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Research Article

Teaching Undergraduate Otolaryngology During the COVID-19 Pandemic: A Cross-Sectional Questionnaire Study

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ABSTRACT

Introduction: Live teaching via online platforms during the COVID-19 pandemic has proved to be an innovative solution during the crisis, yet limitations were still observed. Teaching challenges during the pandemic must be accurately studied to come up with evidence-based solutions. We aimed to assess the effectiveness of virtual or online teaching in delivering educational objectives to otorhinolaryngology, head and neck surgery (ORL-HNS) clerkship students (undergraduate medical students) during the COVID-19 pandemic. **Methods:** This was a cross-sectional questionnaire study with a survey designed to evaluate undergraduate medical students' responses toward online ORL-HNS classes. The same set of questions was sent to two different groups who were in ORL-HNS clerkship rotation under different quarantine restrictions levels during the pandemic. **Results:** In total, 95 responses were analyzed; 32 responses were collected from the first group of students who were in the clinical rotation exclusively through online means under strict lockdown measurements. The remaining 63 responses were from the second group of students who were in the rotation after modifications to the COVID-19 lockdown protocols; the modifications allowed more in-person meetings under social distancing measures. The overall feedback about the scientific benefit of the ORL-HNS clerkship course was positive, with the majority of students agreeing that they felt prepared for future examinations, but not as much for clinical practice. In addition, students reported that lab skills sessions held after quarantine protocol modifications helped enhance their knowledge and better prepare them for future clinical practice and exams. **Conclusion:** Online teaching technologies might be able to compete with conventional teaching methods, but further improvements must take place to close the gaps between traditional and online classrooms. We believe advanced methods and simulation techniques can be implemented to aid in teaching complex topics in medicine, especially in otorhinolaryngology.

Keywords: COVID-19, medical education, otorhinolaryngology, online teaching

INTRODUCTION

In December 2019, a novel infectious disease from the coronavirus family, COVID-19, was first identified in Wuhan, China.[1] The number of deaths associated with COVID-19 goes beyond the other two coronaviruses (severe acute respiratory syndrome coronavirus, SARS-CoV, and Middle East respiratory syndrome coronavirus, MERS-CoV), which created a massive burden for the global public health and economics sectors.[2] On March 11th, 2020, COVID-19 was declared a pandemic by the World Health Organization.[1]

In efforts to reduce the virus transmission in Saudi Arabia, the Ministry of Education declared suspension of education in all public and private schools, universities, and institutions starting from March 9th, 2020, until

further notice. Thus, online classrooms and distance education had to be implemented by institutions to close educational gaps.[3] Worldwide, immediate actions were taken to introduce new teaching strategies while trying to maintain high-quality material delivery to students and prioritize the safety and well-being of students, their educators, and involved staff.[4] This situation evolved rapidly and unexpectedly; thus, flexibility was required from both learners and educators.[4] However, students faced a dramatic drop in their in-person communication, which created a challenge for them and their educators.[4]

Otorhinolaryngology, head and neck surgery (ORL-HNS) is considered one of the main components of primary healthcare.[5] We believe it is a complex domain that requires variable methods of teaching and training to transfer knowledge on both diagnostic and therapeutic skills. Although live teaching via online platforms has proved to be an innovative solution, limitations were still observed.[5] The teaching challenges during the COVID-19 pandemic must be accurately identified and studied to reach better solutions.

Our objective was to assess the effectiveness of virtual or online teaching in delivering education objectives to ORL-HNS clerkship students (undergraduate medical students) during the COVID-19 pandemic. In addition, we aimed to report the feedback from students who had to undergo such an educational experience at the time of a pandemic. This study focused on providing a beneficial contribution to the literature of medical education in a much-needed area of study.

METHODS

This study was approved by the Ethics Committee at the College of Medicine in Alfaisal University, Riyadh, Saudi Arabia (institutional review board no. 20050). Participation in the study was completely voluntary, names were not registered to ensure anonymity and confidentiality, and the survey was conducted in the English language.

A cross-sectional questionnaire was designed to evaluate Alfaisal University's clerkship students' responses toward online ORL-HNS rotation. A 5- or 7-point Likert response scale was used for scoring purposes because it is one of the most important and frequently used tools in research methodologies.[6] The questionnaire was created via SurveyMonkey Inc. (Palo Alto, CA, USA), data were then extracted from the surveys and analyzed using the SPSS Statistics 21 data analysis package version 25.

The questionnaire was sent separately to two student groups. Group A included the students who attended the ORL-HNS clerkship rotation exclusively through online methods during the strict COVID-19 pandemic lockdown. Group B included the students who attended the clerkship rotation after modifications to the COVID-19 lockdown protocols; the modifications allowed for more in-person activities to take place yet maintained social distancing measures (only the theoretical lectures were conducted online).

Table 1. Demographics for students in groups A and B

	Group A, *n* (%)	Group B, *n* (%)
Sex		
Male	14 (43.75)	21 (33.33)
Female	18 (56.25)	42 (66.67)
Skipped	0 (0)	0 (0)
Age group, y		
18–24	28 (87.50)	59 (93.65)
25–35	3 (9.38)	4 (6.35)
Skipped	1 (3.12)	0 (0)

Note - Group A included students who attended the clerkship rotation exclusively through online methods during strict lockdown. Group B included students who attended the clerkship rotation after modifications to lockdown protocols.

RESULTS

In total, 95 responses were analyzed including 32 (33.6%) from group A and 63 (66.3%) from group B. For group A, 32 out of 48 (66.7%) students started the survey, and 30 students completed it (62.5% completion rate). For group B, 63 out of 126 (50.0%) students started the survey, and 55 completed it (43.6% completion rate).

Demographics

Table 1 shows the demographics for group A and group B. There was no pattern of differences noted between sexes or ages in either group.

Feedback Regarding Course

The overall feedback regarding the ORL-HNS clerkship course in both groups was positive, as shown in Figures 1 and 2. This segment included four questions, in which a 5-point Likert scale was used with the following components: *strongly disagree*, *disagree*, *neither agree nor disagree/neutral*, *agree*, and *strongly agree*.

The first question aimed to assess the benefit of the scientific value. In group A, 63.3% had *agree* responses and 23.3% *strongly agree*; constituting 86.7% combined. Only 13.3% had *neither agree nor disagree*, and there were no *disagree* or *strongly disagree* responses.

Similarly, in group B, 49.1% had *agree* responses and 40.0% *strongly agree*; constituting 89.1% combined. Only 10.9% had *neither agree nor disagree* responses, and there were no *strongly disagree* or *disagree* responses.

The second question aimed to assess feedback regarding the students' preparedness for future practice and examinations after the ORL-HNS clerkship course. In group A, 43.3% had *agree* responses, 10.0% *strongly agree*, and 33.3% *neither agree nor disagree*. There were 10.0% with *disagree* responses and 3.3% with *strongly disagree*.

In group B, 41.8% had *agree* responses, 29.1% *strongly agree*, 21.8% *neither agree nor disagree*, 3.6% *disagree*, and 3.6% *strongly disagree*.

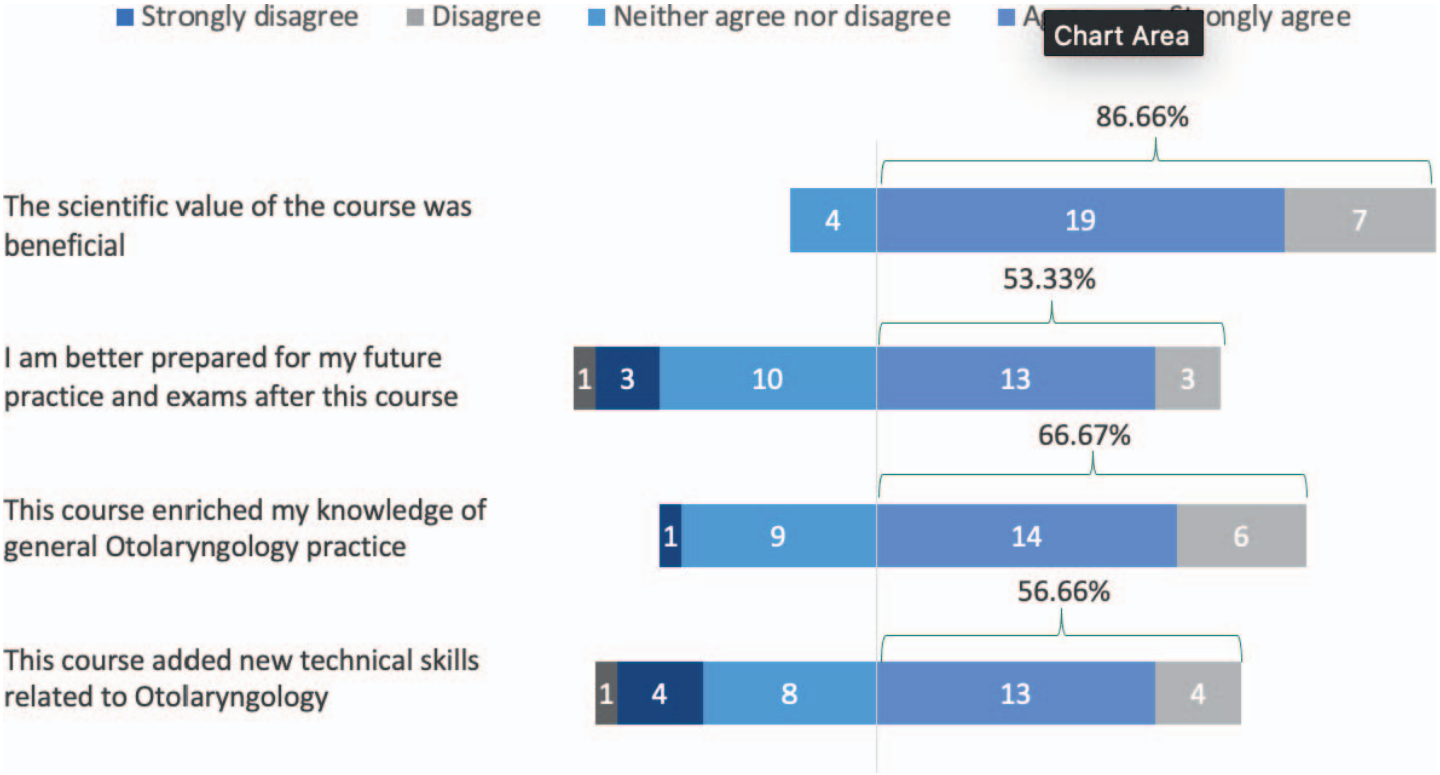

Figure 1. Number of responses from group A regarding their perceptions on the different benefits of the course.

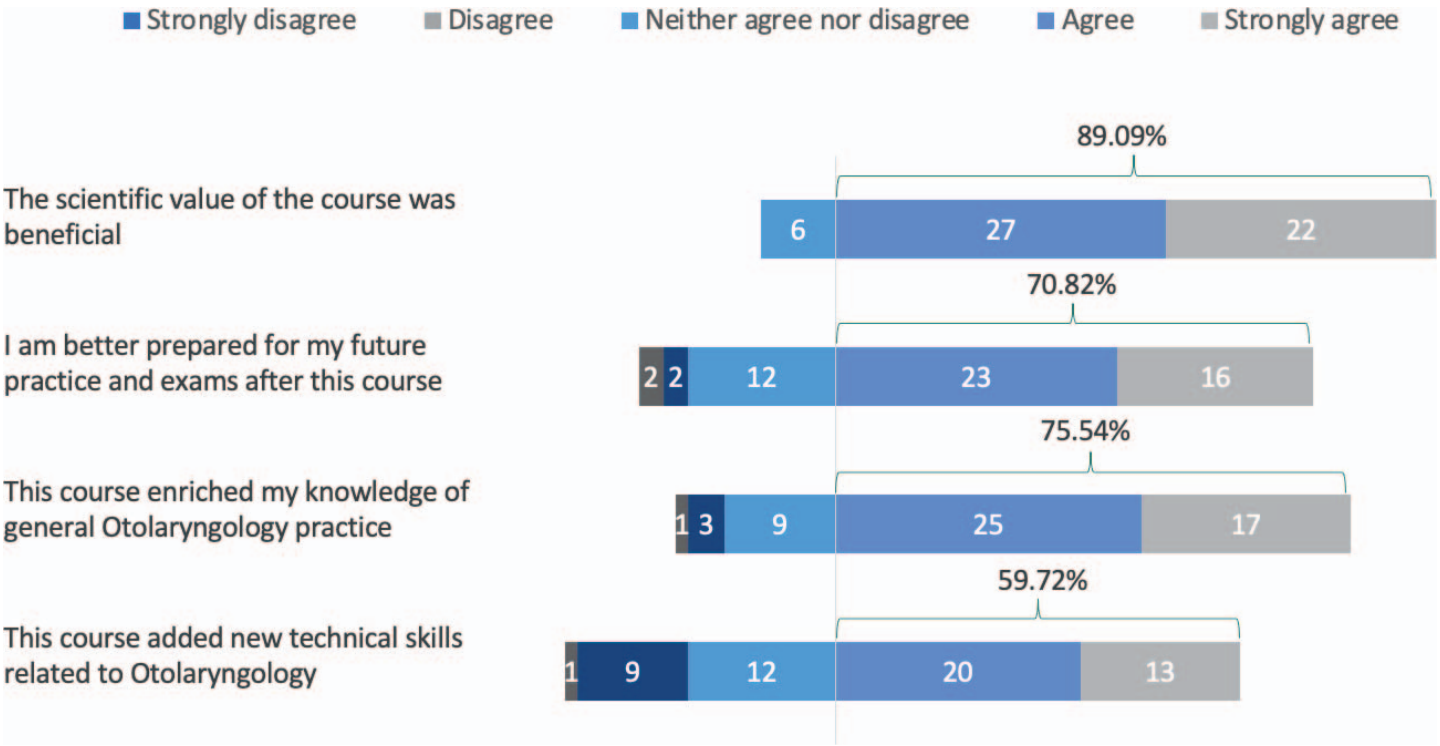

Figure 2. Number of responses from group B regarding their perceptions on the different benefits of the course.

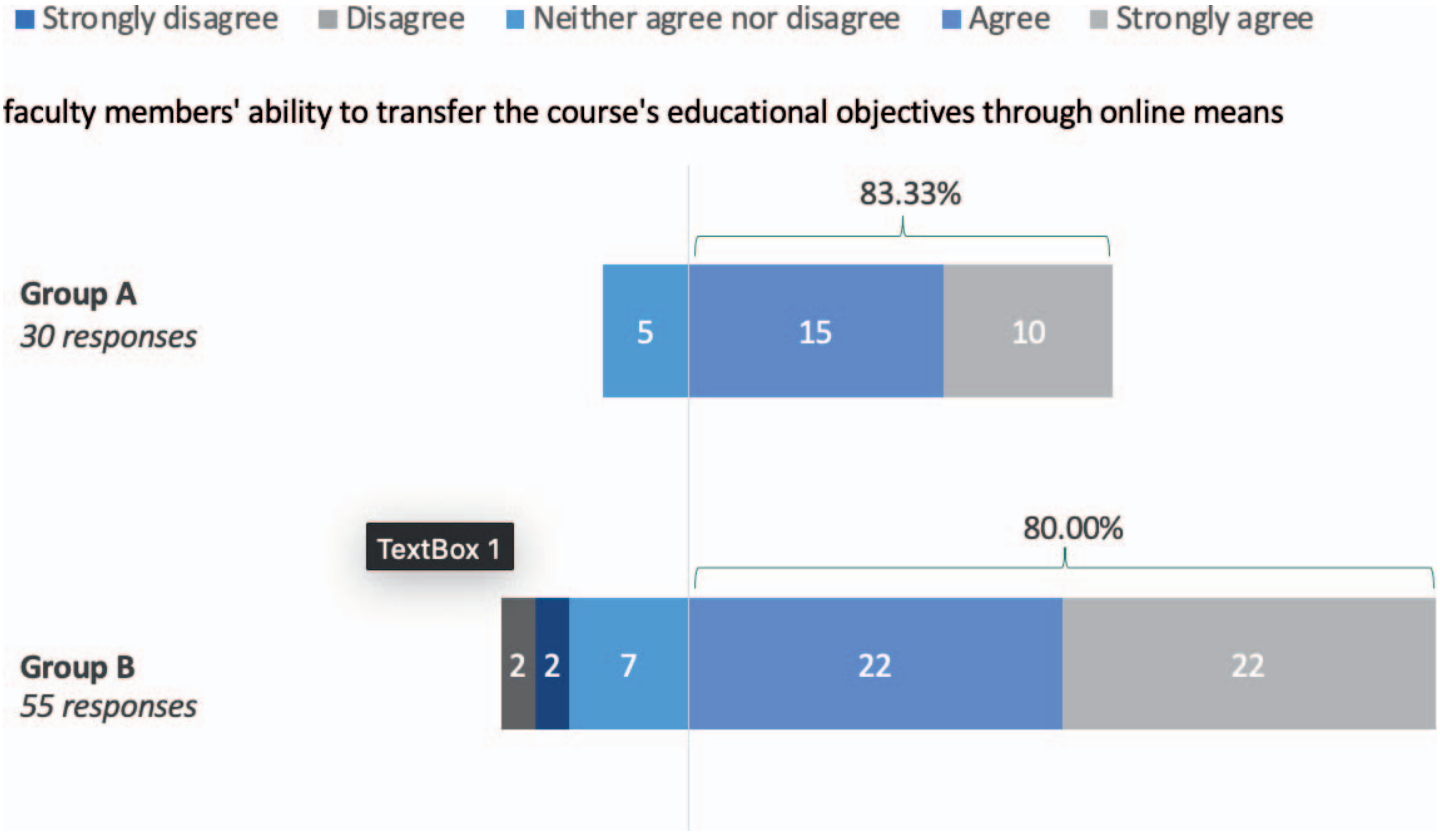

Figure 3. Number and percentage of responses from each group when asked if faculty members were able to transfer the educational objectives of the course.

The next question targeted the knowledge of general ORL-HNS practice after the course. In group A, 46.7% had *agree* responses and 20.0% *strongly agree*, constituting 66.7% combined. However, 30.0% had *neither agree nor disagree* responses and 3.3% *disagree*, but no *strongly disagree*.

In group B, 45.5% had *agree* responses, 30.9% *strongly agree*, 16.7% *neither agree nor disagree*, 5.5% *disagree*, and 1.8% *strongly disagree*.

The final questions in this segment assessed whether the course added new technical skills related to ORL-HNS. In group A, 43.3% had *agree* responses, 13.3% *strongly agree*, 26.7% *neither agree nor disagree*, 13.3% *disagree*, and 3.3% *strongly disagree*.

In group B, 36.7% had *agree* responses, 23.6% *strongly agree*, 21.8% *neither agree nor disagree*, 16.7% *disagree*, and finally 1.8% *strongly disagree*.

Feedback Regarding Ease of Information Transfer

This question aimed to evaluate faculty members' ability to transfer the course's educational objectives through online means as shown in Figure 3. A 5-point Likert scale was also used in this question, which included the following components: *strongly disagree*, disagree, *neither agree nor disagree/neutral*, *agree*, and *strongly agree*.

In group A, 50.0% had *agree* responses and 33.3% *strongly agree*, constituting 83.3% combined. Only 16.7% had *neither agree nor disagree*, and there were no *disagree* or *strongly disagree* responses.

In group B, 40.0% had *agree* responses and 40.0% *strongly agree*, constituting 80.0% combined. Only 12.7% had *neither agree nor disagree* responses, 3.6% *disagree*, and 3.6% *strongly disagree*.

Feedback Regarding Teaching Methods Preference

This segment included two questions and was meant to assess the preference of conventional teaching versus online learning as shown in Figures 4 and 5. A 7-point Likert scale was used in this segment, it included the following components: *strongly disagree*, disagree, *somewhat disagree*, *neither agree nor disagree/neutral*, *somewhat agree*, *agree*, and *strongly agree*.

The first question in this component assessed whether the scientific interaction with the instructor and colleagues is better through online means than in conventional classrooms. In group A, 16.7% had *agree* responses, 10.0% *strongly agree*, and 10.0% *somewhat agree*. However, 10.0% had *neither agree nor disagree* responses, 20.0% *disagree*, 20.0% *strongly disagree*, and 13.3% *somewhat disagree*.

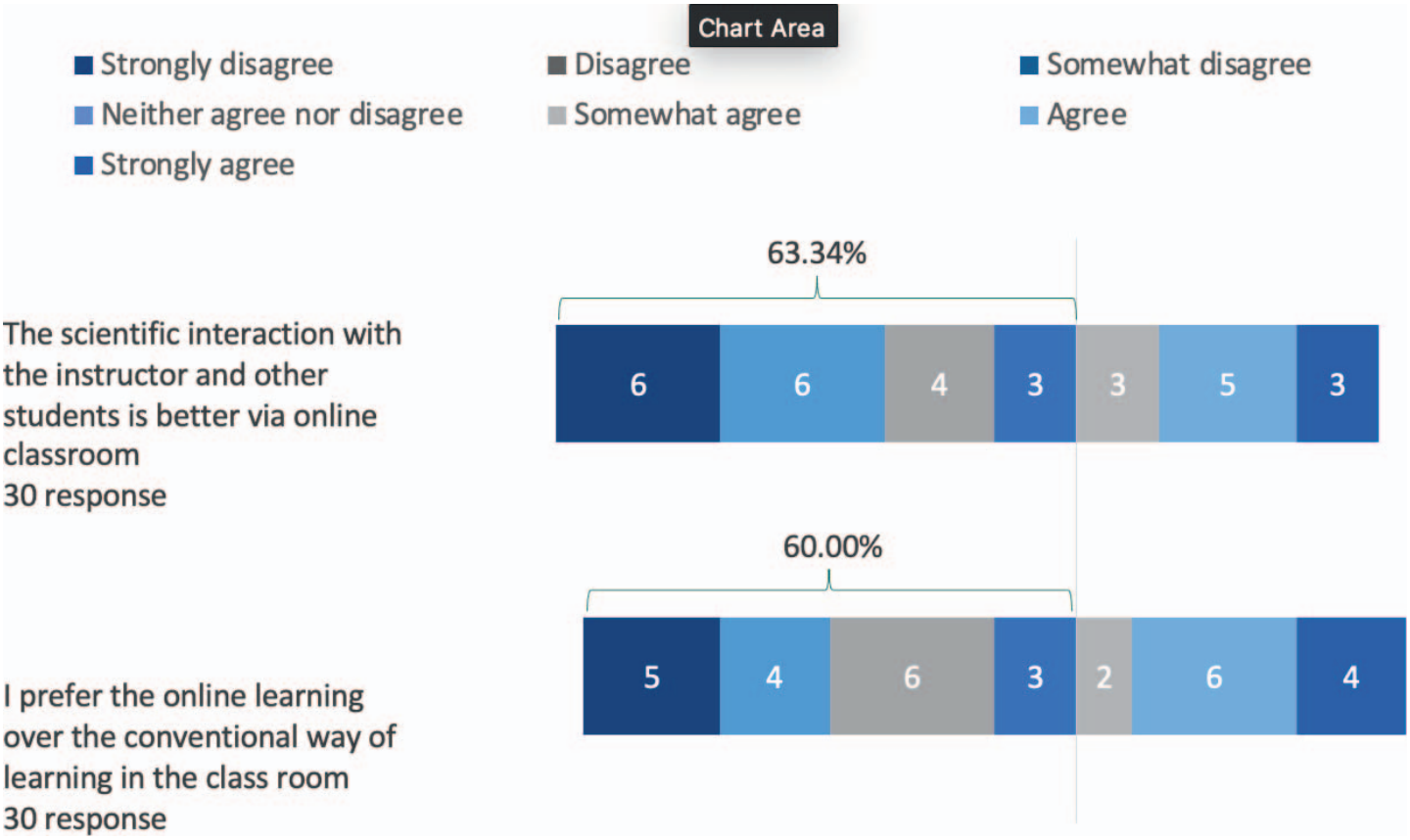

Figure 4. Number of responses from group A regarding their teaching method preferences.

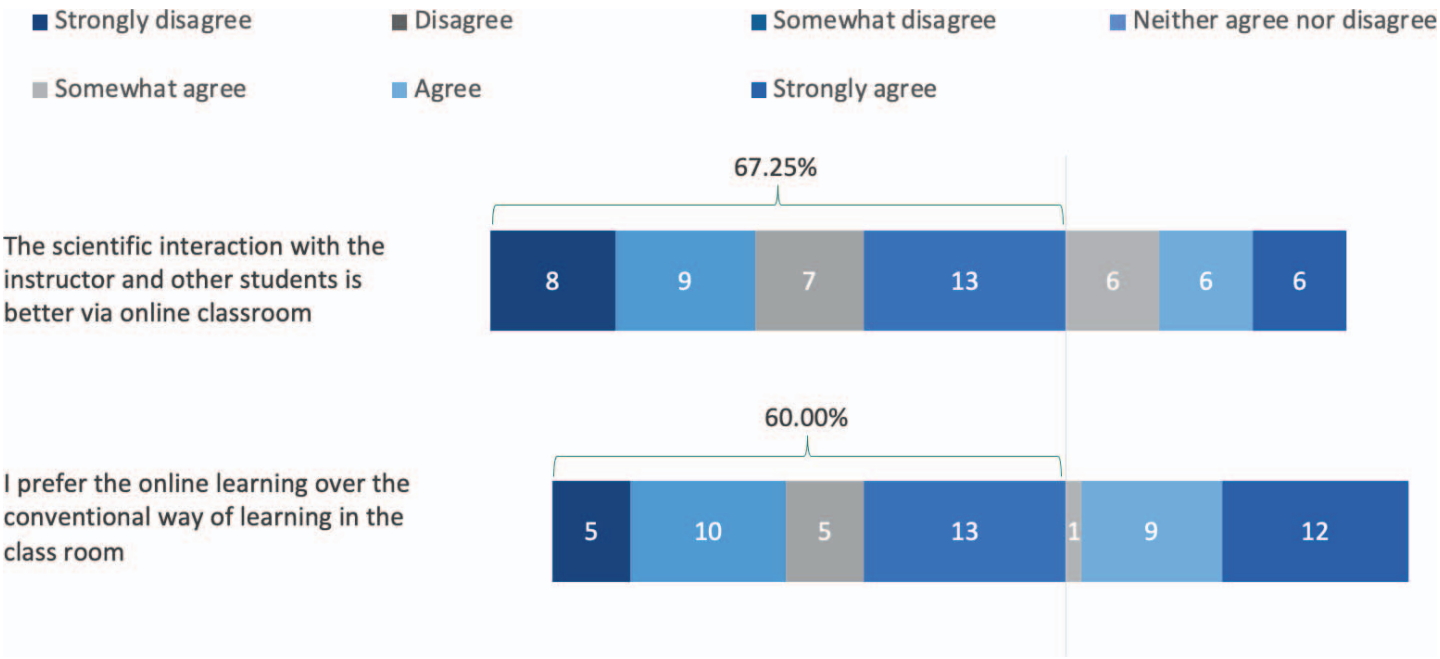

Figure 5. Number of responses from group B regarding their teaching method preferences.

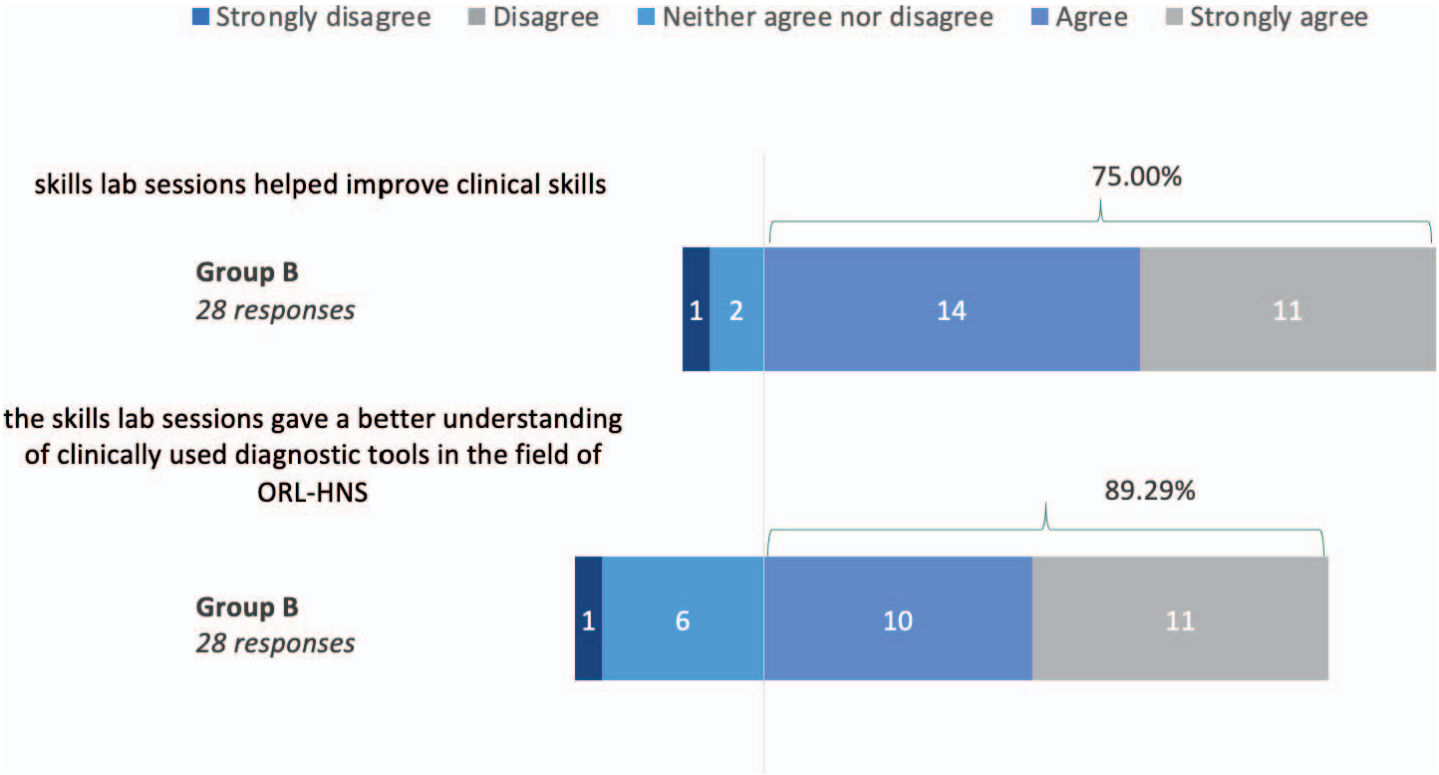

Figure 6. Number of responses from group B regarding their lab experience.

In group B, 10.9% had *strongly agree* responses, 10.9% *agree*, and 10.9% *somewhat agree*. However, 23.6% had *neither agree nor disagree* responses, 16.7% *disagree*, 14.5% *strongly disagree*, and 12.7% *somewhat disagree*.

The second question assessed whether students prefer online classes over conventional teaching. In group A, 20.0% had *agree* responses, 13.3% *strongly agree*, and 6.7% *somewhat agree*, comprising only approximately 40.0% of the total. However the remaining 60.0% preferred the conventional way, with 20.0% *disagree* responses, 16.7% *strongly disagree*, 13.3% *somewhat disagree*, and finally 10.0% *neither agree nor disagree*.

In group B, 21.8% had *strongly agree* responses, 16.4% *agree*, and 1.8% *somewhat agree*, also comprising approximately 40.0% of the total group. However, the remaining participants had 23.6% *neither agree nor disagree* responses, 18.2% *disagree*, 9.1% *somewhat disagree*, and 9.1% *strongly disagree*.

Feedback Regarding the Skills Lab

This segment included two questions and was sent only to group B, as shown in Figure 6, after adding a skills lab session to the clerkship program. In the lab, students practiced several skills at the Alfaisal University anatomy lab, where nasal endoscopes and otoscopes were used on cadavers and mannequins. A total of 28 students answered this segment, and a 5-point Likert scale was also used in this section, which included the following components: *strongly disagree*, *disagree*, *neither agree nor disagree/neutral*, *agree*, and *strongly agree*.

The first question inquired whether the skills lab sessions helped improve clinical skills during the conduction of rotation during the COVID-19 pandemic. Of the participants, 39.3% had *strongly agree* responses and 35.7% *agree*, constituting 75.0% combined. Only 21.4% had *neither agree nor disagree* responses, 3.6% *disagree*, and there were no *strongly disagree* responses.

The second question assessed whether the skills lab sessions gave a better understanding of clinically used diagnostic tools in the field of ORL-HNS. Of the participants, 50.0% had *agree* responses and 39.3% *strongly agree* constituting 89.3% combined. Only 7.1% had *neither agree nor disagree* responses and 3.6% *disagree*.

DISCUSSION

Teaching undergraduate medical students has changed dramatically since the beginning of the year 2020 due to the COVID-19 pandemic. At the beginning of March 2020, Saudi Arabia took preventive and precautionary measures following the recommendations of health authorities to limit the spread of the virus; hence, educational institutions had been closed as part of these measures. Meanwhile, the Saudi Ministry of Education directed the activation of the virtual educational process to comply with these measures while maintaining the educational system.

In this study, we observed the effect of adapting to new challenges in teaching ORL-HNS to undergraduate medical students during the pandemic. And by compar-

ing two groups, we noticed how interactive tools have a strong impact on the educational process, which has been improving greatly and rapidly during and after the pandemic.

A study conducted by Agarwal et al[7] surveyed postgraduate medical students, particularly in the pediatric specialty, regarding their perception of online learning during the COVID-19 pandemic. Responses were obtained from 77 participants; the majority (97%) found the sessions relevant to their learning objectives and clinical practice. Almost all students (99%) responded affirmatively that the sessions were tailored to their level, and 95% found the sessions to be exciting and enjoyable. Finally, the study concludes that online teaching methods must be integrated into postgraduate training even after the pandemic lockdown measures.[7]

One reported concern was the difficulty to communicate with colleagues and instructors, which is consistent with our data in which 63.3% and 67.3% of both groups reported that interaction via online means was not preferred (Figs. 4 and 5).

Another study regarding undergraduate medical education in ORL-HNS, showed that new e-learning teaching methods are of good value in teaching basic clinical knowledge, but not in teaching complex anatomy and advanced technical skills.[5] This conclusion is consistent with our results: we observed a similar feedback pattern when comparing basic scientific knowledge to complex technical skills (Figs. 1 and 2).

Moreover, Wickemeyer and Yu[8] concluded that creating a model that included real patient cases, journal clubs, interactive sessions, flipped classrooms, and professionally led discussions would effectively encourage students. They would read background information, respond to questions, and review online with a faculty member, with a goal of making accurate clinical decisions based on the knowledge obtained from these sessions. Similarly, we designed our study to include clinical scenarios, flipped classes, skills lab sessions, and professionally led discussions.[8]

Furthermore, Luu et al[9] conducted an assessment of YouTube as an educational tool in otorhinolaryngology during the COVID-19 pandemic. However, despite the popularity of YouTube, it could not be considered a primary resource for learning and preparing for surgical cases because it lacked consistent quality.

Mian et al[10] concluded that although tele-teaching in medical education was not ideal, it was indeed a novel solution. Rather than expecting students to study at their own pace, online teaching guided student education and aided in their learning process. However, as highlighted previously, online teaching methods might be enough to teach basic knowledge to preclinical medical students, but not to senior medical students practicing in a clinical setting. This lack of exposure to the hospital environment might delay the diagnostic thinking abilities of clerkship students. One suggestion was to use video communication whereby both students and physicians communicate with patients without risking their safety. Owing to this conclusion, we were keen in our clerkship program to provide interactive training by including hands-on simulation lab sessions, which were monitored by medical doctors.

Another paper by Pellegrini et al[11] studied the incorporation of telemedicine in ORL-HNS teaching. They allowed students to attend telemedicine clinics; however, the lack of face-to-face interaction between students and their preceptor was perceived (among other factors) as a disadvantage. Reflecting on our results, despite the strong validation for the online teaching method over the conventional teaching methods, students still reported communication difficulties between them and their preceptors through online teaching.

In addition, we believe that open access to online medical libraries can be an additional solution to further engage students and provide them with reliable resources. Access can be achieved through institutional collaborations similar to those of surgical organizations. These organizations support residency programs by providing access to surgical video libraries and encouraging surgical educators to share their resources for better outreach.[4]

We believe this experience is quite reflective of a better approach to online learning, and this study might set the foundation for future research during emergency or disaster situations and beyond.

CONCLUSION

We expect that this unprecedented circumstance will change the traditional teaching methods even after the end of this pandemic. Online teaching technologies might be able to compete with conventional teaching methods, but further improvements need to be studied. We believe advanced methods and simulation techniques helped close gaps between online teaching and conventional teaching; however, further research is needed to fully integrate online teaching into medical education.

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