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**A quantitative and qualitative study of the impact of COVID-19
on an otorhinolaryngology residency training programme in
Singapore**

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INTRODUCTION

What began as an Epidemic in late December 2019 in Wuhan Province, China, the Coronavirus disease (COVID-19) caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)⁽¹⁾ is now labelled a Pandemic by the World Health Organization (WHO).⁽²⁾

Singapore, like many other countries, was not spared from the punishing effects of this global pandemic. While public health-care directives were introduced in a bid to treat the infected and stem further spread of the disease, this diversion of attention and resources undeniably culminated in significant changes and disruptions to the clinical responsibilities and training of the Otorhinolaryngology (ENT) residents in Singapore.

Hence, the aim of this study was to explore the educational and psychological impact of the COVID-19 pandemic on residents from the ENT Residency Programme at one of the Sponsoring Institutions of the National Healthcare Group (NHG) in Singapore.

METHODS

This is a cross-sectional study of ENT residents from the NHG ENT Residency Programme. It was conducted from April - May 2020, during which Singapore and its healthcare institutions remained on a heightened alert. The participating sponsoring institution from the NHG was Tan Tock Seng Hospital (TTSH), Singapore.

Our study protocol was formally reviewed and approved by the Domain Specific Review Board, NHG, Singapore. Residents' details were anonymised before analysis.

This study followed the number of ambulatory patients reviewed by a junior ENT resident, the operative loads of a junior and senior ENT resident in the TTSH Department of ENT from 1st January 2020 - 30th April 2020. These figures were directly compared with the respective ambulatory and operative load from 1st January 2019 - 30th April 2019, based on the assumption that the mean ambulatory and operative load of a resident at a public healthcare

institution remained fairly constant across the same time period in a different calendar year. Secondary outcome measures included residents' protected teaching time, disruptions in examination schedules and educational courses.

To evaluate the impact of COVID-19 on the psychological wellness of residents of an ENT training programme, residents were asked to independently complete two questionnaires. Participation was voluntary and anonymity was assured.

The first questionnaire employed was the "General Health Questionnaire (GHQ-12), a validated screening instrument introduced by Goldberg to evaluate for psychological distress.⁽³⁾ It aims to measure 3 domains; Anxiety and depression, social dysfunction and loss of confidence which have arisen from an unpleasant event. It consists of 12 questions, six of which are positively-worded items while the rest comprises negatively-worded items. We adopted the four-point Likert scoring scale (i.e. 0, 1, 2, 3) for our study. The total score ranges from 0 to 36, of which scores more than 12 imply possible psychological distress that may warrant further psychological evaluation (sensitivity 78.9%, specificity 77.4%⁽⁴⁾). The second questionnaire was the "Impact of Events Scale – Revised" which is a 22-item self-reported instrument that measures the subjective distress caused by traumatic events. It has 3 subscales (intrusion, avoidance and hyperarousal), which are closely affiliated with post-traumatic stress disorder (PTSD) symptoms. A total IES-R cut-off score of 24 raises the clinical concern of PTSD and its associated mental well-being consequences.⁽⁵⁾

All statistical analyses in this study were performed using the Statistical Package for the Social Sciences (SPSS, Chicago, III), Version 20.0. Comparative analysis of means was performed using the T Test. A P Value of < 0.05 is considered statistically significant.

RESULTS

In this study, the ambulatory clinical load, measured by the mean number of patients reviewed by a junior ENT resident in January - April 2019 was directly compared with that across the same time period in 2020, during the heightened phase of the disease outbreak in Singapore. From January - April 2019, the mean number of patients seen by a junior ENT resident per month was 130.75 ± 54.78 . This decreased significantly during the COVID-19 disease outbreak in the subsequent year to a mean of 70.50 ± 32.19 patients ($P < 0.001$). (Table I, Fig. 1)

Table I. Ambulatory Clinical Load of a Junior Resident in 2019 and 2020 (January - April)

	January	February	March	April	Mean (\pm SD)	P Value
2019	135	195	149	44	130.75 \pm 54.78	P < 0.001
2020	71	115	72	24	70.50 \pm 32.19	

The negative impact of the COVID-19 disease outbreak on education was further compounded by a significant drop in the mean operative load across the same time period (January - April) from Year 2019 to Year 2020. From January - April 2019, the mean number of surgeries per month performed by a junior ENT resident was 25.50 ± 7.43 . This fell to a mean of 16.50 ± 6.22 ($P < 0.001$) cases in the subsequent year during the COVID-19 disease outbreak. (Table II, Fig. 2) This finding was similarly observed in a senior ENT resident where the mean number of surgeries performed per month fell from a mean of 22.50 ± 6.54 to 12.50 ± 4.27 ($P < 0.001$). (Table III, Fig. 3)

Table II. Number of ENT Surgeries performed by a Junior Resident in 2019 and 2020 (January - April)

	January	February	March	April	Mean (\pm SD)	P Value

2019	32	27	30	13	25.50±7.43	P < 0.001
2020	22	20	18	6	16.50±6.22	

Table III. No. of ENT surgeries performed by a Senior Resident in 2019 and 2020 (January - April)

	January	February	March	April	Mean (± SD)	P Value
2019	25	21	31	13	22.50 ± 6.54	P < 0.001
2020	18	15	10	7	12.50 ± 4.27	

During the COVID-19 disease outbreak, ENT residents from TTSH were deployed to support the screening facility at the National Centre for Infectious Diseases (NCID). In Singapore, the NCID is the designated frontline healthcare institution for the management of patients with COVID-19. The first ENT resident was deployed to the NCID Screening Facility on January 31, 2020. Each rotation to the screening facility lasted a total of ten days in duration. Up till June 2020, ENT residents are still being deployed to NCID on a regular basis.

The educational disruptions to routine effected by the COVID-19 outbreak also persisted in other facets of the ENT residency training programme. On January 28, 2020, the 4-day NHG (National Healthcare Group) ENT Surgical Dissection Course was cancelled, just one day prior to the expected course date. Postponements in educational events also extended to residency examinations and assessments. On January 30, 2020, it was announced that the annual ACGME-I (Accreditation Council for Graduate Medical Education - International) Otolaryngology Training Examination originally planned for March 2020 was cancelled. Similarly, on March 10, 2020, the Academy of Medicine, Singapore, announced that the Exit Accreditation Examination would be postponed from May 16, 2020 to a tentative date two months later. Likewise, the Masters of Medicine (ENT) Examination was postponed from April 2020 to August 2020.

In addition, to comply with increasingly stringent social distancing measures enforced by healthcare authorities, effective from February 3, 2020, the weekly national centralised in-person teaching seminar was moved to a web-based livestream broadcast. The weekly institutional teaching sessions in TTSH were also postponed indefinitely from February 13, 2020 onwards. The latter resulted in a weekly reduction of 3 hours of protected training time, further compromising valuable training opportunities for residents.

The psychological impact of the COVID-19 disease outbreak on residents is similarly apparent. In this study, the mean GHQ-12 score among the residents was 14. All residents felt that they had difficulty concentrating on their tasks (Question 1), 42.87% of residents felt that they had problems overcoming their difficulties (Question 6), 57.14% of residents felt that they were not able to enjoy their day-to-day activities (Question 7) and 57.14% of residents felt that their overall happiness was less than usual during this period (Question 12).

Their mean IES-R score was 14 which implied that none of the residents had scores that raise clinical concern of PTSD.

DISCUSSION

Amongst the myriad of policies introduced by the Ministry of Health to divert resources to the management of the COVID-19 outbreak, both elective and emergency surgical procedures sans oncologic and trauma surgeries were postponed with immediate effect. At the point of writing in June 2020, these policies remained in place. This resulted in a detrimental impact on the surgical training for ENT residents in TTSH. Operative load was reduced by 34.61% for a junior resident and 43.48% for a senior resident while the outpatient clinic consultations by a junior resident dropped by 45.80% during the COVID-19 pandemic. The decline in operative load was most pronounced in April 2020, during which a slew of measures termed the “Circuit-breaker” was introduced by local healthcare authorities in an attempt to stem further

community transmission of the disease. For TTSH, this comprised multiple measures, including the cancellation/ postponement of non-urgent elective ENT surgeries as well as the diversion of emergency cases to other restructured hospitals, necessarily resulting in a decline in emergency surgical cases.

In TTSH, institutional teaching sessions were postponed indefinitely to avoid large group gatherings of healthcare workers in the spirit of social distancing. The national centralised teaching seminars were permitted to proceed albeit via an online webcast platform.

We had learnt from the 2003 SARS pandemic that psychological distress is not uncommon amongst front-line healthcare workers.⁽⁶⁾ Similarly in this COVID-19 outbreak, with medical education and clinical services pressed to adapt to this existential crisis, the anxiety and distress amongst ENT residents were understandably palpable. Disruptions to educational and clinical routines were significant and ever increasing. Medical conferences and ENT Intermediate and Exit Accreditation examinations were postponed, adding to the anguish and psychological distress already evident in ENT residents.

In addition, Otolaryngologists were at a uniquely higher risk of being infected with COVID-19 due to the frequent contact with the upper respiratory tract in their field of practice. During the course of routine evaluation and management of patients, they will invariably come into contact with upper respiratory tract secretions, which may become aerosolized during an inadvertent sneeze or cough.⁽⁷⁾ Such events typically occur during a nasal and upper airway endoscopy, or during routine examination of the oral cavity and oropharynx.⁽⁸⁾ Therefore, ENT residents are in a particularly unique position that would undoubtedly contribute to the psychological stress they experience during the COVID-19 pandemic. This finding is well demonstrated in this study, in which ENT residents reported a mean GHQ-12 score of 14, for which a score of greater than 12 implies negative mental health.⁽⁴⁾ Significantly, greater than half of ENT residents from the NHG programme reported an overall decline in happiness and

inability to enjoy their usual day to day activities during this pandemic. However, despite these challenges, it is heartening to know that the resilience of the residents did not waver as demonstrated by their low IES-R scores. We believe that this may be ascribed to increased mental preparedness and stringent infection control measures after Singapore's SARS experience.⁽⁹⁾

It is without question that COVID-19 will leave an indelible scar on all healthcare professionals. While technology has attempted to seemingly mitigate the inconveniences of this challenging time, the pervasive impact of COVID-19 on residents' education and psychological wellness will remain with many for the rest of their lives. From an educational perspective, it is apparent that training opportunities were marginalised to serve critical healthcare needs during this pandemic. Should such an event unfortunately recur in the future, a necessary transition towards webcast-based examinations, educational courses and conferences to minimize disruptions to routine must happen when feasible. Additionally, increasing the frequency of formative assessments to better assess for training deficiencies, with remedial extension of training if required should remain an option. On a broader scale, the pervasive ramifications of this pandemic on graduate medical education as a whole must be taken into vital consideration. While the increased exposure to aerosol generating procedures in the practice of ENT may render ENT doctors more vulnerable, the tentacles of the COVID-19 pandemic are far-reaching, with residents and faculty from a myriad of disciplines succumbing to the COVID-19 pandemic in the United States of America. Further studies should therefore evaluate the wider impact of this pandemic on graduate medical education in Singapore as the negative repercussions on this foundation of healthcare can have potentially deleterious effect on the health and happiness of a nation.

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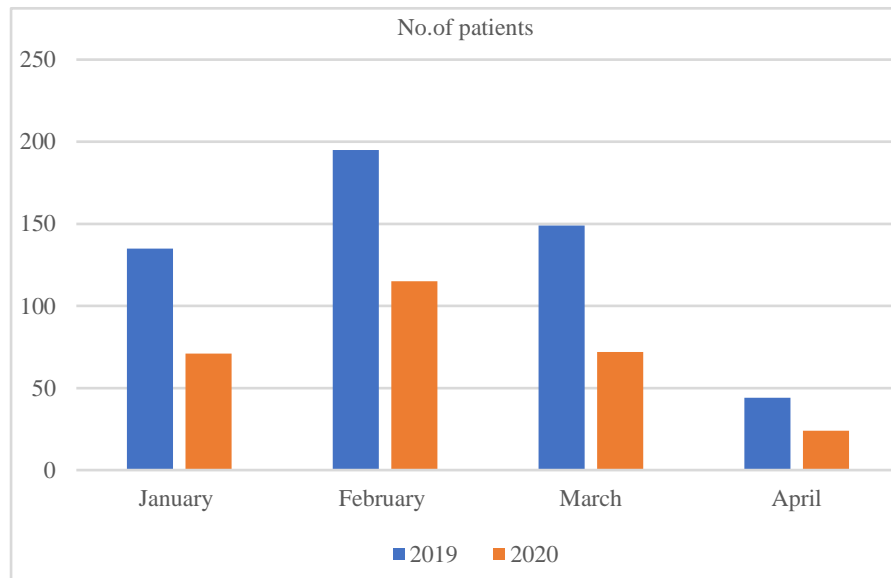
FIGURES

Fig. 1. Ambulatory Clinical Load of a Junior Resident in 2019 and 2020 (January - April)

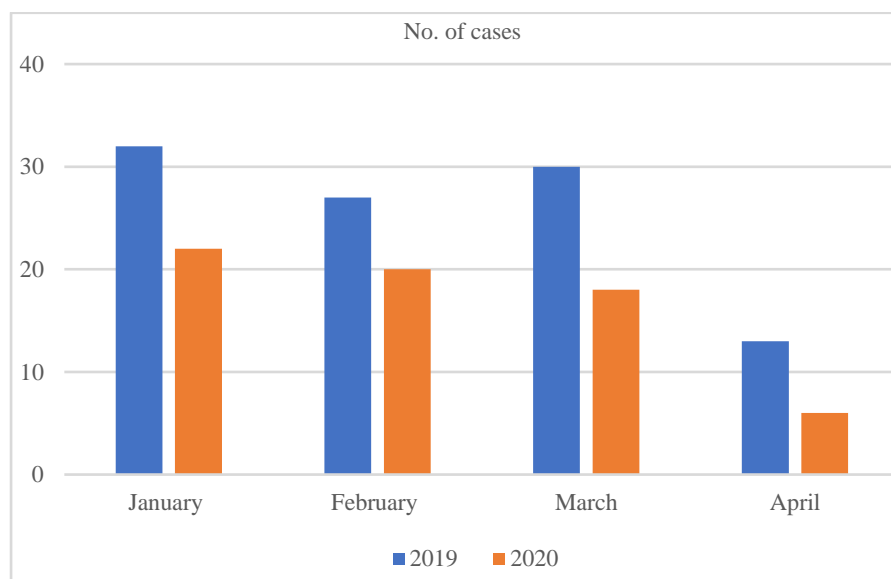


Fig. 2. Number of ENT Surgeries performed by a Junior Resident in 2019 and 2020 (January - April)

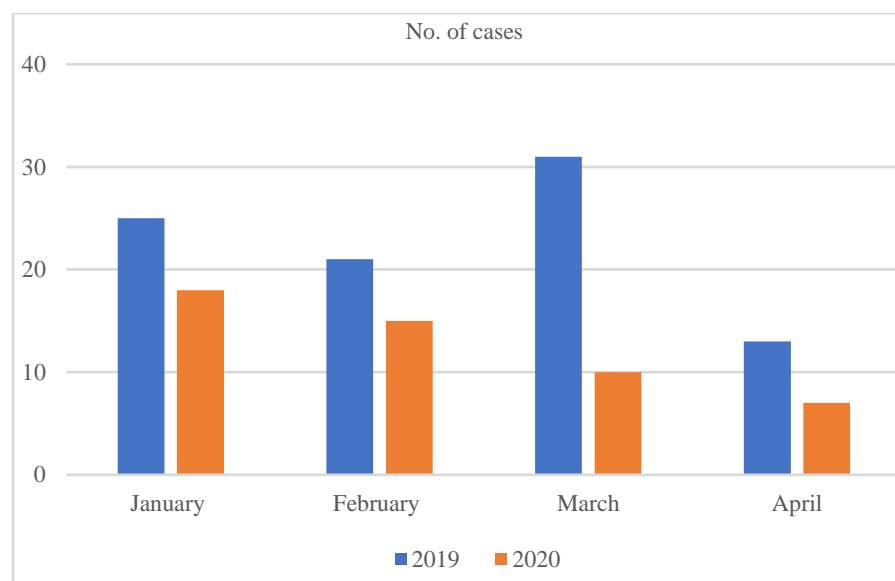


Fig. 3. Number of ENT Surgeries performed by a Senior Resident in 2019 and 2020 (January – April)