

Access this article online
Quick Response Code:

Website: www.jehp.net
DOI: 10.4103/jehp.jehp_373_21

A nationwide cross-sectional study to assess the impact of COVID-19 on surgical residency programs in India

Harkirat Singh Talwar, Tushar Aditya Narain¹, Vikas Kumar Panwar, Ankur Mittal, Arup Kumar Mandal

Abstract:

BACKGROUND: The COVID-19 pandemic with its plenitude of hardships has been a challenge for residents in training. Besides the fear of contracting the disease, the complete reconfiguration of hospital services has severely affected the surgical residency programs across India. The current study highlights the lacunae that have arisen in the residency programs and design appropriate solutions to reframe the remaining part of the surgical training.

MATERIALS AND METHODS: The present study is an observational study based on a questionnaire survey done in November 2020 aimed at gauging the mood and perspective of residents across India pursuing surgical residency programs on how the pandemic has impacted various domains of their residency namely surgical training, clinical skills, research, academic curriculum, and mental health. The analysis was performed using an Internet-based program.

RESULTS: Seventy-eight percent of residents felt that they have lost crucial months of surgical training. Impact on clinical skills was reported by 73.9% of residents. Almost half of the residents (49.1%) believed that there has been a definite increase in research activities and 81.7% believed that the academic curriculum was affected during the past 6 months. Furthermore, 86% of respondents admitted to have had a profound impact on their mental health as a result of the pandemic.

CONCLUSION: Formulating reform policies in the current residency programs is paramount to train the current and future generation of surgeons. Whereas personal safety and wellness of the residents is paramount during these times, residency training via digital medical education and various other innovative ways needs to continue.

Keywords:

COVID-19, residency during COVID-19, residency training, surgical training

Introduction

On January 30, 2020, the first case of the novel coronavirus in India was reported from the state of Kerala, in a student who had just returned from Wuhan, China.^[1] Six months since and over two million cases, the COVID-19 pandemic has progressed exponentially throughout the country.^[2] The still-in-place lockdown which was enforced on the 25th of March by the Government of India has affected various sectors, with healthcare being one of the primary

one.^[1] The current COVID-19 situation and the ensuing lockdown have forced the governments and hospital administrators alike to limit hospital services to conserve resources and manpower for the COVID patients, and in preparedness for a possible worsening scenario.

The entire landscape of a quintessential hospital has changed drastically since. "Social distancing," "hand hygiene" and "masking" are considered the new holy trinity in the current era. The words "positive" and "negative" have a whole

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Talwar HS, Narain TA, Panwar VK, Mittal A, Mandal AK. A nationwide cross-sectional study to assess the impact of COVID-19 on surgical residency programs in India. *J Edu Health Promot* 2021;10:440.

Department of Urology, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India,
¹Department of Urology, University College London Hospital, NHS Foundation System, London, UK

Address for correspondence:

Dr. Tushar Aditya Narain,
University College London Hospital, NHS Foundation System, London, UK.
E-mail: aditya.tushar@gmail.com

Received: 20-03-2021

Accepted: 14-05-2021

Published: 30-11-2021

new meaning. “Flattening the curve,” “Learn to live with it” and “Quarantine the contact” are phrases which have become mainstream and a part of our everyday conversation. Medical schools have postponed classroom lectures indefinitely and students no longer have clinical rotations. Tele-health and telemedicine are the new norm as also there has been an unprecedented decline in the number of inpatients as well as out-patients. Surgical services are reserved only for those in absolute need such as emergency, trauma, or oncology patients. The web of webinars is a reality and virtual teaching is the only way forward. Policies of redistribution of residents and deployment in areas of critical need are underway and so is mandatory testing of every patient at the point of the primary contact. Every administrative policy is made with the sole aim of limiting the spread of infection at the expense of minimal resource use.

The aftermath of these decisions and situations can be well seen on the teaching hospitals, who in addition to patient care, have a critical responsibility of training resident doctors across the country. Diversion of resources towards battling the COVID pandemic has led to a disruption of the planned training curriculum of residents pursuing surgical branches across India. COVID-19 related disarray of hospital services has impacted residency training in the last 5 months and with no end in sight and cases rising exponentially, the foreseeable future seems grim. This has posed a serious hurdle in the 3 years surgical residency program with semester-wise defined goals of skill and knowledge acquisition for residents.

Essential components to an enriching and wholesome surgical residency program include a high volume patient inflow, didactic conferences, and lectures, clinical experiences of experts and surgical skill training, more so because surgery is a craft which is learnt only with a scalpel in hand. This study is aimed to find out what measures surgical departments across India have taken to ensure minimal disarray of their residency program, and what impact this pandemic has had on the training of the residents, from their perspective. The results of the current study are expected to highlight the lacunae created by the pandemic in the training program, and thus would assist the program directors to reframe the remaining part of the training in a way to be able to provide holistic tutoring, negating the effects of this pandemic.

An important and neglected area this study focussed on is that of mental health of medical professionals, especially the residents in training. The mental stress and anxiety issues faced by the residents due to the current pandemic has compounded the already existing pressure related to long working hours and meeting expectations

during residency. Identifying these issues at the earliest is the need of the hour so essential steps can be taken to mitigate the issue in a timely fashion.

Pursuing residency in COVID-19 times is a challenge that needs to be seen through in the best way possible acquiring skill sets pertinent to the particular residency without compromising on mental health and at the same time being sensitive and responsible to issues pertaining to the pandemic.

Materials and Methods

Study design and setting

This was an observational study based on a questionnaire survey to assess the impact of the COVID-19 pandemic on the surgical residency programs in India.

Study participants and sampling

All surgical specialty and super specialty residents across India pursuing M.S/M.D/M.Ch/DNB with a minimum course completion of 6 months were included in the study. Residents pursuing residency in nonsurgical branches, residents in surgical branches who have completed <6 months of the course, and participants not willing to give consent were excluded from the study. The aim of the study was to study the effect of dysfunctional hospital services due to COVID-19 on the training curriculum of surgical specialty and super specialty residents across India. The primary objective was to study how the current COVID-19 situation has impacted the various domains of residency training in terms of

- a. Surgical skill acquisition
- b. Clinical skills
- c. Research
- d. Academic curriculum.

The secondary objectives were to study the effect of the current pandemic on the mental health of residents and also to develop strategies to bridge the deficiencies in surgical residency training which have arisen due to the COVID-19 pandemic.

Data collection tool and technique

A questionnaire comprising of the perceived impact of COVID-19 on various domains of resident training was constructed using an Internet-based program. The questionnaire reached the respondents via E-mail/messaging service and a filled in form was returned back to the researcher ensuring complete anonymity. The nonresponders received a follow-up call/email to decrease the nonresponder bias. The questionnaire comprised a total of 20 open-ended questions to study the perceived impact of COVID-19 on the following 5 domains of resident training (4 questions

each) namely surgical training, clinical skills, research, academic curriculum, and mental health. Internal validation of the study questionnaire was done.

Questions assessing surgical training tried to find out the number of surgeries being performed and how the decrease in the number of cases has impacted their surgical training and trying to find the best possible solutions. Questions on clinical skills assessed how the decrease in patient load has impacted the clinical exposure of the residents and what strategies should be employed to bridge the gap. Also included in the questionnaire were questions assessing how much of an impact the current situation has had on the academic curriculum with a shift from classroom to virtual teaching and more emphasis on research than ever before.

Mental health was judged using four questions to assess the effect of the current pandemic on the mental status of the residents and how they cope with it. The questionnaire was validated by four researchers before it was sent out for data collection, and a content validity index of 0.9 was achieved.

A pilot study was conducted within the institute before the start of the study. After meaningful results were obtained, the questionnaire was sent out to residents across various surgical disciplines nationwide.

Ethical consideration

Before the beginning of the study, the study protocol was approved by the institutional ethics and review committee dated July 8, 2020, bearing the letter number AIIMS/IEC/20/422. Informed consent was taken (as the first segment in the questionnaire) before recruitment into the study.

Statistical analysis

Categorical and nominal variables were described using frequency tables and cross-tabulations. The frequency distribution data of each question was presented in the form of pie charts. The answers to top research questions were analyzed first, followed by cross tabulating. Finally, the quality of the data was analyzed before drawing final conclusions.

Results

Discipline and year of training

A total of 232 residents pursuing various surgical disciplines all across the country took part in the study [Figure 1]. The highest number of respondents belonged to general surgery (35.2%) followed by urology (15.2%) and obstetrics and gynecology (13.5%). 36.6% of residents were in their final year of training, 30.4% in their second year of training and the rest were in their

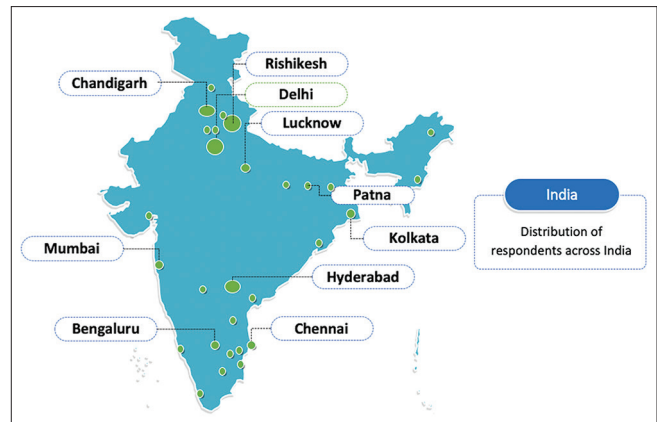


Figure 1: Geographical distribution of the respondents across India

1st year of respective courses. About 80% of the residents who responded were working in a government hospital.

Surgical training

Only 1.7% of respondents stated that all surgeries were being performed just as before in contrast to 37.5% of respondents who said that only emergency, semi-emergency and oncology surgeries were being performed. Another 29% of the respondents said their hospital was catering only to emergency cases. 78% of residents felt that they have lost crucial months of surgical training, however, 16.5% were in favor of course extension. A more focussed approach to surgical training in the coming months was the preferred solution by 76.1% of residents, while 77 residents felt “Wet Labs” should be set up for simulation-based training to make up for the lost months of training. Interestingly, 16.4% of the respondents wanted their course to be extended by the same duration as that lost in view of the pandemic. Furthermore, 72% of residents were in favor of restarting all routine surgeries after subjecting patients to COVID-19 testing, highlighting the lost hours of surgical training to be the major concern for them [Figure 2a-d].

Clinical skills

A reduction in in-patient beds belonging to their respective departments was reported by 81.3% of residents. 71.3% of residents also stated that they were posted in the care of COVID-19 patients away from their parent departments for a variable period of 30–60 days on average. Impact on clinical skills due to discontinuity in patient care and reduction in patient load was reported by 73.9% of residents. When asked about a plausible solution for the same, 61.7% of residents were in favor of uninterrupted emergency and oncology services and 25.7% favored absolutely no restriction on patient inflow [Figure 2e-h].

Research

Almost half of the residents (49.1%) strongly believed that there has been a definite increase in research

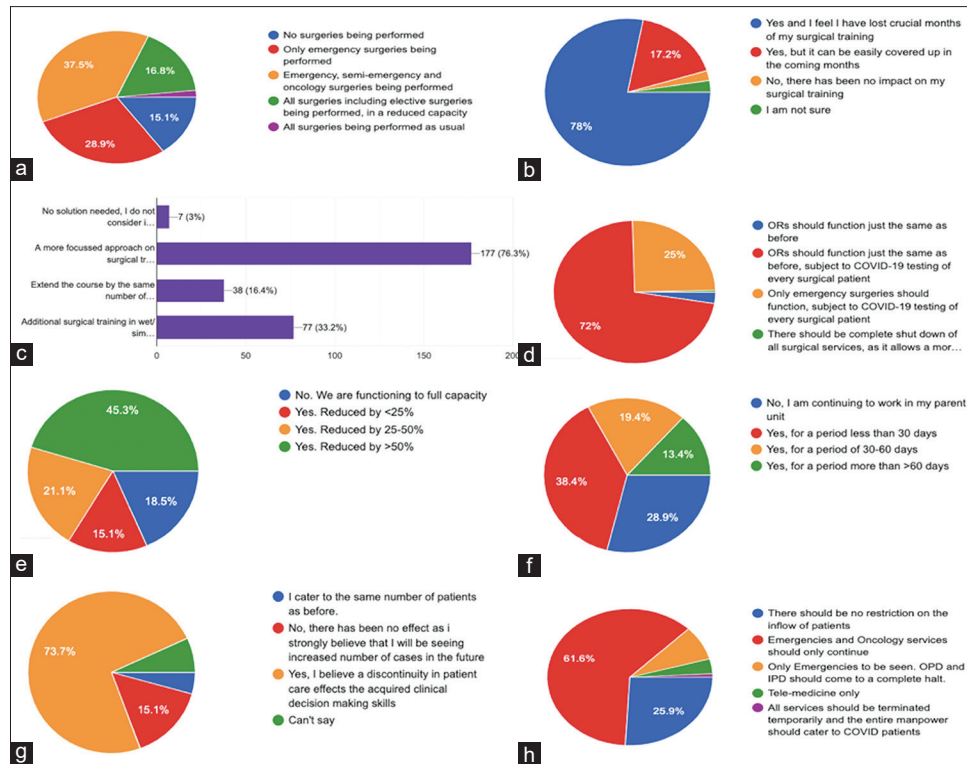


Figure 2: Residents perspective on surgical training (a-d) and residents perspective on clinical skills (e-h). (a) How have the surgical services in your department been affected by the current COVID-19 situation? (b) Do you feel this has impacted your surgical training in any way? (c) What according to you is a solution to the lost months of surgical training? (d) As a resident, what do you think is the best strategy regarding surgical services in the COVID-19 era? (e) Due to reallocation of hospital beds for COVID-19 patients, has there been a reduction in the number of in-patient beds at your workplace? (f) Have you been posted in the care of COVID-19 patients during this entire period? (g) Has the reduced patient flow affected your clinical skills training in any way? (h) As a resident, what do you think is an ideal strategy to cater to non-COVID patients in such a pandemic?

activities during the lockdown period. However, 15.7% believed that they had made efficient use of this time in research. Almost 53.1% of residents said that they have invested time on research, out of which 17.4% were of the opinion that they devoted this time to research not by choice but out of peer pressure or as an obligation to seniors. Surprisingly a large proportion (31%) said they weren't interested in research during their training. The need to contribute to COVID-19 related research was felt by 51% of residents and another 51.3% also felt that as a result of this increased focus on COVID-19 related research, there has been a general increase in interest toward research activities [Figure 3a-d].

Academic curriculum

Majority (81.7%) believed that the academic curriculum was affected to some extent during the past 6 months. 62.2% of residents were of the opinion that academics should continue albeit only through virtual platforms, where 48.3% preferred that academics should continue as before with due social distancing measures. An overwhelming majority (92.6%), believed that the webinars are a useful platform for their academic growth, although to variable extents. Furthermore, most of the residents (90.8%) stated that the academic activities organized by various societies were valuable to their curriculum [Figure 3e-h].

Mental health

The ongoing pandemic and the disruption it has caused in the surgical training and lifestyle, in general, has had a profound effect, albeit to varying extents, in about 86% of the respondents. 54% were disheartened by the discrimination faced by them, or other health care workers, which also made them question their resolve against this pandemic. Various activities undertaken to deal with the anxiety and stress were as follows: talking to parents/friends (45.7%), personal hobbies (33.5%), meditation and mind-calming exercises (21.7%), sports (17%), and alcohol/smoking (11.3%). Only 18.3% of residents reported to not have been stressed at all during this current situation. Despite the adversities, majority (73.1%) strongly believed that they could see this pandemic through with an optimistic attitude [Figure 4].

Discussion

The COVID-19 pandemic has hit every community worldwide hard, and the healthcare community and residents in training, in particular, are no exception, especially the ones in surgical branches. Their residency training and education have been jeopardized in view of the deployment of manpower and services for the care of patients affected by the novel coronavirus and for the

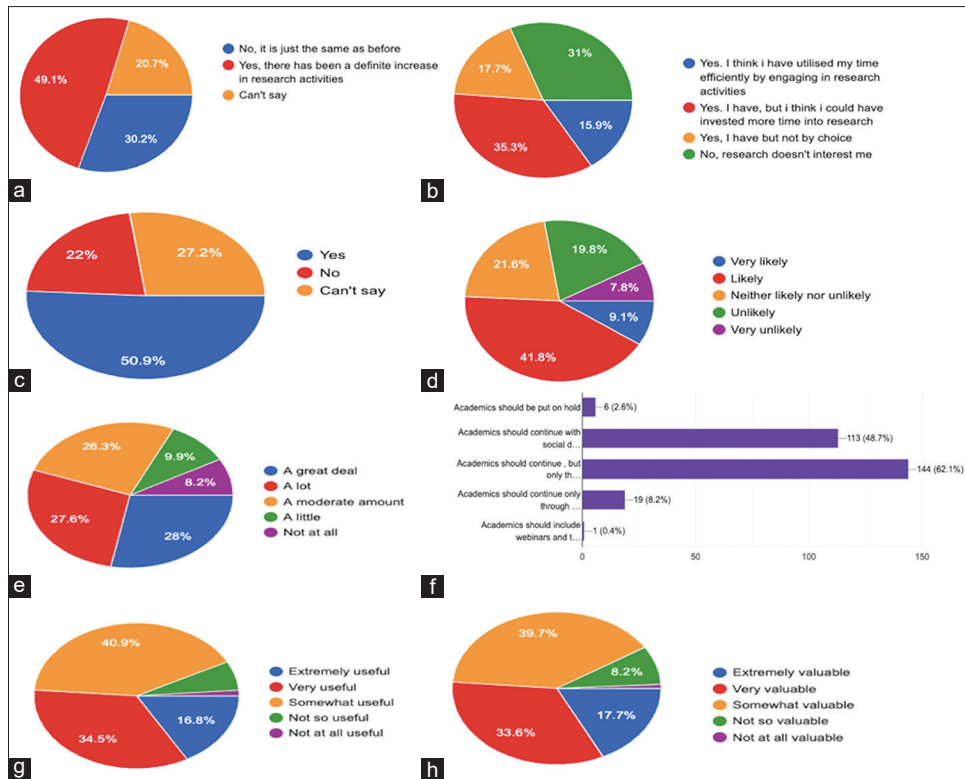


Figure 3: Residents perspective on research (a-d) and residents perspective on academic curriculum (e-h). (a) Do you think there has been an increased focus on research during this entire period? (b) Have you personally devoted a considerable amount of time on research activities during this entire period? (c) Do you feel a need to contribute to COVID-19 related research? (d) Do you think as a result of increased focus on COVID-19 related research, there also has been an increased interest amongst residents toward research in general? (e) Do you think the current situation has affected your academic curriculum in any way? (f) What do you think is the ideal strategy pertaining to academics at such times? (g) In your opinion, how useful are webinars as a platform for fulfilling the academic needs during this lockdown? (h) There definitely has been an increased number of academic activities organized by various academic societies. Do u think this is valuable?

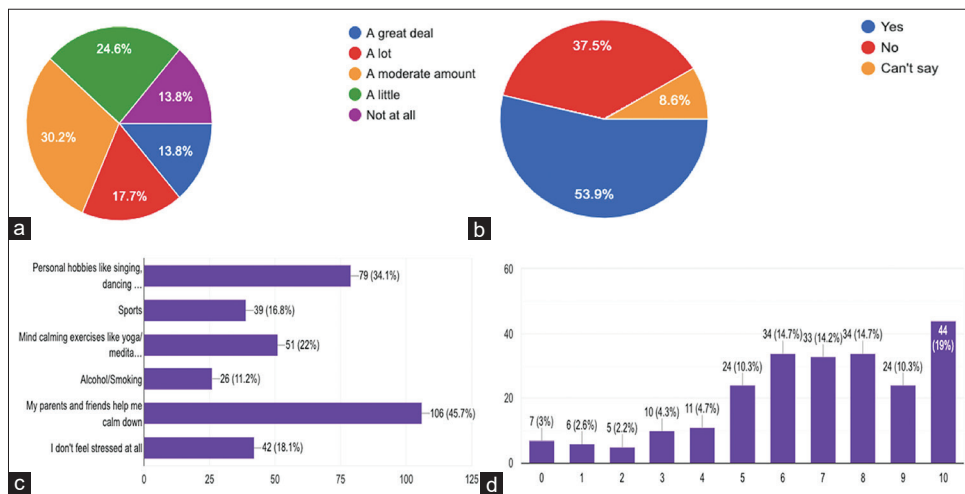


Figure 4: Residents perspective on mental health. (a) Has the COVID-19 pandemic affected your mental health in any way? (b) Does the discrimination faced by COVID-19 health care workers despite being on the frontlines of a pandemic make you question your decision of being a part of the medical fraternity? (c) How do you deal with times of anxiety/stress related to the current pandemic? (d) What is your general perception on the entire COVID-19 pandemic?

mitigation of the pandemic in general. Several studies done in various departments all over the world echo the same sentiment. This is a very pressing issue in teaching hospitals who have the additional responsibility of training the next generation of doctors. The results

of our study have clearly shown the deficiencies and lacunae the residents feel have arisen as a result of the pandemic. Every aspect of their training has been affected and this unprecedented attack on their training needs solutions.

Surgical training

A overwhelming majority of residents across India believe that as a result of only emergency, semi-emergency, and oncology surgeries being performed in their respective departments, they have lost crucial months of their surgical training to this pandemic and they hope there will be a more focussed approach on their surgical training once the pandemic subsides with added training through surgical simulation exercises. However since there is uncertainty over the end of the pandemic in the near future, most of the residents feel the OR services should resume just as before, subject to proper precautions including a COVID-19 test of every patient being posted for surgery.

Clinical skills

The residents also strongly believed that as a result of decreased in-patient admissions and they themselves being out of touch with their parent units for variable periods, this discontinuity in care has affected their clinical decision-making skills. According to the residents, the ideal strategy to cater to non-COVID patients is that emergencies and oncology services pertaining to their field should continue and that as far as possible, the medical specialties should cater to the COVID-19 patients who are better qualified for the job and surgical residents be pooled in only when the need arises.

Research

With hospital services being decreased and backup teams formed with only a third to half of the residents on duty at a particular time, most of the residents felt there has been a considerable increase in the research activities in the COVID-19 era over the last few months. However when it comes to their personal opinion on the time devoted to research, the residents are split with some of them being satisfied with their focus on research, which may have stemmed from their own interest, or because of a push from seniors, while others think they could still have put in a few extra hours into research.

Academic curriculum

With classroom teaching taking a hit due to social distancing, the academic curriculum of the residents is affected. However, a vast majority of the residents are satisfied with the teaching curriculum through webinars and some are also in favor of academics in classrooms with social distancing measures whenever feasible. However, excess of webinars are again detrimental with residents unable to concentrate and are lost in the so-called web of webinars. Another trend which has been noticed is the plethora of academic activities being organized by the various academic societies, and as they say, excess of anything can be detrimental, the attitude of the residents toward this trend has been a mixed one, with a few starting to feel the heat.

Mental health

Undoubtedly the most important and neglected aspect of this entire pandemonium is the mental health of the residents.^[3,4] Most of the residents have expressed that they have been affected mentally and despite being on the frontlines of the pandemic, they had to face discrimination from the society they live in and this has made them question their decision of being a part of the medical fraternity.^[5] The dichotomous attitude of the society toward its health workers has definitely deterred some in their resolve to fight and win over this war. However, in times of anxiety and/or stress, most of them have expressed that their immediate family and friends, and activities such as sports, yoga, and personal hobbies have helped them tide over the crisis and maintain a positive outlook. Despite the pressure of the workload and at the same time the worry of being trained as expected, most of the residents still have a very positive and hopeful outlook toward the COVID-19 pandemic and a majority believe that they will see this through.

Various national and international surveys conducted to assess the impact of COVID-19 have yielded very similar results. A similar nationwide survey done in Pakistan also concluded that 86.6% of residents were worried about decreased hands-on surgical training during the COVID-19 times.^[6] About 85% of plastic surgery residents surveyed in a study in Belgium expressed that their surgical training is suffering and 60% have the residents reported anxiety issues.^[7] In an editorial by Bambakidis and Tomei, the impact of the pandemic on neurosurgery resident training and education have been highlighted and have expressed concerns over undertraining of residents if this pandemic was to continue.^[8] Warhadpande *et al.* have reported similar disruptions in the interventional radiology training programs in the United States.^[9] Kumar and Agarwal pointed out that restructuring the entire residency program for ophthalmology at a national level is the need of the hour.^[10] Kwon *et al.* have laid down various difficulties faced by urology residents and measures that need to be taken to mitigate them.^[11] Similarly, Cleveland clinic has also laid down certain guidelines for its urology residents with a strict emphasis on daily virtual learning.^[12] Schwartz *et al.* highlighted the importance of developing effective strategies to safeguard the training of orthopedic residents in the United States during the COVID-19 pandemic.^[13] Thus, these surveys all acknowledge a single fact that resident training has been severely affected and desperate measures need to be taken to safeguard the future of the young nascent minds.

Taking into account the perspective of the residents and in agreement with various educational experts, we

propose the following solutions required to bridge the current deficiencies in the residency training curriculum that have arisen due to the pandemic [Table 1].^[14-17]

Limitation and recommendation

The current study helps to understand the current mood of the surgical residents in training and is not restricted to a single specialty or super/sub-specialty. The strength of the study lies in the fact that a healthy number of residents across specialties participated in the survey. Furthermore, based on the deficiencies identified, solutions have been proposed which can help reshuffle the remainder of the surgical programs of these residents. An important aspect which the current study also analyzed is the impact on mental health which is paramount for any resident in training.

However, certain limitations were also identified. As some of the surgical branches have more number of emergencies as compared to others, the impact of the current reshuffling of hospital services was not inform across all specialties. Also, as the study was spread all across the country, there were various hospitals involved and the extent to which the training was affected was different in different cities and consequently, all residents were not subject to the same decrease in patient load and surgical training.

Conclusion

The current generation of residents has been caught off guard by the ongoing pandemic. COVID-19, because of its infectivity, poses a unique challenge, as it requires isolation of patients to prevent spread, forcing policymakers to severely curtail non-COVID services too. This has affected the surgical training of the residents to a much greater extent as compared to their medical counterparts. With the virus strengthening its hold by the day and no end in sight, formulating reform policies in the current residency programs of various surgical specialties is the need of the hour. Whereas personal safety and wellness of the residents are paramount during these times, residency training via digital medical education and various other innovative ways needs to continue. The novel challenges put forward by the current COVID-19 pandemic need novel solutions to train the current and future generation of surgeons.

Acknowledgment and ethical moral code

The authors would like to express their sincere gratitude and thanks to all the participants who wilfully consented to participate in the study. At the time of recruitment, all the participant were explained about the study protocols, procedures, duration and its perceived benefits. The

Table 1: Proposed solutions to bridge the lacunae that have arisen in the surgical residency training programs as a result of the on-going COVID-19 pandemic

Domain	Solution
1. Surgical training	Continue emergency, semi elective, and oncology cases subject to COVID-19 testing and strict precautions, where ever feasible and ensure resident rotation in ORs Surgical simulation exercises: Wet simulation labs and hands-on surgical training on cadaver/ mannequins Guided lectures: Structured videos and graphic content on learning surgeries After the weaning of pandemic, stress on surgical teaching to cover up the deficiencies Extended tenures/short fellowship courses as per the residents choice once the situation normalizes
2. Clinical skills	Encourage tele health clinics for all residents on a rotational basis Emergency and oncology services to continue Ensure all residents from surgical field in primary care of COVID-19 patients have equal rotations so as to decrease the total per capita days spent away from the primary department Mandatory COVID-19 lectures on precautions and preventive measures for every resident
3. Research	Encourage research activities Continue ongoing research projects, both inter institutional and intra institutional Participate in various research and biostatistics courses online Research strictly optional and by no means mandatory Encourage participation in national conferences
4. Academics	Continue departmental academic activities via virtual web platforms Encourage interactive sessions over didactic lectures Attend informative webinars organized by societies whenever feasible Maintenance of log books and assessment exams
5. Mental health	Educate the residents regarding the mental health challenges they are likely to face Encourage group sessions and forums to voice their opinions, fears, challenges, and expectations 24x7 helpline numbers for psychological and psychiatric issues Periodic mental health screening of all residents Encourage extra-curricular activities

ORs=Operating rooms

results of the study would help to shape the remaining part of their residency training.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. WHO Timeline – COVID-19; 2020. Available from: <https://www.who.int/news-room/detail/08-04-2020-who-timeline---covid-19>. [Last accessed on 2020 Aug 12].
2. COVID-19 Coronavirus Pandemic; 2020. Available from: <https://www.worldometers.info/coronavirus/>. [Last accessed on 2020 Aug 12].
3. Tan BY, Chew NW, Lee GK, Jing M, Goh Y, Yeo LL, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med* 2020;173:M20-1083.
4. Balasubramanian A, Paleri V, Bennett R, Paleri V. Impact of COVID-19 on the mental health of surgeons and coping strategies. *Head Neck* 2020;42:1638-44.
5. Indian Doctors Being Evicted from Homes Over Coronavirus Fears; 2020. Available from: <https://www.theguardian.com/world/2020/mar/30/indian-doctors-being-evicted-from-homes-over-coronavirus-fears>. [Last accessed on 2020 Aug 12].
6. Osama M, Zaheer F, Saeed H, Anees K, Jawed Q, Syed SH, et al. Impact of COVID-19 on surgical residency programs in Pakistan: A residents' perspective. Do programs need formal restructuring to adjust with the "new normal"? A cross-sectional survey study. *Int J Surg* 2020;79:252-6.
7. Kapila AK, Schettino M, Farid Y, Ortiz S, Hamdi M. The impact of coronavirus disease 2019 on plastic surgery training: The resident perspective. *Plast Reconstr Surg Glob Open* 2020;8:e3054.
8. Bambakidis NC, Tomei KL. Editorial. Impact of COVID-19 on neurosurgery resident training and education. *J Neurosurg* 2020;1-2.
9. Warhadpande S, Khaja MS, Sabri SS. The Impact of COVID-19 on Interventional Radiology Training Programs: What You Need to Know. *Acad Radiol* 2020;27:868-71.
10. Kumar A, Agarwal D. Commentary: Restructuring residency training in ophthalmology during COVID-19 era: Challenges and opportunities. *Indian J Ophthalmol* 2020;68:1005-6.
11. Kwon YS, Tabakin AL, Patel HV, Backstrand JR, Jang TL, Kim IY, et al. Adapting urology residency training in the COVID-19 era. *Urology* 2020;141:15-9.
12. Vargo E, Ali M, Henry F, Kmetz D, Drevna D, Krishnan J, et al. Cleveland clinic Akron general urology residency program's COVID-19 experience. *Urology* 2020;140:1-3.
13. Schwartz AM, Wilson JM, Boden SD, Moore TJ Jr., Bradbury TL Jr., Fletcher ND. Managing resident workforce and education during the COVID-19 pandemic: Evolving strategies and lessons learned. *JB JS Open Access* 2020;5:e0045.
14. Nassar AH, Zern NK, McIntyre LK, Lyngge D, Smith CA, Petersen RP, et al. Emergency restructuring of a general surgery residency program during the coronavirus disease 2019 pandemic: The university of Washington experience. *JAMA Surg* 2020;155:624-7.
15. Potts JR 3rd. Residency and fellowship program accreditation: Effects of the novel coronavirus (COVID-19) pandemic. *J Am Coll Surg* 2020;230:1094-7.
16. Kumar R, Singh V, Mohanty A, Bahurupi Y, Gupta PK. Corona health-care warriors in India: Knowledge, attitude, and practices during COVID-19 outbreak. *J Educ Health Promot* 2021;10:44.
17. Gathiya N, Kumar S. Psychosocial implication of quarantine and lockdown during COVID-19 pandemic in India. *J Educ Health Promot* 2020;9:363.