

Original Research Article

Past, present and future of the national surgical residency program: residents' concerns and post COVID-19 pandemic preparedness

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ABSTRACT

Background: The pandemic affected the day-to-day routine of millions of people, with the healthcare sector being at the frontline. The surgical units have seen a drastic decrease in the amount of patient load, elective surgical procedures, and consequently a decrease in the quality of surgical training.

Methods: A cross-sectional study was conducted using a self-structured questionnaire, containing questions about concerns during COVID-19 Pandemic, availability of PPEs and the effect of surgical training during the pandemic, administered on already enrolled surgical trainees of major tertiary care hospitals of the country. A total of 207 surgical trainees were conveniently enrolled in this descriptive study.

Results: Out of a total of 207 surgical trainees, 41.7% were first-year residents, 37.9% were second-year, 1.9% were third, 4.4% were forth and 14.1% were fifth-year surgical trainees. 62.6% of doctors reported that their stress levels have increased, most of them were worried about transmitting the infection to their families and vulnerable patients ($p < 0.01$). 56.4% of surgical trainees reported being satisfied with their department's response to the pandemic, 30.1% doctors said that the testing capacity was insufficient but 60.7% were satisfied with the support of their own hospital. Only 1.9% of doctors were satisfied from their training during the pandemic ($p < 0.01$)

Conclusions: The system needs an urgent improvement in the provision of safety measures, an increase in the use of technology for the purpose of training and an easy provision of psychological support to trainees.

Keywords: COVID-19, Pandemic, Surgery, Training, Personal protective equipment

INTRODUCTION

Towards the end of 2019, the world faced a threat, a biological threat that rapidly engulfed almost the entire world. The pandemic affected the day-to-day routine of millions of people and has affected them both financially and psychologically, with the healthcare sector being at the frontline.^{1,2} Throughout the world, efforts were made to tackle the situation and reduce the transmission of the virus to healthcare workers. Schedules were changed, shifts were adjusted and elective procedures postponed hoping for a better response to this unprecedented situation.³ The first confirmed case was reported in Pakistan on February 26, 2020, in Karachi, Sindh Province.⁴ Since then, the cases have skyrocketed. All the

confirmed cases, within the first few weeks of the virus being reported in Pakistan, had a travel history from Iran, London, or Syria.⁴ Currently, the country has not been able to achieve a flat curve, partly due to its lower literacy rate that led to people not following proper SOPs.⁵

On March 23, 2020, almost one month after the report of its first confirmed case, the Pakistani government decided to go into a complete lockdown. Meanwhile, it developed its resources to combat the worsening situation in the country such as designated hospitals, quarantine centers, testing facilities, treatments, public awareness, and the response of the local community against the COVID-19 outbreak.⁴

A study conducted by NIHR global research health unit on global surgery reported that COVID-19 infected patients undergoing surgical procedures have worse postoperative outcomes than similar subsets of patients without the infection. The thirty-day mortality of patients with the infection was reported to be 23.8%, ranging from minor operations (16.3%) to emergency surgeries (25.6%).⁶

Surgical trainees, like the rest of the healthcare force, are performing duties in the COVID-19 triage and isolation wards. They face an additional challenge of how to manage a surgical emergency with no prior COVID 19 testing. The setting of an operating room poses a high risk of infection transmission between the surgical staff and the patient.⁷ Keeping in view the probability of false negatives (that depends on the time at which the test was done) and asymptomatic carriers, one can never be sure about the COVID-19 status of an individual.^{8,9} This requires a prompt revision of all surgical protocols preoperatively, intraoperatively, and postoperatively.

Surgical training depends on the number of patients presenting to that facility, proper surgical knowledge about the patient's management, and adequate hands-on experience.¹⁰ Due to the COVID-19 pandemic and hospitals only catering to emergencies and COVID-19 patients, the surgical units have seen a drastic decrease in the amount of patient load, elective surgical procedures, and consequently a decrease in the quality of surgical training. There is a need to establish new protocols for COVID screening of surgical cases, starting new approaches for academic meetings and sessions and most importantly taking care of the mental health of the healthcare staff by organizing psychological wellness sessions.⁷ In view of these challenging situations, a new specific duty roster should be made (outlining the duties and case assignments in detail) minimizing exposure without negatively impacting the training of a surgical resident. In most countries, training programs have been suspended and healthcare workers are redirected towards taking care of COVID 19 patients. For example, in Lombardy, surgical trainees are performing duties in the 'regional crisis units' established solely to deal with this pandemic.¹

It is not possible to hold back surgical care for a long period of time, hence changes have to be made to help deliver these services to the general population, and also help residents train adequately to prevent shortage of expert surgical staff in the future. Moreover, it is pertinent to mention here that the residents' concerns need to be addressed properly so as to ensure their optimal functioning. It is observed that there is growing fear and anxiety amongst them and they are primarily worried about passing on the virus to their loved ones. A study showed that 61% of the residents questioned were concerned about this. 38.4% of residents were afraid of dying because of direct exposure to the virus.¹⁰ However, most of the doctors expressed their willingness to take

care of their patients in these difficult times. This study aims to evaluate, in detail, the effect of COVID-19 on the national surgical residency program in Pakistan, and what necessary steps should be taken to sustain and improve this program during and after the pandemic. Are we prepared for the 'new normal'?

METHODS

This is a cross-sectional study based on a multicenter interviewer-based questionnaire survey conducted online from May 2020 to August 2020. This questionnaire was given to surgical residents working in various tertiary care hospitals of Pakistan. These hospitals see a high influx of patients representing a wide socioeconomic and geographical setting.

Inclusion criteria

Participants were selected based on convenience sampling from surgical residents through year 1 to year 5 working in general surgery and all other subspecialties and branches of surgery.

Exclusion criteria

Residents not currently working during the pandemic and residents working in medical specialties were excluded from the study.

Sample size:

The sample size was calculated as 179 resident doctors using the formula:

$$n = (Z^2 \times P \times (1-P)) / e^2$$

Z = value from standard normal distribution corresponding to desired confidence level (Z=1.96 for 95% CI) - P is expected true proportion (0.866).¹⁰ e is desired precision (half desired CI width).

Study procedure

Participants were approached and data was collected through an online semi-structured, self-built questionnaire. The study questionnaire was developed in English. A Cronbach's alpha score was calculated ($\alpha=0.83285$) after a pilot study on 40 filled questionnaires to check for internal consistency and the questionnaire was modified to improve coherency. The questionnaire had four parts; firstly, the concerns of doctors during the pandemic, the availability of Personal Protective Equipment, the effect on surgical training during and after the pandemic, and the last part of the questionnaire allowed the participants to express their opinions and recommendations.

Statistical analysis

The data was then compiled on statistical package for the social sciences version 23 and analyzed and outcomes were published.

RESULTS

A total of 207 surgical residents from various allied departments participated in this study (Figure 1), out of which 41.7% were first-year residents, 37.9% were second-year, 1.9% were third, 4.4% were fourth and 14.1% were fifth-year surgical trainees. 57.8% were male and 42.2% were females.

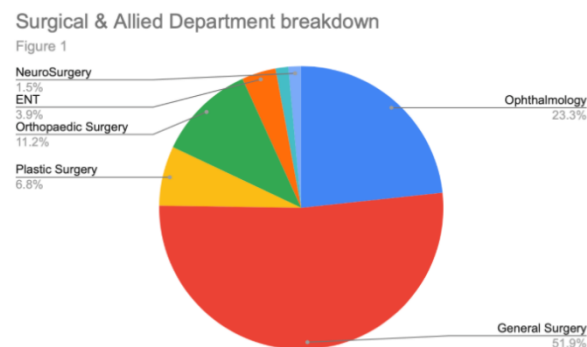


Figure 1: Surgical and allied department breakdown.

Concerns during the COVID-19 pandemic

62.6% of doctors reported that their stress levels have increased because of the ongoing pandemic, out of which 100% of the residents said that they were primarily worried about their family contracting the infection from them ($p < 0.01$). 76.7% of the trainees who mentioned an increase in their stress levels reported that they were also worried about transmitting the infection to vulnerable and immunocompromised patients ($p < 0.01$). 177 out of 207 surgical trainees (85.5%) agreed that it is their duty to take care of their patients even in harm's way (Figure 2). COVID-19 has been a challenging time for both doctors and patients alike. On one hand, elective surgeries are postponed while on the other, we are in uncharted waters, not knowing the long-term consequences of the effects of COVID-19 exposure on such a large scale within the population. In a way, this pandemic has shown how organized a medical system of the country can be. 74.3% of trainees questioned agreed that their seniors support them in taking every possible precaution for the protection against this unpredictable and deadly virus. Unfortunately, this pandemic has put an unnecessary amount of burden both physically and emotionally on healthcare professionals that has led them to feel burnt out after their shifts, unlike normal times, that is also a contributing factor to additional stress ($p < 0.01$) (Table 1).

It is my duty to take care of my patients and I'm ready to perform my duties even in harm's way

Figure 2

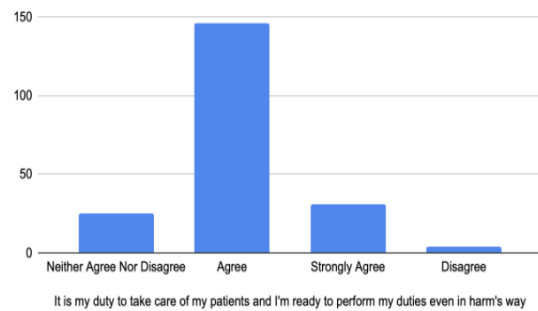


Figure 2: Response to duty.

Table 1: Burnout after doing a shift during the COVID-19 pandemic.

Response	Tally	Percentage (%)
Strongly agree	13	6.3
Agree	67	32.4
Neither agree nor disagree	68	32.9
Disagree	58	28

Availability of personal protective equipment

56.4% of surgical trainees reported that they were satisfied with their department's response to the COVID-19 pandemic (Figure 3), the departmental breakdown of the doctors who said they were satisfied is shown in Figure 4. 35.4% of trainees neither agreed nor disagreed on their department's response and 8.3% disagreed, out of these 30% of doctors reported that they did not have appropriate PPE when they needed it to examine patients or perform an operative procedure ($p = 0.026$).

I am satisfied with my department's COVID 19 Response

Figure 4

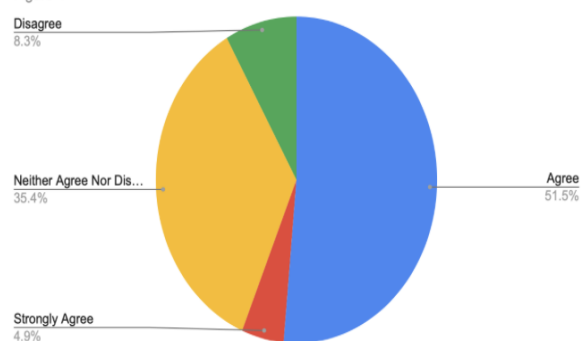


Figure 3: Satisfied with department's COVID-19 response.

Department breakdown
Figure 5

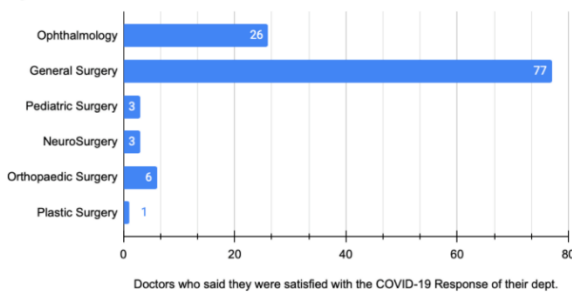


Figure 4: Department breakdown.

The rapid spread of COVID-19 took Pakistani health authorities by surprise and a disparity was seen in the testing capacity of certain areas within the country. When the trainees were asked about how satisfied they were from the local testing capacity of their area, 30.1% reported that the capacities were insufficient and 44.7% chose not to comment on this matter, while only 25.3% were satisfied (Figure 5).

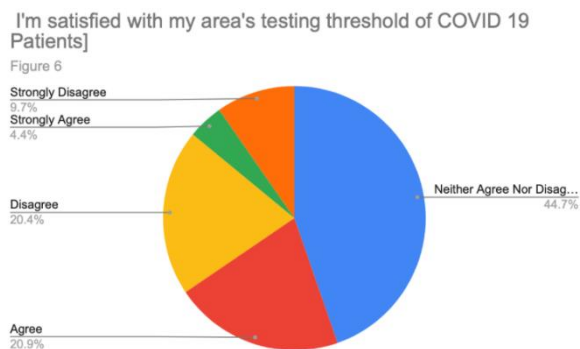


Figure 5: Satisfied with area's testing threshold of COVID-19 patients.

Surgical trainees are at the frontlines during this pandemic, dealing with all sorts of emergencies and not knowing the COVID-19 status of most patients during their first contact in the emergency department. This amount of pressure and uncertainty requires a proper back up plan by the hospital administration in case one of their trainees gets the infection. Fortunately, 60.7% of doctors reported that they are satisfied with the support their hospital provides in case a doctor gets infected and 15% chose not to comment.

Surgical training during the COVID-19 pandemic

Surgical trainees are an essential part of the workforce on the surgical floor of any hospital. 55.3% of doctors said that they were completely satisfied with their surgical training before pandemic, this number dropped to only 1.9% when asked about their training during pandemic. The detailed result is summarized in Table 2 ($p < 0.01$).

Table 2: Completely satisfied with training.

Response	Before the pandemic		During the pandemic	
	Tally	%	Tally	(%)
Strong agree	26	12.6	2	1.0
Agree	88	42.7	4	1.9
Neither agree nor disagree	55	26.7	41	19.9
Disagree	37	18.0	123	59.7
Strongly disagree	0	0.0	36	17.5

There appears to be a direct link between satisfaction with surgical training and sufficient hands-on experience, out of those doctors who had reservations about their surgical training during the pandemic, 70.6% reported that they were not having sufficient surgical hands-on training because of the pandemic and 14.7% chose not to comment on this matter. Only 14.7 percent said that they were satisfied with their hands-on experience during the pandemic ($p < 0.01$). Detailed results are in Table 3.

Table 3: Sufficient surgical hands-on training.

Response	Before the pandemic		During the pandemic	
	Tally	%	Tally	%
Strong agree	24	11.7	0	0.0
Agree	90	43.7	32	15.5
Neither agree nor disagree	49	23.8	30	14.6
Disagree	43	20.1	106	51.5
Strongly disagree	0	0.0	38	18.4

Junior residents (1st, 2nd and 3rd year) reported a significant decrease in their hands-on training with only 8.3% being satisfied (Figure 6). This number drastically increases when talking about senior residents (4th and 5th year) to 47.4% (Figure 7).

I am getting sufficient hands on training during the pandemic -
4th & 5th Year Residents
Figure 10

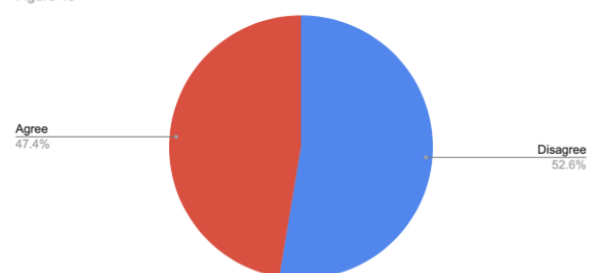


Figure 6: Training during the pandemic 1st, 2nd and 3rd year residents.

I am getting sufficient hands on training during the pandemic -
1st, 2nd and 3rd Year Residents

Figure 11

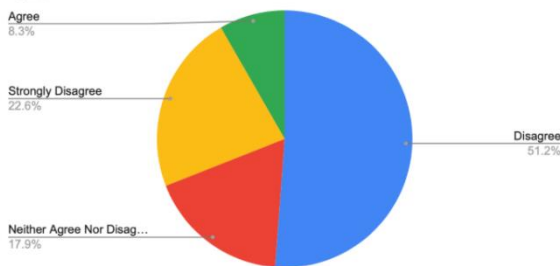


Figure 7: Training during the pandemic 4th and 5th year residents.

Considerable number of doctors who took part in this study reported being reluctant to examine patients because of this pandemic and since examination is an essential part of surgical training, 61.7% of trainees said that this is a contributing factor towards their training being adversely affected.

Although the majority of doctors (86.2%) said that their shift schedule was appropriately adjusted to minimize exposure, at the same time 71.8% of trainees thought that this shift schedule is negatively impacting their surgical training ($p < 0.01$). Keeping in view the current situation of the pandemic and anticipating future challenges to the healthcare system of any country, there needs to be a permanent change in how the national residency program operates so that we are well equipped to deal with any kind of unforeseen circumstances in the future without having a negative impact on the surgical training. A few suggestions given by our surgical frontline workers are summarized in the table below (Table 4).

Table 4: Suggestions.

Suggestion	% of trainees agreeing to this
COVID-19 testing mandatory for all patients undergoing elective surgeries in the future	79.1
Separate operation theatres for COVID-19 positive patients	89.3
Development of skills lab for surgical hands-on training	92.2
International collaboration with e-learning platforms for surgical trainees	95.1
Mandatory public health rotation during the training period	76.3
Online presence of training (online lectures, workshops) should increase	76.7
Continue all existing precautions against COVID-19 (N95 masks, PPEs) in post-COVID period as well	68.5

One of the contributing factors towards a successful healthcare delivery system is the general population. Proper programs directed towards imparting awareness to the general population to deal with this kind of health crisis are necessary, 94.2% of the doctors who took part in the study felt that the hospital should make an effort to educate the people who are at the other end of the healthcare delivery system.

Senior trainees are an important source of knowledge for their junior colleagues, 90.8% of doctors felt that there needs to be an improvement in the vertical model of peer teaching within the department. These kinds of activities should be a mandatory part included in the curriculum of the national residency program and it should be counted as an experience for senior trainees.

DISCUSSION

The world saw a major disruption in all kinds of surgical services, whether it be minor or major procedures, elective or even emergency operations, everything was affected due to this pandemic.¹¹ The way the surgical floor operated daily changed overnight and a rapid but innovative approach was needed to reorganize the system to tackle this new problem. Surgical trainees, especially newly inducted ones, were affected the most, losing considerable amount of time due to reorganization of duties left them feeling under confident about their newly attained skills and surgical knowledge. This period also brought with it a lack of access to surgical facilities including a limited supply of PPE, decrease in the workforce and a reduced number of skilled anesthetists, all in all contributing to the lack of proper surgical training.¹² The United States, United Kingdom, Canada and New Zealand saw nationwide postponement of surgical board exams and in-training assessment activities were heavily modified.¹³ None of these developed countries were successful in implementing proper national guidelines for surgical trainees to operate during the COVID-19 era.¹³ All the regulatory bodies concerned with surgical training, including the college of physicians and surgeons Pakistan (CPSP), faced a difficult challenge of having to mobilize surgical trainees to be a part of the COVID-19 response team, while simultaneously making guidelines aimed at protecting the workforce and ensuring smooth running of the already established workflow. Italy is the most affected country in Europe, one study done there reported extensive postponement of elective procedures due to which the residents were not able to complete the required number of procedures needed to complete their surgical certification.¹⁴ A study done in the United Kingdom reported a significant decrease in operative procedures being performed during the pandemic and a major shift to an open approach rather than the preferred laparoscopic one. This has also had an impact on surgical training as well as patient management as a whole.¹⁵

To improve surgical training in the future, one needs to cater to the concerns of surgical trainees as well, hearing their problems and their worries can help the provider better understand how to improve the system, especially when the healthcare system is put under a lot of pressure. Providing professional and psychological support to all healthcare workers is essential for the smooth working of the system because in the majority of cases, these residents are the first to come in contact with patients.¹⁶ The world is going through one of the worst public health crises not seen in 100 years, one needs to keep in mind the long-term psychological impact on healthcare workers that can affect their training. Most trainees are either stressed about getting the infection from their patients and transmitting it to their families, or they are feeling vulnerable and uncertain about their future.¹⁷ This has led to an overall decrease in productivity. Some reports suggest that pre-existing mental health conditions including previous trauma have worsened¹⁸. A team approach liaison with the department of psychiatry is needed to cater to any short or long-term consequences that this might have.¹⁹

Limitations

As the duration of the study was short, it is not possible to draw long term conclusions about the effect of the pandemic on surgical training. The restrictions placed by the local government and the periodic lockdowns limited fieldwork and the data collection was limited to an online questionnaire. A few surgical residents were not able to work during this pandemic due to health reasons and were excluded from the study.

CONCLUSION

This research article focused on highlighting the concerns of surgical trainees about this ongoing pandemic, the availability of PPEs and the effect of this on the surgical training of residents from year 1 to year 5. This article also aims to suggest some possible solutions to improve the quality of teaching for the residents. In conclusion, the system needs an urgent improvement in the provision of safety measures, an increase in the use of technology for the purpose of training and an easy provision of psychological support to trainees. Residents should be made aware of free online surgical simulators that will help them improve their surgical skills even when they are in the safety of their homes (e.g., Touch Surgery®).²⁰ COVID-19 has proven to be a difficult time for healthcare delivery systems throughout the world, but at the same time, it has proven itself as an eye-opener to the faults and shortcomings of health and medical education systems worldwide, especially when they are under extreme pressure.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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