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IMPACT OF THE COVID-19 PANDEMIC ON SURGICAL TRAINING OF JUNIOR RESIDENTS- IN A TERTIARY CARE CENTER

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ABSTRACT

Background: the healthcare field is one of the most affected sectors during and following the COVID-19 pandemic globally including in India along with medical teaching. COVID-19 has severely decreased the training level of the resident healthcare personnel. However, existing literature and statistical data are scarce concerning the correlation between different phases of the COVID-19 pandemic and the satisfaction level of residents under surgical training.

Aim: The present study aimed to assess the impact of the COVID-19 pandemic on the surgical training of Junior Residents- in a tertiary care center in JNMCH, AMU, Uttar Pradesh, India.

Methods: The present retrospective study was done from December 31st, 2021 & January 31st, 2022, and included 30 resident doctors with 10 subjects each from the 1st, 2nd, and 3rd year residency program. From each participant, data gathered were satisfaction data (based on on-hand surgical training, teaching services, perceived mental and perceived physical stress) to Surgery services-teaching services data (Outpatient department (OPD), Surgical emergency services, Surgical patient admission to ward, Elective surgeries, Seminars, and Conferences) during Pre covid, Covid phase 1, Covid phase 2 and Post covid phase of JNMCH, AMU, Aligarh, Uttar Pradesh, India, a tertiary care hospital.

Results: The study results showed a significant correlation between a reduction in both Surgery services-teaching services and Surgery resident satisfaction in Pre covid, Covid phase 1, Covid phase 2, and Post covid phase of JNMCH, AMU, Aligarh, Uttar Pradesh, India, a tertiary care hospital.

Conclusions: The present study concludes and focuses on the impact of reduced Surgery services-teaching services during Covid Phase 1 and Covid Phase 2 on the reduced satisfaction of overall satisfaction levels in surgery residents.

Keywords: COVID-19, medical teaching, Pandemic, Surgical Practice, Surgical Training

INTRODUCTION

The COVID-19 pandemic has badly affected the population globally including in India. It has been a highly devastating and brutal disease affecting all aspects of the lives of human beings. It has led to more than 45.5 lakh deaths globally with an overall number of cases to be 21.9 crores, whereas, in India, COVID-19 has led to 4.46 lakh deaths among 3.36 crore cases following the data till September 2021, the disease has broken the backbone of all the countries in all aspects of the life. The disease is caused by a virus that is a member of the Coronaviridae family. Apart from the virus causing COVID-19, various other members of the coronavirus exist in humans and animals. The term corona depicts crown-like surface projections on the virus. The coronavirus causing COVID-19 has the largest genome for any ribonucleic acid (RNA) virus described so far. These viruses are commonly known to cause respiratory infections like the common cold.^{1,2,3}

A relatively new infectious disease known as SARS (respiratory infections like the common cold) first was seen in the Guangdong province of PR China in November 2002 and was attributed to be caused by a virus named SARS Coronavirus.⁴ The current COVID-19 is known as the novel coronavirus SARS-nCoV-2 and is among seven types of coronaviruses that lead to severe diseases such as SARS (sudden acute respiratory syndrome) and MERS (Middle East Respiratory Syndrome). COVID-19 started as an outbreak in Wuhan, China, in December 2019.³

COVID-19 outbreak has quickly spread around the globe leading to devastation in all the dimensions of life of human beings. COVID-19 has predominantly emerged as a respiratory tract infection, however, its pathogenicity is seen in all the organ systems of humans and has created havoc across all the nations. COVID-19 virus has a positive-stranded RNA that can act as an mRNA (messenger RNA) in the infected cells assisting in the rapid spread and was soon turned into a pandemic.⁵

By the end of the year 2020, India was considered one of the 50 countries that isolated subjects that tested positive for COVID-19. Also, India imposed a one-day curfew in the country on March 22, 2020, to alert subjects concerning the danger of COVID-19 India could face. The Indian government has also announced a nationwide 21-day lockdown from 25 March 2020 followed by the second, third, and fourth lockdowns. This was known as the 1st wave of the COVID-19 pandemic.⁶

The second wave of COVID-19 started around 11 February 2021 in India. It affected the Indian subjects very badly with the daily case count reaching nearly triple the numbers from the first peak as from the data of 19 April 2021. However, a sharp decrease was seen in the cases in July 2021 and the majority of the services were resumed in India from September 2021. The impact of COVID-19 on as reduction of the teaching of Surgery resident Doctors has been addressed in many literature studies in the past with no correlation of the Surgery services-teaching services data.⁷

MATERIALS AND METHODS

The present retrospective observational study was aimed to assess the impact of the COVID-19 pandemic on the surgical training of Junior Residents- in a tertiary care center in JNMCH, AMU, Uttar Pradesh, India. The study was done at JNMCH, AMU, Uttar Pradesh, India from December 31st, 2021 & January 31st, 2022. The study participants were residents of the Surgery Department of the Institute. Verbal and written informed consent were taken from all the subjects before study participation.

The study included 30 residents with 10 residents each from 1st Year, 2nd Year, and 10-3rd Year. The study assessed correlation of Surgery residents (30 residents; 10-1st Year, 10-2nd Year and 10-3rd Year) satisfaction data (based on on-hand surgical training, teaching services, perceived mental and perceived physical stress) to Surgery services-teaching services data (Outpatient department (OPD), Surgical emergency services, Surgical patient admission to ward, Elective surgeries, Seminars and Conferences) during Pre covid, Covid phase 1, Covid phase 2 and Post covid phase of JNMCH, AMU, Aligarh, Uttar Pradesh, India, a tertiary care hospital.

Pre covid, Covid 1st wave phase, Covid 2nd wave phase, and Post covid phase three months Surgery services-teaching services data were obtained and mean per-monthly data (3 month data/3). Variables were the number of

Outpatient Department (OPD) patients attended, Number of Surgical patients admitted to the ward, Number of Elective surgeries done, Number of Emergency Surgical operations done, Number of Seminars that occurred, and Number of Conference organized during Pre covid, Covid phase 1, Covid phase 2 and Post covid phase of JNMCH, AMU, Aligarh, Uttar Pradesh, India, a tertiary care hospital.

The 30 study subjects were selected using the simple random sampling technique of 10:1st Year, 10: 2nd Year, and 10: 3rd Year General Surgery Residents. The study utilized a structured questionnaire for data collection that comprised four questions with rating scores of 1 to 5 depending on their experience during pre-covid, COVID phase 1, COVID phase 2, and Post covid phase concerning perceived physical stress, perceived mental stress, teaching services, and on-hand surgical training at JNMCH, AMU, Aligarh, Uttar Pradesh, India.

The questionnaire was given to the subjects and was in the English language after collecting the demographics from the subjects. In all the 30 chosen Surgery residents, they were asked to answer the questionnaire in written format. The questionnaire assessed in the study included questions such as the name of the subject and year of residency program along with their experience with hands-on training, satisfaction by teaching-training services, perceived workload stress, and perceived mental stress which was rated on a scale of 1-5 where 1 depicted minimum scores and 5 depicted maximum scores.

After obtaining the data, the mean of all four factors in all four phases of COVID-19 in all the 30 surgery residents was calculated and correlated to the mean surgery services-teaching services data in the respective assessment phases.

The data gathered were analyzed statistically using SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk. NY, USA) for assessment of descriptive measures, one-way ANOVA (analysis of variance), Pearson correlation, and chi-square test. The results were expressed as mean and standard deviation and frequency and percentages. The p-value of <0.05 was considered statistically significant.

RESULTS

The present retrospective observational study was aimed to assess the impact of the COVID-19 pandemic on the surgical training of Junior Residents- in a tertiary care center in JNMCH, AMU, Uttar Pradesh, India. The present study included 30 resident doctors with 10 subjects each from the 1st, 2nd, and 3rd-year residency program. From each participant, data gathered were satisfaction data (based on on-hand surgical training, teaching services, perceived mental and perceived physical stress) to Surgery services-teaching services data (Outpatient department (OPD), Surgical emergency services, Surgical patient admission to ward, Elective surgeries, Seminars and Conferences) during Pre covid, Covid phase 1, Covid phase 2 and Post covid phase of JNMCH, AMU, Aligarh, Uttar Pradesh, India, a tertiary care hospital.

On assessing the mean surgery services-teaching services per monthly data in pre-covid, Covid 1st wave phase, Covid 2nd wave phase, and Post covid phase, elective surgeries were done in 70.28% (n=991), 0.85% (n=12), 23.75% (n=335), and 51.56% (n=727) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. OPD services were needed in 46.45% (n=6650), 0.52% (n=75), 11.66% (n=1670), and 41.35% (n=5921) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Ward admissions were done in 44.03% (n=1265), 0.87% (n=25), 19.56% (n=562), and 35.53% (n=1021) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Emergency surgeries were done in 40.82% (n=365), 8.38% (n=75), 18.68% (n=167), and 32.10% (n=287) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Seminars were attended by 41.66% (n=100), 0, 16.66% (n=40), and 41.66% (n=100) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Conferences were attended by 50% (n=4), 0, 12.5% (n=1), and 37.5% (n=3) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively (Table 1).

It was seen that for mean satisfaction scores in study subjects in all four COVID basis based on the questionnaire response, on-hand training scores were 5, 1, 1, and 4 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Teaching satisfaction scores were 5, 1, 1, and 4 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Perceived workload scores were 4, 1, 2, and 4 at 3

months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Perceived mental stress scores were 4, 1, 2, and 4 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Overall mean resident satisfaction scores were 18, 4, 6, and 16 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively (Table 2).

The study results showed that for correlation between Mean Surgery Resident Satisfaction Score about the Surgery & teaching services during Pre covid, Covid 1st wave phase, Covid 2nd wave phase, and Post covid phase, elective surgeries were done in 991, 12, 335, and 727 subjects during pre-Covid 1st wave phase, Covid 2nd wave phase and Post covid phase respectively which was significantly higher pre-COVID with $p=0.02928$ showing significant positive correlation. Ward admission was also significantly higher at pre-COVID followed by 3 months after 2nd wave with $p=0.04673$ showing a significant positive correlation. OPD services also showed a significant positive correlation with r and p -values of 0.9959 and 0.004113 respectively. Emergency services also showed a significant positive correlation with r and p -values of 0.9737 and 0.02634 respectively. Conferences showed a significant positive correlation with r and p -values of 0.9878 and 0.01224 respectively. Also, the seminar showed a significant positive correlation with r and p -values of 0.9687 and 0.03127 respectively (Table 3).

DISCUSSION

The present study assessed 30 resident doctors with 10 subjects each from the 1st, 2nd, and 3rd-year residency program. From each participant, data gathered were satisfaction data (based on on-hand surgical training, teaching services, perceived mental and perceived physical stress) to Surgery services-teaching services data (Outpatient department (OPD), Surgical emergency services, Surgical patient admission to ward, Elective surgeries, Seminars and Conferences) during Pre covid, Covid phase 1, Covid phase 2 and Post covid phase of JNMCH, AMU, Aligarh, Uttar Pradesh, India, a tertiary care hospital. The study design was similar to the design adopted by Rahman SZ et al⁸ in 2020 and Amir SH et al⁹ in 2021 where authors scenarios and challenges in managing emergency trauma services during the COVID-19 pandemic.

It was seen that on assessing the mean surgery services-teaching services per monthly data in pre-covid, Covid 1st wave phase, Covid 2nd wave phase and Post covid phase, elective surgeries were done in 70.28% ($n=991$), 0.85% ($n=12$), 23.75% ($n=335$), and 51.56% ($n=727$) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. OPD services were needed in 46.45% ($n=6650$), 0.52% ($n=75$), 11.66% ($n=1670$), and 41.35% ($n=5921$) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Ward admissions were done in 44.03% ($n=1265$), 0.87% ($n=25$), 19.56% ($n=562$), and 35.53% ($n=1021$) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Emergency surgeries were done in 40.82% ($n=365$), 8.38% ($n=75$), 18.68% ($n=167$), and 32.10% ($n=287$) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Seminars were attended by 41.66% ($n=100$), 0, 16.66% ($n=40$), and 41.66% ($n=100$) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Conferences were attended by 50% ($n=4$), 0, 12.5% ($n=1$), and 37.5% ($n=3$) subjects at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. These data were comparable to the previous studies of Al-Jabir A et al¹⁰ in 2020 and Ennab RM¹¹ in 2021. Similar to the present study authors probed the effect of a pandemic on the practice of Surgery.

The study results showed that for mean satisfaction scores in study subjects in all four COVID basis based on the questionnaire response, on-hand training scores were 5, 1, 1, and 4 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Teaching satisfaction scores were 5, 1, 1, and 4 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Perceived workload scores were 4, 1, 2, and 4 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Perceived mental stress scores were 4, 1, 2, and 4 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. Overall mean resident satisfaction scores were 18, 4, 6, and 16 at 3 months before 1st wave, 1st wave, 2nd wave, and 3 months after 2nd COVID wave respectively. These results were consistent with the findings of Bernardi L et al¹² in 2020 and Stöß C et al¹³ in 2020 where similar to the present study authors assessed and reported the impact of the COVID-19 pandemic on various aspects of the practice of Surgery.

It was seen that for correlation between Mean Surgery Resident Satisfaction Score about the Surgery & teaching services during Pre covid, Covid 1st wave phase, Covid 2nd wave phase, and Post covid phase, elective surgeries were done in 991, 12, 335, and 727 subjects during Pre covid, Covid 1st wave phase, Covid 2nd wave phase and Post covid phase respectively which was significantly higher pre-COVID with $p=0.02928$ showing significant positive correlation. Ward admission was also significantly higher at pre-COVID followed by 3 months after 2nd wave with $p=0.04673$ showing a significant positive correlation. OPD services also showed a significant positive correlation with r and p -values of 0.9959 and 0.004113 respectively. Emergency services also showed a significant positive correlation with r and p -values of 0.9737 and 0.02634 respectively. Conferences showed a significant positive correlation with r and p -values of 0.9878 and 0.01224 respectively. Also, the seminar showed a significant positive correlation with r and p -values of 0.9687 and 0.03127 respectively. These findings were in agreement with the previous studies of Anjankar VP et al¹⁴ in 2020 and Khan S et al¹⁵ in 2021 where authors reported findings similar to the present study were reported by the authors in their studies on the impact of COVID-19 on the healthcare sector and personnel.

CONCLUSIONS

The present study, considering its limitations concludes that and focuses on the impact of reduced Surgery services-teaching services during Covid Phase 1 and Covid Phase 2 on the reduced satisfaction of overall satisfaction levels in surgery residents. Further, longitudinal studies are needed in the future with larger sample sizes and more parameters to reach a definitive assessment and conclusions.

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TABLES

Phase (per month average data of 3 months) n (%)	Elective surgeries (n=1410)	OPD services (n=14316)	Ward admissions (n=2873)	Emergency surgeries (n=894)	Seminars (n= 240)	Conferences (n=8)
3 months before 1 st wave	991 (70.28)	6650 (46.45)	1265 (44.03)	365 (40.82)	100 (41.66)	4 (50)
1 st wave	12 (0.85)	75 (0.52)	25 (0.87)	75 (8.38)	0	0
2 nd wave	335 (23.75)	1670 (11.66)	562 (19.56)	167 (18.68)	40 (16.66)	1 (12.5)
3 months after 2 nd wave	727 (51.56)	5921 (41.35)	1021 (35.53)	287 (32.10)	100(41.66)	3 (37.5)

Table 1: Mean surgery services-teaching services per monthly data in pre-covid, COVID 1st wave phase, Covid 2nd wave phase, and Post covid phase

Phase (average of 30)	On hand training (1-5)	Teaching satisfaction (1-5)	Perceived workload stress (1-5)	Perceived mental stress (1-5)	Overall mean resident satisfaction
3 months before 1 st wave	5	5	4	4	18
1 st wave	1	1	1	1	4
2 nd wave	1	1	2	2	6
3 months after 2 nd wave	4	4	4	4	16

Table 2: Mean satisfaction scores in study subjects in all four COVID basis based on the questionnaire response

Parameter	3 months before 1 st wave	1 st wave	2 nd wave	3 months after 2 nd wave	r- value	p-value
Elective surgeries	991	12	335	727	0.9707	0.02928
Ward admission	1265	25	562	1021	0.9533	0.04673
OPD services	6650	75	1670	5921	0.9959	0.004113
Emergency services	365	75	167	287	0.9737	0.02634
Conferences	4	0	1	3	0.9878	0.01224
Seminar	100	0	40	100	0.9687	0.03127

Table 3: Co-relation between Mean Surgery Resident Satisfaction Score about the Surgery & teaching services during Pre covid, Covid 1st wave phase, Covid 2nd wave phase, and Post-COVID phase.