

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

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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 \pm standard deviation 88.69 \pm 6.50%) performed better than the in-person seminar student groups (86.32 \pm 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 \pm 10.94% vs. 78.75 \pm 11.37%, p=0.43). Cumulative scores were higher for virtual seminar student groups vs. in-person seminar cohort (86.70 \pm 5.40% vs. 84.52 \pm 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-person 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 limited the ability to give in-person lectures and seminars, which has long been a key part of postgraduate 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 used virtual clerkship, showing promising results on engagement and learning from real-life patients, with limited risk of contracting COVID-19.⁵ Advantages of virtual medical education, which include accessibility and lability of resources, have been reported.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 access to role models.¹³

At Dalhousie University in 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 13 one-hour, in-person seminars to educate the clinical clerks. Because of social distancing policies, this was replaced by prerecorded urology lectures covering the same topics,

KEY MESSAGES

- The 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.

with students able to email presenters with questions as needed. There were no changes with the structure of the optional urology rotation aside from education delivery. The primary objective of this study was 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 ascribes them a clinical score at the end of their rotation based on clinical knowledge and performance. Furthermore, clinical clerks complete a written exam based on the urology 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 by their respective preceptor based on the clinical acumen they showed throughout the two-week elective. The evaluat-

ing 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 out of 100.

Statistical analysis

Using 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 student groups after ensuring normality. A 95% significance level ($p < 0.05$) was used.

RESULTS

A total of 119 participants were included in the study, with 59 in the pre-COVID group who received in-person didactic lectures, and 60 (post-COVID) who received virtual seminar-based teaching. No demographic data was collected.

Students in the post-COVID group (mean \pm standard deviation 88.69 \pm 6.50%) did not perform better

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

than the pre-COVID student groups ($88.16 \pm 5.63\%$) in terms of clinical performance gradings ($p=0.64$) (Figure 1, Table 2). There were no statistically significant differences in standardized exam scores between the pre-COVID and post-COVID student groups ($74.92 \pm 12.68\%$ vs. $78.75 \pm 11.37\%$, respectively, $p=0.09$) (Figure 1, Table 1). Total rotation scores were higher for post-COVID student groups when compared to student groups prior to COVID ($86.70 \pm 5.40\%$ vs. $85.51 \pm 5.12\%$, respectively, $p=0.22$) but this was not statistically significant (Figure 1, Table 2).

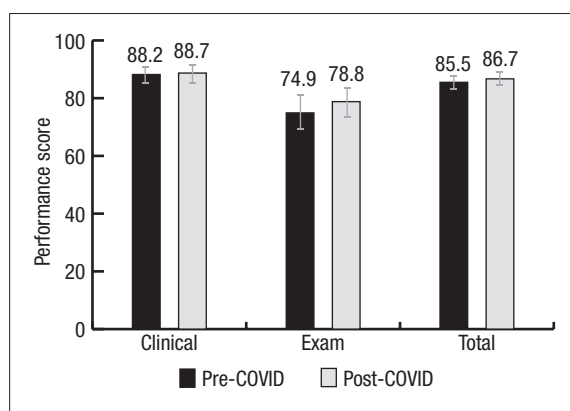


Figure 1. Graphical representation of the mean clinical performance, exam scores, and cumulative grade at the end of two-week urology elective at Dalhousie Medical School, Nova Scotia, Canada, between the in-person seminar (pre-COVID) and virtual (post-COVID) cohort.

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

SD: standard deviation.

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 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 drastically altered medical education globally and resulted in a shift to online channels for most medical education institutions. Urology education during the pandemic saw a rise in massive open online courses (MOOCs), which are easily accessible.^{3,14,15} The Karolinska Institute, using EdX, and Johns Hopkins University via Coursera have been ahead of the curve in providing introductory online urology education.^{3,16,17} The presence of widely available MOOCs provided further educational material for clinical clerks in addition to the prerecorded seminars at Dalhousie University, and may have increased their 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 been drastically impacted by the implementation of virtual seminars.¹³ In fact, in this study, our results suggest there were no statistically significant changes in clinical or assessed performance in those students who undertook virtual compared to in-person seminars. 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 in that the impact of COVID-19 on urology education was not deleterious to third-year clinical clerks.¹⁸ It is likely that through virtual teaching, medical students were able to remain involved in clinical duties and gain greater exposure to urology throughout their rotation, which could improve clinical skills and aid in future career planning.

Limitations

This study is not without its limitations, which include a small sample size 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 evaluation of clinical clerks, there will not be significant differences in scores when comparing at the aggregate level.

CONCLUSIONS

Our study shows that clinical clerks undergoing virtual education during a two-week urology elective had improved clinical and cumulative score performances when compared to the in-person seminar cohort; virtual seminars did not statistically negatively impact exam scores. Based on these results, it is likely that virtual components will likely continue to have a role in medical education despite the lifting of COVID-19 restrictions.

COMPETING INTERESTS: The authors do not report any competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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