemingly demonstrated, albeit with a small sample size, that clinical ability and knowledge retention have not had a drastic impact with the implementation of virtual seminars.[13] In fact, in this study, our results suggest that there was no ~~a~~ statistically significant changes in clinical or assessed performance in those students who underwent virtual seminars when compared to in-person seminars while the exam grades were not significantly different between the two groups (Table 2; Fig 1). With a recent study demonstrating the importance of third year medical student clerkship grades and their respective residency match, the results of this study are promising that the impact of COVID-19 on urology education was not deleterious to third year clinical clerks.[18]

The Dalhousie Urology program has been known for excellent teaching and it has been a vital tool in attracting prospective residents to the program. Prior to the pandemic, staff urologists dedicated 13, one-hour seminars every three weeks which meant taking time away from clinical and surgical duties. The original thought was the loss of in-person seminars would negatively impact the scores of third year medical students at Dalhousie University. It is likely that through implementing virtual teaching sessions, medical students were able to remain involved in clinical duties and gain greater exposure to urology throughout their rotation, which may improve clinical skills and aid in career planning. With the information that the clinical clerks performed as well on exam scores, the shift towards virtual education will be heavily considered upon the lifting of COVID-19 restrictions.

This study is not without its limitations which include a small sample size (N = 60 post-COVID students; N = 59 pre-COVID students), and the involvement of a single institution. Furthermore, demographic data was not collected which limits the ability to generalize the results of our study to different institutions. There may also be variations in clinical and exam-based performance of clinical clerks based on the timing of their urology rotation in the year. This timing was not assessed although we propose that due to our ongoing assessment of clinical clerks, there will not be significant differences in scores when comparing at the aggregate level.

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FIGURES AND TABLES

Figure 1. Graphical representation of the mean clinical performance, exam scores, and cumulative grade at the end of two-week urology elective at Dalhousie Medical School, Nova Scotia, Canada between the in-person seminar (pre-COVID) and virtual (post-COVID) cohort.

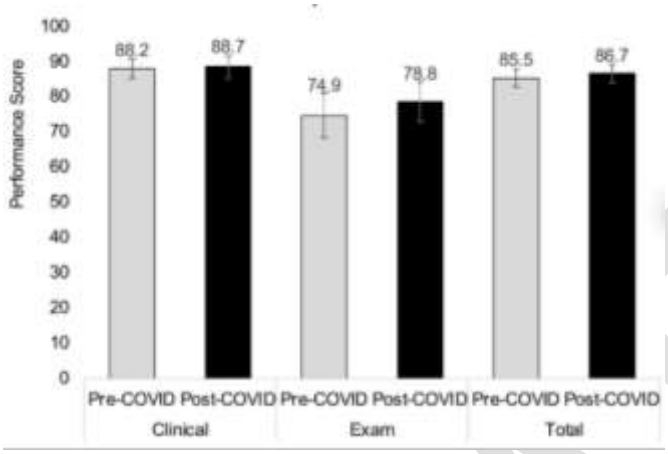

Table 1. Overview of urology seminar topics covered for third-year medical students undergoing their two-week urology elective

Lesson number	Topic
1	Overactive bladder and urinary incontinence
2	Approach to the difficult urethral catheterization
3	Hematuria
4	Scrotal disorders
5	Erectile dysfunction and testosterone therapy
6	Pediatric urinary tract infections and bowel and bladder dysfunction
7	Genitourinary trauma
8	Urolithiasis
9	Essential pediatric urology
10	Kidney transplantation
11	Acute kidney injury and obstructive uropathy
12	Appropriate treatment of urinary tract infections

Table 2. Mean clinical performance, exam scores, and cumulative grade at the end of two-week urology elective at Dalhousie Medical School between the in-person seminar (pre-COVID) and virtual seminar (post-COVID) cohort

		n	Mean score	Std. deviation	p
Clinical score	Pre-COVID	59	88.2	5.6	0.64
	Post-COVID	60	88.6	6.5	
Exam score	Pre-COVID	59	74.9	12.7	0.09
	Post-COVID	60	78.8	11.4	
Total score	Pre-COVID	59	85.5	5.1	0.22
	Post-COVID	60	86.7	5.4	