Clinics of Surgery

Review Article ISSN 2638-1451 | Volume 5

How Surgical Residency Has Derailed During The COVID-19 Pandemic: An Appraisal

Sandhu H[1], Barabari GS[2], Ravi B[3], Seenivasagam RK[4], Balija SS[5] and Mammen KJ[6*]

[1]Department of Surgery, Assistant Professor, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

[2]Department of Surgery, Postgraduate, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

[3]Department of Surgery Professor, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

[4]Department of Surgical oncology, Associate Professor, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

[5]Department of pediatric surgery, Professor and head, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

[6]Department of Urology, Professor, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

***Corresponding author:**

Kim Jacob Mammen,
Professor, Department of Urology, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India,
E-mail: kjmammen@gmail.com

Received: 06 Apr 2021
Accepted: 28 Apr 2021
Published: 05 May 2021

Keywords:

COVID-19 Pandemic; SARS COV-2 infection; Residency; Surgical Training

Citation:

Mammen KJ.et al., How Surgical Residency Has Derailed During The COVID-19 Pandemic: An Appraisal. Clin Surg. 2021; 5(7): 1-6

1. Abstract

COVID-19 pandemic has immensely impacted all walks of life and all professions including our surgical residency training program. To gauge this impact on surgical residencies around the world, we searched for literature in Medline database and shortlisted 25 articles that are relevant to this topic and reviewed them. Most of the articles, in general, talked about the decrease of elective and emergency surgeries, closing of OPD's, moving residents to COVID duties thereby decreasing hands on surgical exposure for residents, clinical skill learning and increasing online form of meetings and academic activities. Residents also talked about mental impact in view of physical and mental stress of working in PPE's, fear of contracting infection or transmitting it to family members, fear of unavailability of testing and treatment facilities, and the same time having to complete their course requirements and passing exams. Rapid adoption of technology in the form of virtual rounds, simulators for learning surgical skills are advised as a way to combat this crisis. We hope to encourage discussion and thereby enable finding meaningful solutions to these problems.

2. Introduction

Coronavirus Disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) [1] affected 213 countries and more than 13 million patients around the world as of July 12, 2020. It originated in Wuhan, China in December 2019 [1] and became a global pandemic [2] at an extraordinary pace forcing governments around the world to impose lockdowns and other restrictions on their countries to curb the spread of infection and to avoid overwhelming the hospitals that started to bow under the weight of the increasing number of COVID-19 patients. Lives of peoples across all spheres of life around the world was impacted either directly or indirectly by COVID-19 infection. Social norms changed due to social distancing, the decline of the handshake, lifestyle changes, and restrictions on public gatherings. The inadequacies of healthcare systems around the world to handle a pandemic were revealed [3, 4].

The pandemic is yet to reach its peak in some countries and with no significant breakthrough in the prevention or treatment and no effective vaccine available, the numbers are likely to continue growing. New protocols emerged in management of other important areas of healthcare like cancer [5]. Healthcare workers including trainees/residents became the most affected as they are one of the few professions that kept working throughout the pandemic. They were also at high risk of contracting COVID-19 infection because of treating patients [6]. In addition to work-related challenges, the residents' academic activities were interrupted, and

surgical training took a toll owing to cancellation and postponement of routine surgeries, diversion of the workforce to battle the pandemic, quarantine following exposure, cancellation or postponement of exams, assessments and increased work hours [7-17]. Here we tried to gauge the impact of COVID-19 on surgical and allied (specialty) trainees/residents by going through published literature, hoping to start a discussion to bring out meaningful solutions to this problem.

3. Methods

We used the search terms 'COVID-19', 'coronavirus', 'SARS-CoV', 'MERS-CoV', 'Novel coronavirus', 'resident', 'surgical trainees', 'surgical training', 'surgical residents', 'surgical residency' on Medline database. We expanded the search by snowball method and selected 25 relevant articles for review.

3.1. Effect On Surgical Residency

Many researchers tried to assess the impact of COVID-19 on surgical and allied specialty residents on their training, education, research, and mental health by surveys, questionnaires, etc both online and offline.

3.2. Impact On Surgical Training

A study that analyzed 756 surveys from Italian surgical and allied branch residents and noted that general surgery residents were more often moved to COVID emergency compared to other surgical specialties (p=0.0062) [7]. They also noted that younger residents were more frequently moved. More than half (57.7%) of residents said COVID emergency has hurt their future career prospects [7]. Half (49.1%) of those moved to COVID emergency units stated a positive impact on their clinical training [7]. However, 87.5% stated a negative impact on surgical training.

In a survey conducted among 192 neurosurgical residents, 78.6% said that they performed fewer operations, 16.1% did not perform any operation at all [8]. There was an evident difference in senior and junior residents in that most of the participants who reported decreased surgical activity (80.1%) were senior residents [8]. A study reported that 98.1% of 52 neurosurgery residents stated that their training in the hospital was affected, although positively or negatively was not specified [9].

According to a study [10], first-year urology residents in Europe did not experience any impairment in their activities, whereas second to fifth-year residents' training was compromised in outpatient and diagnostic procedures. For fifth-year residents, training in open, endoscopic, and minimally invasive surgery was also compromised [10].

In another study [11] cardiothoracic trainees reported significant deviation of their time in inpatient, outpatient, and operating theatres between pre-COVID-19 and COVID-19 era. The majority (71%) felt that their planned training time should have been extended if the current situation lasted for more than 3 months [11].

A survey was conducted among oromaxillofacial surgery (OMS) residents, program directors, and program chairs in which 97.7% of the participants agreed that their program has stopped all elective cases [12]. Fourteen percent of the residents said they have been assigned to an off service. [12] Most residents (66%) were not concerned about meeting graduation requirements [12]. But those who were scheduled to graduate in June 2020 were concerned the most.

A survey of 112 residents of all surgical specialties from Pakistan and found that more than eighty percent of them felt that both clinical exposure and surgical hands-on training were adversely affected as there was 56% reduction in elective surgeries and 39% reduction in emergency surgeries [13].

Reports suggested consistent decrease of surgical and ambulatory volume in the US urology programs [14]. Eighty of these residents agreed that program changes have negatively impacted surgical training. More respondents from high COVID-19 regions reported decreased emergency surgeries and cancelled educational activities [14].

It is reported that among 197 neurosurgery residents of North America that participated in a survey, 99.5% said the volume of surgeries had decreased at their institution leading to reduced work responsibilities and work hours ($p<0.0001$) [15]. Most of them also said that outpatient and inpatient volumes had decreased greatly. Few said that their program has been affected by residents needing to quarantine.

Orthopedic residents from South Korea said that average working time and average operating room time had reduced significantly but not in emergency and outpatient clinics [16].

3.3. Impact On Academic Activities

Most of the residents in a survey noticed a reduction or complete cessation of academic activities [7]. Participants of another study reported an increase in educational and scientific activities as their free time was spent studying and due to the increased availability of webinars [8]. A majority of these (73%) were senior residents compared to junior residents. Eighty percent of residents in a survey said that studying hours were affected, positively or negatively is not known [9].

In a survey conducted among European urology residents [10], 85.2% reported having at least two hours per day for studying. Another study [11] reported significant deviation in time spent by cardiothoracic trainees in multidisciplinary team meetings and learning sessions. Many felt their current role offered no relevant learning opportunities and that it is a deterrent to their professional development [11]. Sixty-three percent were very concerned about the impact on learning and structured training [11]. No association was found between this concern and seniority [11]. There was also poor documentation of learning encounters with very few trainees

completing their assessments [11].

Most of the oromaxillofacial surgery (OMS) residents that participated in their survey indicated that the frequency of virtual didactics had increased in their program [12]. Half of them reported that these were better than previous didactics [12]. In one study, 91% had more time for self-study due to the reduction of mean working hours (81.10 hours to 49.16; p=<0.001) [13].

There was a marked increase in attendance for educational sessions with fewer operative cases at John Hopkins academic neurosurgery program [17]. Results of a survey of 197 neurosurgery residents across North America showed that the number of residents that spent >4 hours per week in formal didactic lectures through their program has increased significantly [15]. Nearly all reported that their program had converted to electronic platforms with 71.9% of programs making this change within 1 week [15].

Almost all (99%) of US urology residents that responded to a survey reported discontinuation of in-person conferences with a transition to virtual platforms [14]. In the same study, at least half reported an increase in educational activities [14].

Time dedicated for lectures and clinical case discussions both has decreased significantly [16]. While the use of traditional teaching methods decreased, that of online methods increased [16]. However, the satisfaction level with online teaching was significantly lower [16].

3.4. Impact On Research

First-year residents participated in more research and didactic activities compared to final year residents (26.1 vs 22.8; p=0.092) [7]. Among the residents on COVID-19 emergency duties, 29.5% suspended didactic and research activities while 19.6% of them increased them [7]. The majority of them (61.6%) took part in clinical trials related to COVID-19 [7].

In the survey done on UK cardiothoracic surgical trainees, there was no difference in the time spent on research and clinical audit activity [11]. More than 70% residents had more time for research [13, 14].

3.5. Psychological Impact

Healthcare workers around the world have expressed concern about emotional stress due to physical exhaustion, the question of access to Personal Protective Equipment (PPE), workplace exposure to COVID-19, limited testing, putting their family members at risk, anxiety about assuming new roles, and limited access to mental health services [18, 19].

In a study [9], 90.4% of 52 neurosurgery residents agreed that their mental health was affected and 100% stated that their social life was affected. It was not specified whether the effect was positive or negative [9]. Thirty-two percent of trainees were at least somewhat concerned about their mental well-being while 61% felt that they or their family members would have no access to COVID-19 testing in time of need [11].

According to a survey [12], the modifications in their program were agreeable to majority of participant residents. Comments at the end of the survey expressed concerns regarding limited clinical and operative experience, concern regarding occupational exposure and transmission to family members, access to PPE, and testing and concern regarding meeting graduation requirements [12].

Many surgical residents were afraid of contracting the infection, transmitting the infection to family members, and about dying because of exposure [13]. The average score of modified Maslach Burnout inventory for these residents was reduced from 14.75 in pre-COVID time to 8.33 now showing statistically significant (p<0.001) reduction in burnout [13]. When asked to grade the overall effect of the pandemic on their life from -10 to +10 with -10 being severely adversely affected and +10 being massive positive impact, the average score was - 4 ± 1.73 [13].

Half (51%) of respondents in a survey agreed that there is increased anxiety about competency after graduating residency [14]. This percentage was more in high COVID-19 regions (63% vs 45%, p=0.02). 54% agreed that there were home-life disruption and increased financial concerns [14].

Most respondents (68.2%) in a survey reported that working in the pandemic did not have a negative effect on their home or family lives [15]. One-third were concerned that their residency will be negatively affected and one third were unsure of the long-term effects [15]. More senior residents were worried about this than junior residents [15].

The average score for quality of life decreased (68.9 to 61.7, p<0.001) for orthopedic residents in South Korea, and factors that caused the most stress to them were family/relatives health, their own health and residency program in that order [16].

3.6. Miscellaneous Concerns

From our own experience, there are concerns about wearing PPE in operation theatre such as making the wearer dehydrated and issues like fogging of goggles, slippage of headgear obstructing vision, or worse contaminating the surgical field, with less personnel to troubleshoot in the OT. There are fewer opportunities for residents to attend physical conferences and hands-on workshops which also hurts networking opportunities. There is an increase in peri-operative and post-operative complications which increases the workload and decreases the morale of residents and patients alike [23]. Residents are having to get accustomed to treating patients by telemedicine which may not be great for developing clinical skills and also increases the chances of errors in diagnosis and clinical decision making [20].

4. Discussion

COVID-19 pandemic has affected the whole world in unprecedented ways in a short time. Apart from the few common chal-

lenges that all of us are facing, some challenges are specific to the vocation. One of them is trying to do a surgery residency during the pandemic. Residency programs are typically being limited by a set amount of training years and therefore residents hardly ever miss learning opportunities. In most countries in which the disease has not peaked yet, elective surgeries and outpatient clinics have been canceled or postponed indefinitely and only emergency, oncologic, and cardiac surgeries are currently being undertaken, especially in large hospitals which also are most of the training/teaching hospitals [8, 10, 12, 14, 15].

Some residency programs also have competency requirements that a trainee must meet to complete his residency [10, 11]. In the case of general surgery or other surgical specialty residencies, the requirements are in the form of a certain number of operations or diagnostic procedures they should have performed or assisted, competency level in each of these procedures, number of patients of certain diagnosis they have taken care of and the competency level in the management of these clinical problems [11]. Even if there are no such requirements from the program, operating time and secondly, clinical skills are extremely important for a resident as they will have to practice independently once they graduate [14].

Most of the articles published regarding the impact of the pandemic on surgical specialty residencies agree that most, if not, all elective surgeries are canceled and some even show a decrease in emergency surgery [13, 14]. Even in the surgeries that are being conducted, since people who are allowed to enter the operating room is limited due to rationing of PPE and to avoid the risk of exposure to the disease due to overcrowding and therefore fewer residents are getting scrubbed and consultants may operate to decrease the operating time which limits residents' exposure or hands-on training even more [10, 21, 22]. Outpatient and inpatient working time are reduced which is otherwise paramount in developing the clinical skills of residents. Diagnostic endoscopies and minor operations are the procedures that surgical trainees and residents usually begin their training with [10]. Cancellation of these procedures has decreased the opportunity for surgical training even further.

Since the working hours are reduced, residents reported having more time for self-study and online educational sessions [8, 10, 13, 14]. Most residents reported that traditional in-person academic activities have drastically reduced. While most were happy with the online transition, some reported being less satisfied with the same [16]. Residents are also using extra time for research purposes. Some of the residents who were deployed to COVID-19 duties also took part in research related to COVID-19 rather than their subject of residency [7].

The number of ICU beds has increased with the bulk of these beds being diverted to COVID care and some hospitals have become designated COVID centers. Surgical specialty residents have been deployed to COVID duties to share the burden of their medical, emergency, and anesthesia counterparts. They have been tasked to perform new duties, usually outside of their academic curriculum without adequate training and meanwhile, their surgical training has been suffering [7]. These changes have caused fears in many surgical residents which has been aptly summarized by an orthopedic resident from Singapore posted in emergency duty during COVID-19 pandemic [24].

A significant number of residents were also worried that they may not be able to meet the graduation requirements, some had apprehensions about their future employment prospects, a minority also had doubts about their chosen branch of specialty [7]. But most were more worried about their family members' risk of contracting the infection and exposing them to infection [13]. There are also concerns about themselves getting infected, unavailability of testing, and mental health services [12]. The physical exhaustion of working with PPE may also add to the stress and decreased social contact may flare up depression in some. It seems that the majority of the surgical residents deployed to COVID-19 duties did not have any problem with it and were happy to help, reminding us that before being a specialist, we are all medical doctors ready to treat patients in need. Some residents also reported increased morale as they are doing national duty [12]. Even though there is a certain amount of negative impact on mental health it may not be as drastic as seen in healthcare workers (HCW) directly involved with COVID care. The survey of Pakistani residents even showed decreased burnout among residents after the pandemic [13]. It is also important to note that many of these studies did not include mental health questions in their surveys.

As this pandemic rapidly evolved and brought changes by the day, we are adapting to it and new norms are being created. We were not prepared for it and the health care systems were ill-equipped but governments at national levels and program directors at program levels are bringing timely changes to protect their residents from infection while continuing patient care as much as possible [14]. Some residency programs have been modified or restructured [25, 26]. Pregnant or immunocompromised residents are given more non-clinical responsibilities [14]. There's a marked increase in the number of webinars, virtual patient rounds, morbidity and mortality and interdepartmental virtual online meetings. Education in the form of pre-recorded lectures, offline surgical videos with commentary or YouTube videos, smartphone applications should also be encouraged [27]. To compensate for the lack of surgical hands-on training, we should encourage widespread adaptation of novel technology in the form of portable laparoscopic trainers, virtual laparoscopic trainers, homemade simulation models, video game training, online simulation modules, hobbies and mental imagery [27].

Mental imagery is a mental training technique tested at the Uni-

versity of New Mexico [28]. When learning basic suturing skills, when physical practice followed by extra physical practice was compared with physical practice followed by mental imagery, mental imagery was as effective as additional physical practice. [28] Therefore, when physical practice is not possible, mental imagery may be a cost-effective technique to slow surgical skill decay and lessen performance anxiety [29]. With this current scenario, there may be accelerated development of AI (artificial intelligence) which is bound to play a major part in clinical diagnosis, decision making, surgical training or even performing surgeries by automated robots in the future [30].

5. Conclusion

COVID-19 pandemic affected residents of surgical and allied specialties both professionally and personally. We may or may not see the end of this pandemic, but what we can do is to accept this as the new norm and adopt new technologies to make up for the lack of hands-on surgical training. Webinars, virtual grand rounds, online meetings, home-based simulators, or surgical trainers are exciting new ways of surgical education and must be welcomed with open arms. We should also remember that we are medical doctors first and foremost before being specialists and hope that we will be proud of helping patients in any way. With this article, we hope to help surgical residencies around the world facing the same problems to come up with solutions. We also hope to start a discussion that will help in the emergence of newer, better answers to the question of how to move forward in these times.

References

1. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020; 395(10223): 497-506.
2. Callaway E. Time to use the p-word? Coronavirus enter dangerous new phase. Nature. 2020; 579: 12.
3. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? Lancet. 2020; 395(10231): 1225-8.
4. Moghadas SM, Shoukat A, Fitzpatrick MC, et al. Projecting hospital utilization during the COVID-19 outbreaks in the United States. Proc Natl Acad Sci U S A. 2020; 117(16): 9122-6.
5. Darlington C D, Mammen RJ, Mammen KJ. COVID-19 and its impact on genitourinary malignancies. Indian J Urol. 2020; 36(3): 163-70.
6. Wong SCY, Kwong RT, Wu TC, et al. Risk of nosocomial transmission of coronavirus disease 2019: an experience in a general ward setting in Hong Kong. J Hosp Infect. 2020; 105(2): 119-27.
7. Pertile D, Gallo G, Barra F, Pasculli A, Batistotti P, Sparavigna M, et al. The impact of COVID-19 pandemic on surgical residency programmes in Italy: a nationwide analysis on behalf of the Italian Polyspecialistic Young Surgeons Society (SPIGC). Updates Surg. 2020; 72(2): 269-80.
8. Zoia C, Raffa G, Somma T, Della Pepa GM, La Rocca G, Zoli M, et al. COVID-19 and neurosurgical training and education: an Italian perspective. Acta Neurochir. 2020; 162: 1789-94.
9. Alhaj AK, Al-Saadi T, Mohammad F, Alabri S. Neurosurgery Residents' Perspective on COVID-19: Knowledge, Readiness, and Impact of this Pandemic. World Neurosurg. 2020; 139: 848-58
10. Amparore D, Claps F, Cacciamani GE, Esperto F, Fiori C, Liguori G, et al. Impact of the COVID-19 pandemic on urology residency training in Italy. Minerva Urol Nefrol. 2020; 72(4): 505-9.
11. Caruana EJ, Patel A, Kendall S, Rathinam S. Impact of coronavirus 2019 (COVID-19) on training and well-being in subspecialty surgery: A national survey of cardiothoracic trainees in the United Kingdom. J Thorac Cardiovasc Surg. 2020; 160: 980-7.
12. Huntley RE, Ludwig DC, Dillon JK. Early Effects of COVID-19 on Oral and Maxillofacial Surgery Residency Training-Results From a National Survey. J Oral Maxillofac Surg. 2020; 78(8): 1257-67.
13. 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.
14. Fero KE, Weinberger JM, Lerman S, Bergman J. Perceived Impact of Urologic Surgery Training Program Modifications due to COVID-19 in the United States. Urology. 2020; 143: 62-67.
15. Pelargos PE, Chakraborty A, Zhao YD, Smith ZA, Dunn IF, Bauer AM. An Evaluation of Neurosurgical Resident Education and Sentiment During the Coronavirus Disease 2019 Pandemic: A North American Survey. World Neurosurg. 2020; 140: 381-6
16. Chang D-G, Park J-B, Baek GH, Kim HJ, Bosco A, Hey HWD, et al. The impact of COVID-19 pandemic on orthopaedic resident education: a nationwide survey study in South Korea. Int Orthop. 2020; 44: 2203-10.
17. Khalafallah AM, Jimenez AE, Lee RP, Weingart JD, Theodore N, Cohen AR, et al. Impact of COVID-19 on an Academic Neurosurgery Department: The Johns Hopkins Experience. World Neurosurg. 2020; 139: 877-84.
18. Ayanian JZ. Mental Health Needs of Health Care Workers Providing Frontline COVID-19 Care. JAMA Heal Forum. 2020.
19. Dedeilia A, Sotiropoulos MG, Hanrahan JG, Janga D, Dedeilias P, Sideris M. Medical and surgical education challenges and innovations in the COVID-19 era: A systematic review. In Vivo. 2020; 34(3): 1603-11.
20. Yaghobian S, Ohannessian R, Iampetro T, et al. Knowledge, attitudes and practices of telemedicine education and training of French medical students and residents. J Telemed Telecare. 2020.
21. Ficarra V, Novara G, Abrate A, et al. Urology practice during the COVID-19 pandemic. Minerva Urol Nefrol. 2020; 72(3): 369-75.
22. Simonato A, Giannarini G, Abrate A, et al. Clinical pathways for urology patients during the COVID-19 pandemic. Minerva Urol Nefrol. 2020; 72(3): 376-83.
23. Cano-Valderrama O, Morales X, Ferrigni CJ, et al. Acute Care Sur-

gery during the COVID-19 pandemic in Spain: Changes in volume, causes and complications. A multicentre retrospective cohort study. Int J Surg. 2020; 80: 157-61.

24. Liang ZC, Ooi SBS. COVID-19: A Singapore Orthopedic Resident's Musings in the Emergency Department. Acad Emerg Med. 2020; 27(4): 349-50.
25. Sabharwal S, Ficke JR, LaPorte DM. How We Do It: Modified Residency Programming and Adoption of Remote Didactic Curriculum During the COVID-19 Pandemic. J Surg Educ. 2020; 77: 1033-6.
26. Nassar AH, Zern NK, Mcintyre LK, Lynge 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(7): 624-7.
27. Hoopes S, Pham T, Lindo FM, Antosh DD. Home Surgical Skill Training Resources for Obstetrics and Gynecology Trainees During a Pandemic. Obstet Gynecol. 2020; 136(1): 56-64.
28. Anton NE, Bean EA, Hammonds SC, Stefanidis D. Application of mental skills training in surgery: A review of its effectiveness and proposed next steps. J Laparoendosc Adv Surg Tech A. 2017; 27(5): 459-69.
29. Sanders CW, Sadoski M, Bramson R, Wiprud R, Van Walsum K. Comparing the effects of physical practice and mental imagery rehearsal on learning basic surgical skills by medical students. Am J Obstet Gynecol. 2004; 191(5): 1811-4.
30. Hashimoto DA, Rosman G, Rus D, Meireles OR. Artificial Intelligence in Surgery: Promises and Perils. Ann Surg. 2018; 268(1): 70-76.