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Original Research Article

Pandemic and medical education of surgical residents in a tertiary care hospital in India: a cross-sectional study

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ABSTRACT

Background: COVID-19 pandemic has brought tremendous changes in the functioning of residency training. The impact was maximal on surgical residents whose hands-on training was affected. This study aimed to assess the effect of COVID-19 pandemic on medical education and training of surgical residents.
Methods: A single institutional cross-sectional survey was conducted in a large tertiary care hospital in India. It included residents in various surgical specialties. The survey was divided into six sections to cover all the aspects of their residency.
Results: Out of 106 residents who participated in the study, 95 (59.3%) had worked in the dedicated COVID-19 facility, and 97 (91.5%) feared transmitting the infection to their family members. There was a considerable reduction in both elective and emergency surgeries performed by residents ($p<0.05$).
There was a significant reduction in the working hours per day, helping residents get more time for research work. Further Maslach burnout inventory score was 7.43±2.35 after the pandemic, which shows a statistically significant reduction ($p<0.001$) in residents' burnout.
Conclusions: Surgical residents had to balance their residency training with caring for COVID-19 patients. There had been a decrease in their hands-on training, clinical exposure, and working hours. Both theoretical and practical training of surgical residents has been affected during this pandemic. This survey can be used as a tool to improve the lives of surgical residents in any pandemic situation or during further waves of COVID-19.

Keywords: Surgery, Residents, Residency, COVID-19, India

INTRODUCTION

Since December 31, 2019, the world has been battling the novel Coronavirus disease-2019 (COVID-19). This virus emerged in the city of Wuhan, China before, rapidly spreading across all countries worldwide. The world health organization declared it a global pandemic on March 11, 2020.[1] The healthcare systems worldwide had to rapidly readjust their functioning to balance the care provided for COVID-19 and non-COVID-19 patients. India being a densely populated country, was one of the worst-hit with an exponential rise in patients requiring hospitalization. This impact was severe during the second wave in 2021. As a result, the government-initiated lockdown to restrict people's movement and curb the virus's spread similar to 2020. A government directive was issued to hospitals to stop all nonessential outpatient services and elective surgeries, and only emergency medical services were permitted. Resources were reallocated in most hospitals to care for patients with COVID-19 by shutting down regular wards to mobilize beds, ventilators, and health care workers (HCW).

Residents and fellows in training formed the bulk of HCW in the frontline. The increase in cases increased the workload and disrupted the residents' training.[2] Residents in surgical specialties were affected due to sudden cessation of surgical training. Surgical residents were also called on to care for patients with COVID-19.[3] The prolonged physical, emotional and mental exhaustion among HCWs led to numerous psychological problems.[4] Surgical training forms the important part of medical education for surgical residents. Understanding the effects of this interruption of surgical training is essential for addressing the training gaps.[5]

This study was conducted on surgical residents in a tertiary care hospital and medical school in India. It aimed to assess effect of COVID-19 on medical education of surgical residents. It can be used to improve professional and personal lives of this cohort of HCWs in pandemic situation and during further waves of COVID-19.

METHODS

Study design and procedure

A web-based survey was conducted to assess the effect of COVID-19 on the residents in various surgical specialties in Jawaharlal institute of post graduate medical education and research. The survey was open between March 7, 2021, to March 21, 2021. The "open epi" software was used to calculate the sample size. The interview questions were generated through focus group discussions with five surgery residents from various specialties. Pilot interviews were conducted with three residents from general surgery, gynecology, and otolaryngology. All the surgical residents were invited to participate in the survey using WhatsApp and Telegram. Participation was voluntary, and no incentives were offered. After a brief introduction to the survey, participants were asked to consent before accessing the questionnaire. To maintain anonymity, no personal details were collected. The survey response tool was set up such that each participant was able to respond only once to the survey. Maslach burnout index (MBI) was used to assess burnout experienced by surgical residents. It was modified such that each of the individual components was asked as a yes or no question. Yes, was considered as 1 point and no as 0 points. The score of 22 questions was simply added (Table 5). Inclusion criteria was all the residents in surgical specialties who have performed COVID duty. Exclusion criteria was non-surgical residents and Surgical residents not posted in covid related duties due to various reasons like pregnancy, lactation.

Questionnaire content and statistical analysis

The survey consisted of 5 sections. a) Demographic details, b) Surgical residents and COVID-19 related work, c) Impact of COVID-19 on surgical training of residents, d) COVID-19 and resident burnout and e) Academic activities during COVID-19.

Statistical analysis was done using SPSS (version 23). Continuous data were described as mean and standard deviation and categorical data as proportions. The difference between means was calculated using the "paired t-test." Statistical analysis was performed at the 5% level of significance, and $p<0.05$ was considered statistically significant. Results of the survey were reported in line with cherries guideline.[6] This study was performed in line with the principles of the declaration of Helsinki. We consulted extensively with the IRB of our institute and was decided that our study does not need ethical approval. An IRB official waiver of ethical approval was granted from the IRB of JIPMER.

RESULTS

A total of 106 surgical residents completed the survey out of 140 residents who received it (response rate 75.7%). Of the 106 respondents, 62 (58.5%) were male, and 90 (85%) residents were less than 30 years of age. Twenty-three percent of respondents were in the first year of their residency, 44% in their second year, and the remaining in the final year. Residents from 8 surgical specialties participated in the survey (Table 1).

Table 1: Demographic details.

Surgical specialty	N (%)
General surgery	30 (28.3)
Obstetrics and gynaecology	23 (21.7)
Otorhinolaryngology	18 (17)
Ophthalmology	11 (10.3)
Orthopaedics	12 (11.3)
Plastic surgery	4 (3.77)
Surgical oncology	4 (3.77)
Urology	4 (3.77)
Total	106

Residents were asked about their time in COVID ward, their concerns, and common problems encountered with using personnel protection equipment (PPE) (Table 2).

Inpatient and outpatient services were significantly affected by the pandemic, and it negatively impacted training. Ninety (84.9%) surgical residents felt the reduction in bed strength, and 88(83%) felt reduction in the number of patients seen by a resident in the outpatient clinic had impacted their learning. The amount of time spent on research work, however, increased by 70 (66%). The 81 (76.4%) residents efficiently utilized telemedicine for outpatient care, and 73 (68.9%) residents felt telemedicine had improved patient care. There was a significant (paired t test; $p<0.05$) reduction in working hours since the pandemic began (8.35±2.15 hours) when compared to pre-pandemic time (13.45±2.03 hours). Hands-on surgical training was significantly affected (Table 3).

Table 2: Surgical residents and COVID-19 related work.

COVID-19 related work	N (%)
Have you worked in the COVID ward?	
Yes	95 (59.3)
No	11 (10.3)
How many weeks have you worked in the COVID ward?	
1-5	73 (68.8)
5-10	22 (20.7)
>10	0
NA	11 (10.3)
What are you most worried about while working in the COVID ward?	
Getting infected	88 (83)
Transmitting the disease to family members	97 (91.5)
Fear of death due to COVID	30 (28.3)
What is the most difficult part of working with the PPE?	
Poor visibility with goggles or face shield	70 (66)
Breathing difficulty with the N-95 mask	63 (59.4)
Inability to communicate with assistant	40 (37.7)
Poor ventilation	54 (50.9)

The academic activities changed during the pandemic. Most of the departments turned to online teaching platforms for conducting seminars and lectures (Table 4).

MBI was modified for the sake of simplicity. The average score before pandemic was 13.68±2.56, and after the pandemic, it was reduced to 7.43±2.35, showing a statistically significant reduction in burnout among residents ($p<0.001$) (Table 6).

Table 3: Effects of the pandemic on the surgical training of residents.

Variables	Mean ± SD, P value
If you were performing/assisting 10 elective surgeries per week before the pandemic, how many elective surgeries are you performing/ assisting per week during the pandemic? (Paired t-test)	1.45±1.21, ($p<0.001$)
If you were performing/assisting 10 emergency surgeries per week before the pandemic, how many emergency surgeries are you performing/assisting per week during the pandemic? (Paired t-test)	4.23±0.41, ($p<0.001$)

Table 4: Changes in academic programs in the departments.

Variables	N (%)
How are academic activities being conducted in your department?	
Virtual online classes	92 (86.7)
Vis-a-vis lectures with social distancing	06 (5.6)
No teaching program since the pandemic	08 (7.5)
Do you think an online learning platform is more effective than in-person classes?	
Yes	32 (31)
No	74 (69.9)

Table 5: COVID-19 and resident burnout.

Variables	Before pandemic, (Yes)		After pandemic, (Yes)	
	N	%	N	%
Emotional fatigue				
Do you feel emotionally drained at work?	60	56.6	40	37.7
Do you feel used up at the end of the work day?	56	52.8	39	36.7
Do you feel fatigued when you wake up in the morning to face yet another day at work?	67	63.2	45	42.4
How often do you feel that dealing with patients all day long is a stress for you?	60	56.6	47	44.3
Do you feel that you are frustrated by your job?	58	54.7	33	31.1
Do you think that you have difficulty creating a relaxed working environment at work?	70	66.0	32	30.1
Do you feel a lack of energy at work?	68	64.1	40	37.7
Do you feel that you are unable to accomplish worthwhile things from your work?	85	80.1	34	32.0
Do you think that this job is hardening you emotionally?	60	56.6	33	31.1

Continued.

Variables	Before pandemic, (Yes)		After pandemic, (Yes)	
	N	%	N	%
Personal fulfilment				
Do you feel like you are at the end of the rope?	70	66.0	35	33.0
Do you feel like you are too hard on your job?	69	65.0	33	31.1
Do you feel like you do not care what is happening to some of your patients?	77	72.6	50	47.1
Do you think that you are unable to bring a positive change in other people's life through your work	68	64.1	45	42.4
Do you think that you have difficulty dealing with emotional problems calmly?	85	80.1	48	45.2
Do you feel that working with people all day long is a strain for you?	87	82.0	46	43.3
Do you feel that you treat some patients as if they are impersonal objects?	79	74.5	47	44.3
Do you feel that you have become callous towards people since you have taken this job?	55	51.8	30	28.3
Depersonalization				
Do you feel burned out from work?	80	75.4	34	32.0
Do you feel that the patient will blame you for anything that goes wrong in their treatment?	79	74.5	33	31.1
Do you think that you have difficulty understanding how your patients feel about things?	82	77.3	36	33.9
Do you think that you have difficulty dealing with the patients' problems?	78	73.5	40	37.7
Do you feel a lack of enjoyment while working with your colleagues?	83	78.3	29	27.3

Table 6: Modified Maslach burnout inventory.

Variables	Before pandemic, Mean ± SD	After pandemic, Mean ± SD	P value
Emotional fatigue	6.89±1.96	3.11±1.49	0.007
Personal fulfilment	7.75±1.43	4.75±1.78	<0.001
Depersonalization	3.4±1.07	2.4±0.84	<0.001
Total MBI	13.68±2.56	7.43±2.35	<0.001

DISCUSSION

COVID-19 brought significant changes in the personal and professional lives of surgical residents. During the entire pandemic, most of the residents and fellows from surgical specialties were also responsible for the care of COVID-19 patients, impacting their hands-on training. A majority feared getting infected or transmitting the infection to their family more than the fear of death while working with COVID-19 patients. These fears were similar to the ones reported by other residents around the world.[7,8] This fear affected their critical thinking and decision-making, which was essential while performing surgeries.[8] Clear and supportive discussions about preparation at home and precautions before leaving the hospital were necessary to allay such fears.[9]

Medical education of surgical residents involves more than surgical training. It involves a graded increase in the responsibility of patient care and the maturation of clinical judgment. These characteristics do not develop in operation theatres alone. They also happen at bedsides and in outpatient clinics. The pandemic led to a reallocation of resources as wards were shut, and beds and intensive care facilities were redistributed for the dedicated care of COVID-19 patients. Residents perceived this as a setback in their learning and training. On the bright side, the number of working hours significantly reduced, allowing residents to focus on research and scientific publications.

Surgical training is the backbone of any surgical residency program. At the beginning of the pandemic, due to government regulations, elective surgeries were stopped initially followed by restricting them to tier 3a and 3b cases later.[10] These regulations were used to mobilize manpower and resources for the care of COVID-19 patients. The lockdown measures initiated by the government also prevented people from reaching hospitals. There was a significant reduction in the number of both elective and emergency surgeries performed by residents. The impact of lack of surgical training will be most significant among residents in the final year and penultimate year of training.[11] Further, operating with PPE like face shield impaired visibility and N-95 respirators made breathing difficult among residents. The impairment of dexterity and unfavorable conditions due to PPE added to the burden of having fewer surgeries to do and learn from.

Before the pandemic, the factors associated with burnout were high among trainees, probably due to long working hours and heavy patient load in our country. This, on the brighter side has come down since the pandemic began which was similar to surgical trainees from other countries.[8] Yet the loss of hands-on training and the constant threat of getting infected must produce a considerable amount of stress in the long run. Lai et al demonstrated 70% and 50% of 1257 healthcare workers in China reported distress and depression symptoms, respectively, during the pandemic.[12] The stress of having to step out of their comfort zone into an unfamiliar high-risk environment was overwhelming and, at times, exhausting.[13,14] Coping strategies were needed to overcome those tough times. The world health organisation recommends eating healthy food, engaging in regular physical activity, and maintaining good sleep hygiene to cope with stress.[15]

Teaching hospitals need to balance patient care and resident training. Academic activities' have undergone tremendous changes since the beginning of the pandemic. With the availability of technology, lecture classes were conducted online.

Online resources helped in continuing the training of residents who were constantly shuffling between COVID-19 and non-COVID-19 patient care. But many residents have felt online classes to be less effective than in-person classes. This could be due to numerous distractions that residents have preventing them from being attentive during the lectures. Thus, both theoretical and practical learning of residents has been affected by the pandemic situation. A dedicated team should be made available in medical colleges to address these problems faced by surgical residents to improve their lifestyle in subsequent COVID-19 waves or another pandemic situation.

The limitation of this study was that this is a single institutional study. A large-scale multi-institutional study would be more representative and give a broader picture of impact of COVID-19 on surgical residency in India.

CONCLUSION

The sudden change in medical education and surgical training caused by this pandemic will have a lasting impact on the residents. Surgical trainees played a significant role in taking care of many COVID-19 patients at the cost of their training. The decrease in working hours due to the pandemic has provided more time for research work and reduction in burnout. But there was substantial reduction in their hands-on training and clinical exposure. Hence a dedicated team should be made available in institutions to address concerns of residents and cope with this new professional lifestyle.

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