

EFFECT OF THE COVID-19 PANDEMIC ON CLINICAL SKILLS OF DENTAL STUDENTS AT KING SAUD UNIVERSITY

Abdulrahman AlMubarak^{1*}, Almuhammad Ibrahim Asiri², Ibrahim Abdulaziz Alsaiif³, Mohammed Awad AlKahtani², Ahmad Mohammad AlQahtani⁴, Ahmed Ibrahim Alomar²

¹Department of Periodontics, King Saud University, Riyadh, Saudi Arabia. amalubarak@ksu.edu.sa

²Department of Dentistry, King Saud University, Riyadh, Saudi Arabia.

³Department of Dentistry, OK Clinics, Riyadh, Saudi Arabia.

⁴Department of Dentistry, Deryaq Clinics, Riyadh, Saudi Arabia.

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ABSTRACT

Numerous measures have been established to guarantee that human-to-human contact is kept to a minimum during the pandemic. There is significant emphasis on the role of screening and triaging patients before initiating any dental operations. Personal protection equipment (PPE) kits, facemasks, ideally N-95, and face shields are recommended for dentists. A cross-sectional questionnaire-based study was conducted among undergraduate students consisting of 4 different groups representing different undergrad batches and their respective undergrad year clinical performance. Graduates were in the control group since this group graduated without the COVID-19 precautions affecting their clinical performance whilst being the control for interns. We asked a student who studied in the 5th year both during and without the precautions about their clinical performance. And we noticed no significant difference in simple cases (S, S+). However, there was a significant difference in one of the criteria of advanced cases (M, M+, M++) where (M) signifies the least complex form of the advanced cases and (M++) signifies the most complex, based on the number of specialties involved and the severity of the case. The clinical performance of King Saud University undergraduate dental students who studied precautions against COVID-19 was affected when compared to students who did not study during these precautions.

Key words: COVID-19, Clinical skills, Dental students, Pandemic.

Introduction

Dentistry was recognized as a high-risk profession following the unexpected arrival of the extremely contagious severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), also known as COVID-19, in early 2020 [1-3]. The World Health Organization (WHO) proclaimed the pandemic on March 11, 2020, and curfews and lockdowns were immediately instituted worldwide [4].

COVID-19 has a very high risk of infection. There are two types of transmission: direct and indirect. Direct transfer occurs via aerosols [5], anal (for-oral) secretions, tears, saliva, sperm, and mother-to-child transmission [6]. Transmission via fomites is an indirect way of transmission. Several of these ways of transmission may be underestimated, posing a risk of virus propagation. To prevent the virus from spreading, it is critical to limit human-to-human contact, disinfect everyday objects, and practice good self-hygiene (washing hands regularly, proper coughing and sneezing techniques, and use of face masks). Social distancing is critical for transmission reduction. SARS-CoV-2 has had a significant impact on medical practice. Personal protective equipment must be worn by health practitioners to minimize the risk of transmission. SARS-CoV-2 knowledge is still expanding

rapidly, and additional research is needed to investigate alternative mechanisms of transmission [7].

On January 23rd, 2020, a dentist was reported to have contracted this virus at the hospital at Wuhan University in China, the place where the virus is believed to have originated, and additional health workers were eventually tested [8, 9].

As a result, the civic authorities advised that dental appointments be postponed unless there was an emergency, and dentistry as a profession came to a grinding halt [10, 11]. In addition to the lack of preventive dental treatment, the enforced stay-at-home orders will harm oral health due to dietary changes, economic concerns, overall anxiety, and most importantly fear of being infected [12]. The dentistry profession requires patients to break the specified safe distance of one meter and to undergo dental operations that generate aerosols. As part of the interim advice, all non-essential dental operations were suspended [13, 14].

Numerous measures have been established to guarantee that human-to-human contact is kept to a minimum during the pandemic. There is significant emphasis on the role of screening and triaging patients before initiating any dental operations. Personal protection equipment (PPE) kits, facemasks, ideally N-95, and face shields are recommended

for dentists. Aerosol generation is minimized, the operatory is well-ventilated, and infection control and bio-waste management are strictly followed [15, 16].

COVID-19 is reshaping dentistry, posing an unprecedented challenge to the dental profession. The future and viability of practicing and developing dental professionals are contingent upon their compliance with these new standards and guidelines, as well as their adaptation to post-COVID dentistry. Dentistry has been compelled to change, from how dental education is delivered to how dental treatments are performed.

Due to the covid-19 pandemic, the Saudi ministry of health limited dental practice to only emergency treatment on the 15th of March 2020, following this limitation all dental schools have closed their student clinics forcing all dental schools to shift their focus to a more theoretically inclined education. One article talked about the effect of COVID-19 in its acute phase on Dental education and practice in France [6, 17], its conclusion was to rely on basic dental services and provide prescriptions for analgesics and other medication during that acute phase of the pandemic. Another article published here in Saudi Arabia titled "Dentistry Amidst the COVID-19 Pandemic: Knowledge, Attitude, and Practices Among the Saudi Arabian Dental Students" [18] focused more on the attitude and knowledge aspect towards the disease with less emphasis on the clinical skill impact on the undergraduate students. Finally, one study assessed the effect of online learning on dental education in Asia during the pandemic [19], with no focus nor mention of the impact on the clinical performance of dental undergraduates. With the gaps in the previously mentioned articles, our study aims to compare the clinical skills of King Saud University undergraduate students in the covid-19 clinical setting to students that did not study dentistry in the same conditions.

Materials and Methods

A cross-sectional questionnaire-based study was conducted among undergraduate students consisting of 4 different groups representing different undergrad batches and their respective undergrad year clinical performance. Graduates will be the control group since this group graduated without the COVID-19 precautions affecting their clinical performance whilst being the control for interns, interns will represent clinical performance in undergrad 5th year whilst being the control for 5th-year students, 5th-year students will represent clinical performance in undergrad 4th year whilst being the control for 4th-year students, and finally, 4th-year students will represent clinical performance in undergrad 3rd year. Each group range from 60 to 100 individuals making the total sample size approximately 400.

Data can be easily monitored and collected via digital means, which will be evaluated by a statistician using a Chi-square statistic plan.

After collection, the raw data will be checked and cleaned and will be analyzed using SPSS software [version 25]. Frequencies and percentages were calculated to describe respondents' profiles and questionnaire questions. One-way analysis of variance (ANOVA) was used to measure the impact of these precautions on the clinical performance of dental students. A P value < 0.05 was considered significant.

Results and Discussion

A total of 203 responses were received from Undergraduate students and fresh graduates of whom 160 (78.8%) were male and 43 (21.2%) were female.

We asked the student who studied in the 5th year both during and without the precautions about their clinical performance. In DEN493 (Comprehensive dental treatment course). And we noticed no significant difference in simple cases (S, S+). However, there was a significant difference in one of the criteria of advanced cases (M, M+, M++) where (M) signifies the least complex form of the advanced cases and (M++) signifies the most complex, based on the number of specialties involved and the severity of the case. As noted in **Table 1**.

And we asked about their clinical performance in course POS 493 (Pediatric dentistry). stainless-steel crowns and Pulpotomies procedures showed significant differences as shown in **Tables 2 and 3**.

We also interviewed 4th-grade students about their clinical performance in the clinical prosthodontics course, both with and without the precautions. And there was no significant difference in the results of complete dentures vs removable partial dentures. However, there was a significant difference in the number of crowns that were done **Table 4**.

We also inquired about their performance in their clinical endodontics course and found that while there was no significant difference in single canal treatments performed, there was a significant difference between 2 and 3 to 4 canals performed. As shown in **Tables 5 and 6**. (add percentage)

We also asked about their clinical performance in the clinical pediatric dentistry course, noting significant differences in stainless-steel crowns and pulpotomies completed **Table 5** shows the results.

Additionally, we questioned them about their clinical performance during their clinical course in operative dentistry. And while there was no significant difference

between classes I, IV, and V completed, there was a significant difference between classes II and III completed. As seen in **Table 7**.

Finally, we surveyed third-year students about their clinical performance both with and without the precautions. There was no significant difference in Class II, III, or V performed during their operative dentistry course. However, there was a significant difference in Class I and IV performed. As seen in **Table 6**.

Furthermore, we inquired about their clinical performance during their clinical periodontology course and discovered no statistically significant difference in gingivitis and periodontitis cases performed.

Additionally, we questioned them about their clinical performance during their clinical oral surgery course. And there was a significant difference in the number of extractions performed.

Table 1. Response to questions

		In which year are you currently in?			Statistic
		Graduate (5 th year without precautions)	Interns (5 th year with precautions)	Total	
In 5 th year: regarding course DEN493, please answer how many of each of the following did you do. (M++)	0	N	16	66	X ² =34.093 Df=2 P=0.000
		%	42.1%	91.7%	
	1	N	15	6	
		%	39.5%	8.3%	
	2	N	6	0	
		%	15.8%	0.0%	
	3	N	1	0	
		%	2.6%	0.0%	
Total	N	38	72	110	
	%	100%	100%	100%	

Table 1 shows that out of 110 respondents, among the respondents (Graduate (5th year without precautions)) 16 (42.1%) (M++=0), 15 (39.5%) (M++=1), 6 (15.8%)

(M++=2) and 1 (2.6%) (M++=3). Association between the precautions in the 5th year and [M++] in DEN493 was statistically significant ($\chi^2 = 34.093$, $df = 2$, $p = 0.000$).

Table 2. Response to questions regarding performing stainless steel crown.

		In which year are you currently in?			Statistic	
		Graduate (5 th year without precautions)	Interns (5 th year with precautions)	Total		
In 5 th year: regarding course POS493 (PEDO), please answer how many of each of the following did you do. (Stainless Steel Crown)	0	N	2	7	X ² =27.315 Df=3 P=0.000	
		%	5.3%	23.6%		
	1-2	N	17	49		
		%	44.7%	68.1%		
	3-4	N	15	6		
		%	39.5%	8.3%		
	5+	N	4	0		
		%	10.5%	0.0%		
	Total	N	38	72		110
		%	100%	100%		100%

Table 2 shows that out of 110 respondents, among the respondents (Graduate (5th year without precautions)) 2 (5.3%) (Stainless steel crown =0), 17 (44.7%) (Stainless steel crown =1-2), 15 (39.5%) (Stainless steel crown =3-4)

and 4 (10.5%) (Stainless steel crown =5+). Association between the precautions in 5th year and [stainless steel crown] in POS493 (PEDO) was statistically significant ($\chi^2 = 27.315$, $df = 2$, $p = 0.000$). Furthermore, out of 110

respondents, among the respondents (Graduate (5th year without precautions) 1 (2.6%) (Pulpotomy =0), 18 (47.4%) (Pulpotomy =1-2), 15 (39.5%) (Pulpotomy =3-4) and 4 (10.5%) (Pulpotomy =5+). Association between the precautions in the 5th year and [pulpotomy] in POS493

(PEDO) was statistically significant ($\chi^2= 37.153$, $df= 3$, $p=0.000$).

Table 3. Responses to questions

		In which year are you currently in?			Statistic
		Interns studied in 4 th year without precautions	5 th studied in 4 th year with precautions	Total	
In 4 th year: regarding course SDS433 (FIXED), please answer how many of each of the following did you do. (Crown)	0	N	6	5	X ² =21.230 Df=3 P=0.000
		%	8.3%	12.5%	
	1-2	N	32	33	
		%	44.4%	82.5%	
	3-4	N	28	2	
		%	38.9%	5%	
	5+	N	6	0	
		%	8.3%	0.0%	
Total	N	72	40	112	
	%	100%	100%	100%	

Table 3 shows that out of 112 respondents, among the respondents (Intern studied in 4th year without precautions) 4 (5.6%) (Two canals =0), 62 (86.1%) (Two canals =1-2) and 6 (8.3%) (Two canals =3-4). Association between the precautions in the 4th year and [Two canals] in RDS423 (ENDO) was statistically significant ($\chi^2= 16.754$, $df= 2$, $p=0.000$). Furthermore, out of 112 respondents, among the

respondents (Intern studied in 4th year without precautions) 6 (8.3%) (Crown =0), 32 (44.4%) (Crown =1-2), 28 (38.9%) (Crown =3-4) and 6 (8.3%) (Crown =5+). Association between the precautions in 4 Th year and [Crown] in SDS433 (FIXED) was statistically significant ($\chi^2= 21.230$, $df= 3$, $p=0.000$).

Table 4. Response to questions

		In which year are you currently in?			Statistic	
		Interns studied in 4 th year without precautions	5 th studied in 4 th year with precautions	Total		
In 4 th year: regarding course RDS423 (ENDO), please answer how many of each of the following did you do. (Three or four canals)	0	N	49	32	X ² =1.833 Df=1 P=0.000	
		%	68.1%	80.0%		
	1-2	N	23	8		
		%	31.9%	20.0%		
	Total	N	72	40		112
		%	100%	100%		100%

Table 4 shows that out of 112 respondents, among the respondents (Intern studied in 4th year without precautions) 49 (68.1%) (Three or four canals =0), and 23 (31.9%) (Three or four canals =1-2). Association between the precautions in the 4th year and [Three or four canals] in RDS423 (ENDO) was statistically significant ($\chi^2= 1.833$, $df= 1$, $p=0.176$). Furthermore, out of 112 respondents,

among the respondents (Intern studied in 4th year without precautions) 8 (11.1%) (stainless steel crown =0), 51 (70.8%) (stainless steel crown =1-2), and 13 (18.1%) (stainless steel crown=3-4). Association between the precautions in the 4th year and [stainless steel crown] in POS413 (PEDO) was statistically significant ($\chi^2= 6.362$, $df= 2$, $p=0.042$).

Table 5. Response to questions

		In which year are you currently in?		
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		Interns studied in 4 th year without precautions		5 th studied in 4 th year with precautions	Total	Statistic
In 4 th year: regarding course POS413 (PEDO), please answer how many of each of the following did you do. (Pulpotomy)	0	N	14	15	29	
		%	19.4%	37.5%	25.9%	
	1-2	N	53	25	78	
		%	73.6%	62.5%	69.6%	
	3-4	N	5	0	5	
		%	6.9%	0.0%	4.5%	
Total	N	72	40	112		
	%	100%	100%	100%		

Table 5 shows that out of 112 respondents, among the respondents (Intern studied in 4th year without precautions) 14 (19.4%) (Pulpotomy =0), 53 (73.6%) (Pulpotomy =1-2) and 5 (6.9%) (Pulpotomy =3-4). Association between the precautions in the 4th year and [Pulpotomy] in POS413 (PEDO) was statistically significant ($\chi^2= 6.471$, $df= 2$, $p=0.039$).

Furthermore, out of 112 respondents, among the respondents (Intern studied in 4th year without precautions) 1 (1.4%) (Class II restoration =0), 3 (4.2%) (Class II restoration =1-2), 43 (59.7%) (Class II restoration =3-4) and 25 (34.7%) (Class II restoration =5+). Association between the precautions in the 4th year and [Class II restoration] in RDS413 (RESTO) was statistically significant ($\chi^2= 13.882$, $df= 3$, $p=0.003$).

Table 6. Response to questions

		In which year are you currently in?			Statistic	
		Interns studied in 4 th year without precautions	5 th studied in 4 th year with precautions	Total		
In 4 th year: regarding course RDS413 (RESTO), please answer how many of each of the following did you do. (Class III restoration)	0	N	2	7	9	X ² =13.838 Df=2 P=0.001
		%	2.8%	17.5%	8.0%	
	1-2	N	39	27	66	
		%	54.2%	62.5%	58.9%	
	3-4	N	31	6	37	
		%	43.1%	15.0%	33.0%	
Total	N	72	40	112		
	%	100%	100%	100%		

Table 6 shows that out of 112 respondents, among the respondents (Intern studied in 4th year without precautions) 2 (2.8%) (Class III restoration =0), 39 (54.2%) (Class III restoration =1-2) and 31 (43.1%) (Class III restoration =3-4). Association between the precautions in the 4th year and [Class III restoration] in RDS413 (RESTO) was statistically significant ($\chi^2= 13.838$, $df= 2$, $p=0.001$). Furthermore, out of 93 respondents, among the respondents

(3rd studied in 4th year without precautions) 0 (0.0%) (Class I restoration =0), 6 (15.0%) (Class I restoration =1-2), 17 (42.5%) (Class I restoration =3-4) and 17 (42.5%) (Class I restoration =5+). Association between the precautions in 3rd year and [Class I restoration] in RDS413 (RESTO) was statistically significant ($\chi^2= 10.302$, $df= 3$, $p=0.016$).

Table 7. Response to questions

		In which year are you currently in?			Statistic	
		5 th studied in 3 rd year without precautions	4 th studied in 3 rd year with precautions	Total		
In 3 rd year: regarding course RDS413 (RESTO), please answer how many of each of the following did you do. (Class IV restoration)	0	N	11	32	43	X ² =10.647 Df=2 P=0.005
		%	27.5%	60.4%	46.2%	
	1-2	N	27	18	45	
		%				

	%	67.5%	34.0%	48.4%
3-4	N	2	3	5
	%	5.0%	5.7%	5.4%
Total	N	40	53	93
	%	100%	100%	100%

Table 7 shows that out of 93 respondents, the respondents (3rd studied in 4th year without precautions) 11 (27.5%) (Class IV restoration =0), 27 (67.5%) (Class IV restoration =1-2) and 2 (5.0%) (Class IV restoration =3-4). Association between the precautions in 3rd year and [Class IV restoration] in RDS413 (RESTO) was statistically significant ($\chi^2= 10.647$, $df= 2$, $p=0.005$). Furthermore, out of 93 respondents, among the respondents (3rd studied in 4th year without precautions) 0 (0.0%) (Extraction =0), 10 (25.0%) (Extraction =1-2), 16 (40.0%) (Extraction =3-4) and 14 (35.0%) (Extraction =5+). Association between the precautions in 3rd year and [extraction] in MFS311 (SURGERY) was statistically significant ($\chi^2= 9.625$, $df= 3$, $p=0.022$).

In this study, the effect of COVID-19 precautions on the clinical performance of undergraduate dental students at King Saud University was investigated amongst both fresh graduates and undergraduate students who studied both with and without the precautions. After investigating the results; we found that the precautions have hurt all of the tested years.

First, the 5th undergraduate year was investigated using fresh graduates as control where they studied 5th year in a clinical setting where there were no precautions, comparing them to interns where who studied 5th year in a clinical setting in which there were precautions. 5 of the 10 statistically studied variables were significantly different in favor of the students who studied without the precautions. Those being; the number of [M++] cases in their comprehensive treatment course. The number of Stainless steel crowns, pulpomies, extractions, and space maintainers in their pediatric course.

Second, the 4th undergraduate year was investigated using interns as control where they studied 4th year in a clinical setting where there were no precautions, comparing them to 5th-year students who studied 4th year in a clinical setting in which there were precautions. 9 of the 18 tested variables were significantly different also in favor of the students who studied without the precautions. The number of crowns, posts, and/or cores done in their prosthodontics course. The number of root canal treatments (RCT) done for two canals, and RCT done for three or four canals in their endodontics course. As well as the number of Stainless steel crowns, pulpomies, and space maintainers has done in their pediatric course. A number of Class II and Class III composite restorations are done in their operative course.

Finally, the 3rd undergraduate year was investigated using 5th-year students as control where they studied 3rd year in a clinical setting where there were no precautions, comparing them to 4th-year students who studied 3rd year in a clinical setting in which there were precautions. 3 of the 9 tested variables were significantly different favoring students who studied without the precautions. Those being; the number of Class I and Class IV composite restorations done in their operative course. The number of extractions done in their clinical Surgery course.

We suspect the lack of clinical performance of students who studied during COVID-19 was due to multiple reasons. First, students were divided into two groups (Group A and B) one group had to attend their clinical session for a week while the other group was attending online lectures and vice versa, all to achieve social distancing as well as reduce the risk of spreading the infection. Second, students who were suspected to be infected with the virus were suspended for fourteen days and required clearance from the infection control department afterward. Third, the focus of the hospital was more on emergency treatment rather than educational cases due to the lack of clinical staff. The number of available dental assistants was reduced to occupy King Khalid University Hospital (KKUH) to meet the demand of the increasing COVID-19 cases. And finally, the patient flow was reduced due to two main reasons, lack of access to dental care, and fear of catching the infection in the dental clinic [12].

Conclusion

After evaluating and analyzing the findings of the questionnaires distributed to several groups, each representing affected and unaffected groups for each year. We determined that the precautions imposed due to the COVID-19 pandemic hurt clinical performance in all of the represented years (5th, 4th, and 3rd years). We noticed 5 of the 10 tested variables were significantly different in the 5th year. 10 out of 19 tested variables were significantly different in 4th year. 3 out of 9 variables were significantly different in 3rd year. Making 3rd year the least affected by the precautions due to the COVID-19 pandemic, and 5th the most affected by it. All in all, we concluded that the clinical performance of King Saud University undergraduate dental students who studied during the precautions against COVID-19 was affected when compared to students who did not study during these precautions.

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