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Dental student oral surgery training—Comparing the impact of COVID-19 and cohort sizes

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Abstract

Introduction: The response to the COVID-19 pandemic potentially reduced the clinical experience and academic education of dental trainees through reduced supervised clinical sessions. Graduating dental students, future employers and regulators may be concerned over the level of clinical experience of graduates trained within the COVID-19 pandemic. The purpose of this study was to try and document the evidence for, and significance of, this impact.

Materials and Methods: From dental student data in the 2017, 2018, 2019 and 2020 cohorts attending the University of Sydney, Australia, the number of dental extractions and adjunct oral surgery procedures, as well as final end-of-year examination results, was recorded. Results were compared to determine whether differences in experience and final academic achievement existed between these cohorts.

Results: The smallest student cohort, 2017, demonstrated greater clinical experience than the 2018, 2019 and 2020 cohorts. The 2020 COVID-19-affected cohort demonstrated no statistically significant reduction in clinical experience in all measured clinical procedures when compared to the 2018 and 2019 cohorts. The decrease in city teaching hospital clinical experience was compensated by an increase in rural placements. The 2020 cohort achieved the lowest academic results, and this was statistically significant.

Conclusion: The oral surgery clinical experience of the 2020 dental cohort at the University of Sydney was comparable to prior cohorts. Rural clinics were able to compensate for COVID-19 interruptions to clinical training. The number of students in a cohort, if all other variables remain constant, appeared to affect clinical exposure to a greater extent than COVID-19.

KEYWORDS
clinical competence, COVID-19, dental education, oral surgery, rural health

1 | INTRODUCTION

COVID-19 *(coronavirus disease 2019)* is caused by the respiratory virus SARS-CoV-2 *(severe acute respiratory syndrome coronavirus 2)*, a novel coronavirus, which was first reported on 31 December 2019.[1] The first case of COVID-19 was detected in Australia on 25 January 2020, and the first biosecurity emergency declared on 18 March 2020.[2]

The COVID-19 pandemic adversely affected the education sector, including dental education.[3] In an attempt to reduce the risk of virus transmission to and amongst students, tertiary education institutions discontinued "face-to-face" lectures, most teaching went "online,", and student clinics were suspended in public hospitals.[3] Also, a significant number of elective cases were postponed due to a world-wide shortage of personal protective equipment.[3] COVID-19 has additionally created psychologic stress,[4] which may compromise the academic performance of students.[5]

Students in the four-year graduate dental programme at the University of Sydney utilise the facilities at teaching hospitals and public dental clinics across Sydney for training purposes. Additionally, rural clinics have been utilised at the University of Sydney since 2009[6] in the form of approximately five-week rotations. Rural clinics have been found to be busier than urban clinics, with a requirement to undertake more complex work due to a reduction in available specialist referrals.[7] All clinical facilities were required to close from March 2020, with a partial re-opening of clinics in July 2020. As a result of these closures, student clinical activity in oral surgery was reduced in the 2020 academic year as compared to previous years. As the Australian academic year runs from January to December, this affected a significant portion of the final training year for the 2020 cohort.

The reduction in the number of student clinics has similarly affected dental schools in the United States of America,[8–10] Brazil,[11] Turkey[12] and New Zealand.[13] Although most lectures were moved online,[8] there is no reasonable way to digitally replace clinical sessions with patients.[11] This has affected the graduation of dental students internationally, as many students have been unable to complete required competency examinations.[9] In Scotland, dental students have been required to repeat a year of dentistry, delaying graduation and the intake of new students.[14] This reduced number of student clinics may result in a reduction in clinical exposure to dental students, which could be of general concern to both dental students and prospective employers. A recent survey of dental students in the United States of America reporting a general feeling that their clinical experience was suffering as a result of COVID-19 underscores this concern.[15]

It is difficult to determine what level of clinical experience is necessary for proficiency. This difficulty is expressed in terms of the clinical requirements of the various training institutions. In a study of oral surgery training in Australian Universities, Goss (2018) showed that six of ten dental schools in Australia track the average number of dental extractions performed by dental students prior to graduation.[16] One dental school provided clinical experience such that over 50 extractions were undertaken on average, two saw more than 30 extractions as an average, and three saw more than 11 extractions as an average.[14]

A 2009 survey of 13 dental schools in the United Kingdom (UK), 11 dental schools responded that they have a target or minimum number of dental extractions prior to graduation ranging from 20 to 115, with an average of 51.[17] In this survey, two dental schools aimed for 100 or more dental extractions, four aimed for 50 or more dental extractions, whist the remainder aimed for less than 50 dental extractions. There was no commentary on why such an extensive variation in requirements existed. Of 16 dental schools in the UK, 12 are 5-year training programmes and the remainder are 4-year training programmes.[18]

To date, there are no objective reports on the effect of the COVID-19 pandemic on the level of clinical experience in oral surgery for dental students. The intention of this study is to examine the clinical experience and the final examination grading in oral surgery for the University of Sydney, Australia, dental students who completed their final year in 2020 and compare their outcomes to the graduating years of 2017, 2018 and 2019.

2 | METHODS AND MATERIALS

This study analyses the clinical exposure and final examination outcomes in oral surgery of dental students at the School of Dentistry, Faculty of Medicine and Health, University of Sydney, Australia, whose final training year was the years 2017, 2018, 2019 and 2020. This study was approved by the University of Sydney Ethics Committee, project number 2020/138.

Data were obtained from student "Oral Surgery" logbooks, which were maintained through the final two years of the four-year dental training programme. This record of clinical experience was manually entered into an Excel spreadsheet. The accuracy of data entry was verified both through identifying outliers and manually reconfirming outliers prior to data analysis and having every fourth entry reconfirmed by an additional author. The final examination results were obtained from official university digital records.

This study analysed the four most common clinical experiences related to exodontia within the oral surgery training, which were supervised by a clinical educator in either a training hospital clinic or a university-affiliated rural clinic. The specific activities were as follows: (i) the number of clinical assessments, (ii) infiltration anaesthesia and iii) inferior alveolar nerve block anaesthesia for the purpose of (iv) dental extractions.

Statistical tests were conducted using the software program SPSS 26. A "p" value of $< .05$ was considered statistically significant. Independent sample t-test was used for statistical analysis.[19]

3 | RESULTS

The total number of students successfully completing their dental training in 2017 was 77, and in 2018, 2019 and 2020 was 89, 89

and 79 respectively. Not all logbooks were available. There were 57 (74%) logbooks available in 2017, 89 (100%) in 2018, 89 (100%) in 2019 and 78 (99%) in 2020 for a total sample size of 313 students.

The average dental student across all cohorts performed 39 +/− 12 patient assessments, 30 +/− 11 infiltration anaesthetic procedures, 13 +/− 5 inferior alveolar nerve blocks and 66 +/− 16 total dental extractions (Figure 1 and Figure 2). The mean total number of dental extractions and associated procedures was highest in the 2017 cohort, whilst the 2020 cohort demonstrated the lowest number of total dental extractions and associated procedures (Table 1).

Table 2 demonstrates the statistical significance of the differences between each year group. The difference in the number of total dental extractions between the 2017 cohort and all other cohorts was statistically significant. The differences in dental extractions between the 2018, 2019 and 2020 cohorts were not statistically significant. Overall, the 2020 cohort did not differ significantly from the 2018 and 2019 cohorts, except for a reduced number of dental extractions which took place in university teaching hospitals as compared to the 2019 cohort. For the 2017 to 2019 cohorts, 45% of total dental extractions were in the second-last semester, whilst 41% of total dental extractions were in the final semester; for the 2020 cohort, this was 19% and 64% respectively ($p < .001$).

There was no statistically significant difference for viva examinations, when comparing the 2020 cohort to the 2017, 2018 and 2019 cohorts for the end-of-year oral surgery written examination outcomes, the 2020 cohort achieved lower results than the non-COVID-19 affected cohorts, and this was statistically significant (Table 3).

4 | DISCUSSION

Despite the COVID-19 pandemic and loss of time in the dental extraction clinics, the level of overall oral surgery clinical experience of the 2020 University of Sydney dental student cohort was not statistically different from the 2019 graduates. Neither was the number of dental extractions significantly different from that of the 2018 and 2019 graduates.

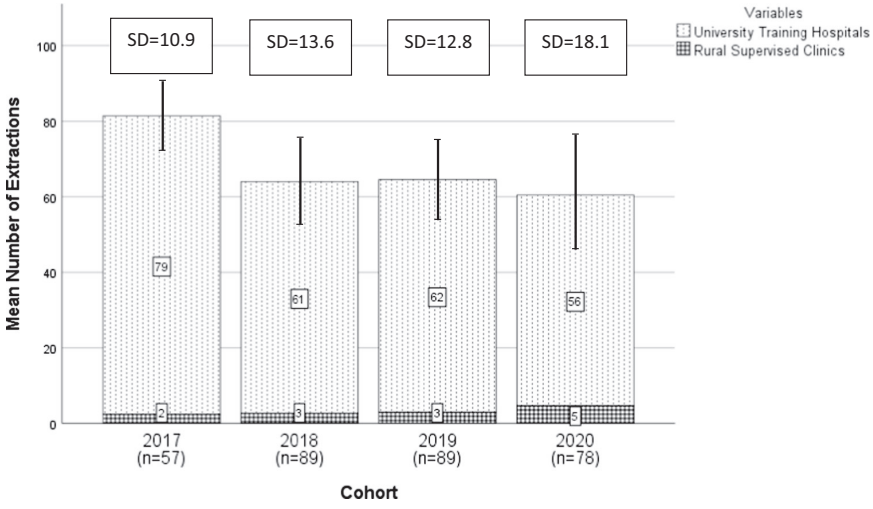

FIGURE 1 Mean number of dental extractions undertaken by students (2017–2020). SD represents standard deviation for the total number of dental extractions. Numbers in boxes represent the mean number of dental extractions in each location

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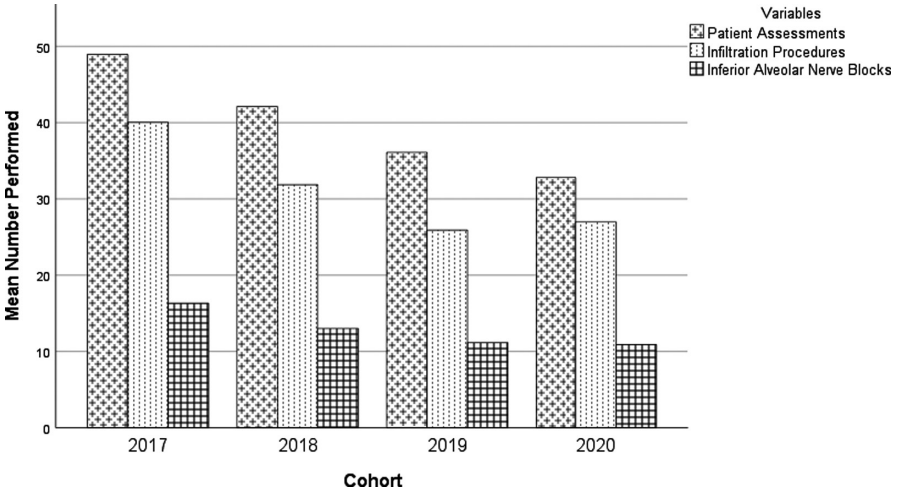

FIGURE 2 Mean of associated clinical procedures 2017–2020

TABLE 1 Overview of exodontia procedures 2017–2020

Year		Patient Assessments	Infiltration Procedures	Inferior Alveolar Nerve Blocks	Dental Extractions—University Teaching Hospital	Dental Extractions—Supervised Rural Clinics	Total Dental Extractions
2017	*N*	57	57	57	57	57	57
	Mean	48.9	40.0	16.3	79.0	2.4	81.4
	Std. Deviation	7.8	8.6	4.4	10.6	4.7	10.9
	Median	49.0	40.0	16.0	79.0	2.0	82.0
	Minimum	21	23	4	62	0	62
	Maximum	62	70	25	109	23	109
2018	*N*	89	89	89	89	89	89
	Mean	42.1	31.9	13.0	61.3	2.7	64.0
	Std. Deviation	8.5	9.1	4.0	12.1	6.2	13.6
	Median	43.0	30.0	13.0	58.0	3.0	60.0
	Minimum	20	16	5	40	0	40
	Maximum	61	66	24	101	24	110
2019	*N*	89	89	89	89	89	89
	Mean	36.1	25.9	11.2	61.5	3.0	64.5
	Std. Deviation	13.4	8.8	5.2	12.0	6.0	12.8
	Median	37.0	27.0	11.0	62.0	3.0	64.0
	Minimum	10	4	0	33	0	33
	Maximum	88	51	24	101	24	101
2020	*N*	78	78	78	78	78	78
	Mean	32.8	27.0	10.9	55.7	4.7	60.4
	Std. Deviation	12.6	11.0	4.8	17.0	9.1	18.1
	Median	33.0	27.0	11.0	53.5	5.0	57.0
	Minimum	3	3	0	29	0	35
	Maximum	63	63	26	110	38	121
Total	*N*	313	313	313	313	313	313
	Mean	39.3	30.4	12.6	63.2	3.2	66.4
	Std. Deviation	12.4	10.7	5.0	15.3	6.8	15.9
	Median	40.0	29.0	12.0	62.0	3.0	66.0
	Minimum	3	3	0	29	0	33
	Maximum	88	70	26	110	38	121

Note: 0 = A minimum of "0" dental extractions could be recorded in supervised rural clinics due to some students not undergoing rural placement.

TABLE 2 *T*-Test of comparing each year of clinical exposure (*p values*)

	Patient assessments	Infiltration procedures	Inferior alveolar nerve blocks	Dental extractions—University teaching hospital	Dental extractions—Rural supervised clinics	Total dental extractions
2017 and 2018	<.001	<.001	<.001	<.001	NS	<.001
2017 and 2019	<.001	<.001	<.001	<.001	NS	<.001
2017 and 2020	<.001	<.001	<.001	<.001	NS	<.001
2018 and 2019	<.001	<.001	.008	NS	NS	NS
2018 and 2020	<.001	.002	.003	.016	NS	NS
2019 and 2020	NS	NS	NS	.011	NS	NS

Abbreviation: NS, not significant.

TABLE 3 *T*-test comparing the results of the 2020 cohort final written examination with the results of the 2017, 2018 and 2019 cohorts

Year	Mean result (out of 40)	*T*-test significance	Change (%) compared to 2020 cohort
2020	25.62 +/− 2.45	-	-
2019	28.28 +/− 2.65	<0.001	6.65
2018	26.95 +/− 3.4	0.005	3.325
2017	27.46 +/− 2.08	<0.001	4.6

On average, a student from the 2020 cohort performed 4 fewer dental extractions as compared to the previous two cohorts, with a mean of 60 dental extractions. This still compares favourably to the number of dental extractions from Australian and UK Universities.[16,17] All measured associated clinical procedures were similar to the 2019 cohort, and there were no statistically significant differences between the oral surgery clinical experience of the 2019 and 2020 cohorts at the University of Sydney. Therefore, despite the possible concerns of students and potential employers, of having a reduction in oral surgery clinical exposure at the University of Sydney, these concerns are unfounded.

The dental students from the 2017 cohort had significantly more oral surgery clinical experience compared with the 2018, 2019 and 2020 cohorts. The data demonstrate that the 2017 cohort also saw the most consistent clinical exposure, with the highest means and lowest standard deviations of the analysed year groups. However, it should be noted that the increased clinical exposure for the 2017 cohort was associated with a smaller cohort size as compared with the 2018, 2019 and 2020 cohorts.

There was a comparable number of clinical sessions available in the non-COVID-19 years of 2017, 2018, 2019. As the student cohort in 2017 was small than the average for the period being assessed, each student was be able to attend an increased number of clinical sessions. The 2020 cohort was also smaller than the 2018 and 2019 graduating years; this helped to compensate for the reduced available clinical sessions in this COVID-19 year. Further support to this explanation arises from the similarity of clinical exposure of the 2018 and 2019 graduating years. With the same cohort size and similar number of clinical sessions, the students had a similar level of clinical experience.

These results show that the size of the cohort appears to have a greater effect on the student clinical experience than the COVID-19 pandemic. The implication of this finding is that if consistency in the level of clinical experience is required, any increase in dental student intake would need to be matched through an increase in available clinical sessions or through the establishment of additional training centres.

The increase in rural clinics for the 2020 cohort allowed students to complete their training period without any significant reduction in oral surgery experience. Illustrated in Figure 1 and Table 1 is that the number of dental extractions performed in university teaching hospital clinics was less for the 2020 cohort as compared to previous cohorts. Rural clinics, therefore, form an important and growing aspect of oral surgery training and can compensate for limitations of university teaching hospital clinics. If universities look to continue increasing dental student intake, rural clinics may be relied upon for the required establishment of additional training centres.

The students in the COVID-19 cohort were predominantly affected in their second-last semester, and therefore, there was an opportunity for clinical experience compensation in their final semester. In the northern hemisphere, the final semester of the 2020 cohort was affected. With a similar level of clinical experience occurring in each of the final two semesters, this may have reduced total clinical experience in the northern hemisphere without the capacity to compensate. However, it has been documented that dental students find their initial transition into clinical practice the most confronting time of their clinical training.[20] With less than half of the final semester being affected for the northern hemisphere and with no interruption to the transition into clinical training for the affected cohort, there may not have been any statistically significant differences. Further research similar to this paper from the northern hemisphere would facilitate an understanding of the timing of future education interruptions on a dental student's oral surgery clinical experience and academic outcomes.

The data suggest that the 2020 cohort seems to have obtained a lower academic outcome in the final oral surgery written examination, despite the compensated clinical experience. With lectures running online and examinations being run in a centralised location, this may be related to COVID-19 rather than an increase in

rural activity, and further investigation is required to confirm this. Possible explanations relate to the move to online seminars, which may have impeded student learning. Alternatively, the timing of clinical experience or the general stress of COVID-19 curriculum changes alternating student learning may have accounted for the academic achievement. The results of the final "oral surgery" written examination (Table 3) demonstrate variability throughout the cohorts; therefore, it is also possible that the 2020 cohort's written examination was more challenging than the previous cohort's written examination. Further research will be able to clarify this issue.

5 | CONCLUSION

The present study shows that despite the COVID-19 pandemic, any concerns of a reduction in oral surgery clinical exposure for 2020 University of Sydney graduates were unfounded. Oral surgery activity in the rural setting was able to compensate for the loss of clinical exposure in the main university teaching hospitals.

The total number of students in each clinical year was shown to inversely influence the overall clinical experience available to students. It may be necessary for the Dental Schools to look for additional training venues as the student cohort in the clinical years increases in size.

It is possible that a students' perception of competency is inversely related to their level of clinical exposure in a recognised "training" venue. Any alteration to a student's perception of competency may be a reflection of the reduced academic achievement or an increase in overall stress of the COVID-19 affected cohort.

As most dental schools are facing similar scenarios to that of the University of Sydney, the findings of this paper will be relevant to other dental schools. Students and employers can be assured that the oral surgery clinical competency of 2020 dental graduates was no different to that of the 2017, 2018 and 2019 dental graduates.

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CONFLICT OF INTEREST

The authors confirm that there are no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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