

A Web-based Cross-sectional Survey to Assess the Effect of Pandemic on Medical Education of Surgery Residents in a Tertiary Care Hospital

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Abstract

Aim: Effect of pandemic on medical education of surgical residents in a tertiary care hospital in Bihar

Methods: A web-based survey was conducted to assess the effect of COVID-19 on the residents in various surgical specialties in our institute. 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. 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 not as 0 points. The score of 22 questions was simply added.

Results: A total of 100 surgical residents completed the survey out of 130 residents who received it (response rate 76.9%). Of the 100 respondents, 58(58%) were male, and 86 (86%) residents were less than 30 years of age. 24 percent of respondents were in the first year of their residency, 43% in their second year, and the remaining in the final year. Residents from 8 surgical specialties participated in the survey 85(85%) surgical residents felt the reduction in bed strength, and 83(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 66(66%). The 76(76%) residents efficiently utilized telemedicine for outpatient care, and 69(69%) 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 (8.45 ± 2.15 hours) when compared to pre-pandemic time (13.55 ± 2.03 hours). Hands-on surgical training was significantly affected. MBI was modified for the sake of simplicity. The average score before pandemic was 13.78 ± 2.56 , and after the pandemic, it was reduced to 7.63 ± 2.35 , showing a statistically significant reduction in burnout among residents ($p < 0.001$).

Conclusion: 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.

Keywords: COVID-19, Pandemic, medical education, surgical residents

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Introduction

Coronavirus disease 2019 (COVID-19) pandemic had drastically changed the existing robot programmed health care system in India where the patient load, disease burden and its associated morbidity and mortality are very high. The centers of excellence and the tertiary health care centers in the country play a leading role in organized, planned and programmed addressal of the patient load. However, the unplanned, sudden implementation of lockdown due to outbreak of severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2) pandemic throughout the country had compromised the conventional methods of health-care education and facilities. Ability to adapt to the changing scenarios is the hallmark of human evolution and telemedicine hospital services have given hope and promising results to the patients' problem during the pandemic. Telemedicine has been in practice since the past 2 decades worldwide. Patient-doctor interaction via technology like telephone, mobile phone, computer video/audio calling, television video calling, exchange of medical records and reports through mail or fax have been effectively exercised by primary or secondary health care services and remote areas with limited health facilities for procuring expert opinion from centers of excellence or tertiary health care centers in developed countries, developing and underdeveloped countries. Literature on tele health care reflects on their ability to effectively address the patient problems and provide constructive guidance to seek specialist care whenever appropriate [1]. 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 health care

workers (HCW) 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 surgery residents in a tertiary care hospital in Patna, Bihar, 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.

Material and methods

This prospective, longitudinal study was done the Department of general surgery, Patna medical college & hospital, Patna, Bihar, India for 1 year

Methodology

A web-based survey was conducted to assess the effect of COVID-19 on the residents in various surgical specialties in our institute. 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). An inclusion criterion 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

Analysis was done using SPSS (version 25). 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

A total of 100 surgical residents completed the survey out of 130 residents who received it (response rate 76.9%). Of the 100 respondents, 58(58%) were male, and 86 (86%) residents were less than 30 years of age. 24 percent of respondents were in the first year of their residency, 43% 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	28(28)
Obstetrics and gynaecology	22 (22)
Otorhinolaryngology	17 (17)
Ophthalmology	10 (10)
Orthopaedics	11 (11)
Plastic surgery	4 (4)
Surgical oncology	4 (4)
Urology	4 (4)
Total	100

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. 85(85%) surgical residents felt the reduction in bed strength, and 83(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 66(66%). The 76(76%) residents efficiently utilized telemedicine for outpatient care, and 69(69%) 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 (8.45 ± 2.15 hours) when compared to pre-pandemic time (13.55 ± 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)
No	11 (10)
How many weeks have you worked in the COVID ward?	
1-5	69 (69)
5-10	21 (21)
>10	0
NA	10 (10)
What are you most worried about while working in the COVID ward?	
Getting infected	83 (83)
Transmitting the disease to family members	91 (91)
Fear of death due to COVID	28 (28)
What is the most difficult part of working with the PPE?	
Poor visibility with goggles or face shield	66 (66)
Breathing difficulty with the N-95 mask	59 (59)
Inability to communicate with assistant	38 (38)
Poor ventilation	51 (51)

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 13.78 ± 2.56 , and after the pandemic, it was reduced to 7.63 ± 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 \pm 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)	1.55 \pm 1.31, ($p < 0.001$)
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)	4.33 \pm 0.51, ($p < 0.001$)

Table 4: Changes in academic programs in the departments

Variables	N (%)
How are academic activities being conducted in your department?	
Virtual online classes	87 (87)
Vis-a-vis lectures with social distancing	6 (6)
No teaching program since the pandemic	7 (7)
Do you think an online learning platform is more effective than in-person classes?	
Yes	31 (31)
No	70 (70)

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?	57	57	38	38
Do you feel used up at the end of the work day?	53	53	37	37
Do you feel fatigued when you wake up in the morning to face yet another day at work?	63	63	42	42
How often do you feel that dealing with patients all day long is a stress for you?	57	57	44	44
Do you feel that you are frustrated by your job?	55	55	31	31
Do you think that you have difficulty creating a relaxed working environment at work?	66	66	30	30
Do you feel a lack of energy at work?	64	64	37	37
Do you feel that you are unable to accomplish worthwhile things from your work?	80	80	32	32
Do you think that this job is hardening you emotionally?	57	57	31	31
Personal fulfilment				
Do you feel like you are at the end of the rope?	66	66	33	33
Do you feel like you are too hard on your job?	65	65	31	31
Do you feel like you do not care what is happening to some of your patients?	73	73	47	47
Do you think that you are unable to bring a positive change in other people's life through your work	64	64	42	42
Do you think that you have difficulty dealing with emotional problems calmly?	80	80	45	45
Do you feel that working with people all day long is a strain for you?	82	82	43	43
Do you feel that you treat some patients as if they are impersonal objects?	74	74	44	44
Do you feel that you have become callous towards people since you have taken this job?	52	52	28	28
Depersonalization				
Do you feel burned out from work?	75	75	32	32
Do you feel that the patient will blame you for anything that goes wrong in their treatment?	74	74	31	31
Do you think that you have difficulty understanding how your patients feel about things?	77	77	34	34
Do you think that you have difficulty dealing with the patients' problems?	73	73	38	38
Do you feel a lack of enjoyment while working with your colleagues?	78	78	27	27

Table 6: Modified Maslach burnout inventory

Variables	Before pandemic, Mean \pm SD	After pandemic, Mean \pm SD	P value
Emotional fatigue	6.99 \pm 1.96	3.21 \pm 1.49	0.007
Personal fulfilment	7.85 \pm 1.43	4.85 \pm 1.78	<0.001
Depersonalization	3.5 \pm 1.07	2.5 \pm 0.84	<0.001
Total MBI	13.78 \pm 2.56	7.53 \pm 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.

Conclusion

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.

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