



## REVIEW ARTICLE



# Surgery residency in the COVID era

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### Abstract

COVID 19 pandemic has completely shattered the world's economic and healthcare systems and has had a major impact on the educational system as well. Amidst this chaos, the surgical training has suffered immensely. Due to the suspension of elective surgeries and outpatient services and deployment of residents to COVID areas, surgical training has taken a backseat. This review analyses the changes that have occurred in the healthcare system and its impact on the surgical residents and also aims to provide steps for its betterment.

Keywords: Surgery residents, surgical training, COVID

## 1 | INTRODUCTION

We are living in times of dismay. The infamous SARS CoV2 virus, also known as the “Novel Coronavirus” (1) has caused widespread havoc across the world with a worldwide tally of affected people reaching 10,665,758 with 515,973 deaths till July 2<sup>nd</sup> 2020. The numbers continue to rise with USA taking the lead with 2,679,230 cases and 128,024 deaths till now. Cases in India have also seen an exponential rise since the opening of the lockdown with the total cases nearing 604,641 with 17,834 deaths.(2) WHO, thus declared COVID 19 as a pandemic on 11<sup>th</sup> March 2020 (3).

COVID 19 has led to a complete collapse of the world's social and economic systems and its ripple effects are seen over its healthcare and educational systems as well.(4) There is chaos, death, helplessness and fear all around and it seems that we are at war with a faceless enemy where we are not surgeons, physicians or nursing practitioners,

but healthcare soldiers fighting this enemy in the battlefield.

There has been a paradigm shift in the approach of management of patients, especially surgical patients since the advent of COVID 19. It has shifted from a “patient centered” approach to a “community centered” approach.(5)The surgical priorities have shifted to the management of emergencies,trauma and time sensitive diseases whilst postponing the electives. The staff from various specialties being

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deployed to special areas designated for the management of COVID as well as non COVID patients in order to minimize the exposure. Main emphasis is now being given to control the transmission of the virus and treat the affected. Guidelines from various organizations regarding management of patients during a pandemic have been released and emphasized upon, including the WHO and the Royal College of Surgeons.(6)(7)

Amidst this, COVID 19 has also affected the surgical training in a number of ways. In our review, we aim at exploring the effect of COVID on the life of residents as well as on their surgical training.

#### **Life of a surgery resident and the COVID era:**

Surgical training can be compared to military training which requires discipline, toil and perseverance. A surgical resident is exposed to blood, spit, stool and pus and is trained and carved in such a way so that he can operate through large incisions or through incisions not bigger than a keyhole.

In 1999, the ACGME defined 6 core competencies that must be achieved by the residents during their training in order to excel in their profession. These included patient care, interpersonal and communication skills, medical knowledge, professionalism, practice-based learning and system-based practice.(8)(9)

But COVID 19 has caused a drastic change in the approach to patient care and general surgical practice. With the elective surgeries postponed, emphasis is now given to cater only emergency and semi emergent cases or diseases that are time sensitive, like malignancies, in order to vacate beds for the patients inflicted with corona virus.(10)(11) The outpatient services have also been suspended in order to minimize the risk of exposure to both the healthcare workers as well as the patients. This has adversely affected the healthcare system and surgeons as well. Recently, the ACGME had proposed a 3-stage guideline on pandemic response for institutions which comprises of: Stage 1: "Business as usual", Stage 2: "Increased clinical demands guidance" and Stage 3 the "Pandemic emergency status guidance".(12) We have entered the pandemic emergency status and all educational activities have been suspended and the residents have been deployed to COVID areas to manage

the COVID affected. Classes and clinical rotations had been cancelled in many parts of the world like the US, UK and Singapore with the postponement of all examinations and educational events by The Royal College of Surgeons of Edinburgh on 13<sup>th</sup> March 2020 which was seconded internationally across all healthcare institutions, including India.(13) It has caused a great impact on the efficient training of surgical residents. There has been a drastic reduction in the surgical knowledge, clinical judgement and the development of surgical skills of the residents.

#### **Patient care and Communication skills:**

Acquiring communication skills is an integral part of a resident's training as it helps in establishing a rapport with the patient and the relatives, alleviate the patient's stress and anxiety associated with the illness, build confidence and helps in enhancing their recovery. It also develops empathy and listening skills in a resident by listening to their ailments. The resident is also taught how to "touch and tell" the clinical signs and is expected to inspect 'every wound-every day'.(14) This helps in a better 'tactile assessment' which is very important for a surgeon. He is taught to think both as a surgeon and as a physician, developing a holistic approach to patient care and management. The outpatient services of any department are essential in managing the patients who do not necessarily require admission and monitoring which develops quick listening and diagnosing skills as well as time and crowd management. Moreover, a resident is expected to manage the surgical wards which inculcates team work, patience and efficient management skills in him and also helps in nurturing the doctor-patient relationship.

With the advent of COVID 19 and the suspension of the elective surgeries and outpatient services, the general wards are converted to isolation wards catering the COVID affected patients.(10)(11) The patient is first screened for COVID with a nasopharyngeal and an oropharyngeal swab at admission and is kept in the isolation wards till the reports come negative. These wards have people donned in full Personal protective gear which poses difficulty in communication with the patient and the initial rapport formation. There is limited movement in the isolation wards with an emphasis kept on 'do I need

to see this?'. Once he comes to the ward, it is advised to keep one-on-one contact to a minimum while giving the maximum patient care and practice physical distancing as much as possible. The practice of "touching" the patient and communicating with him has reduced greatly which has adversely affected the development of these skills in a resident. There are virtual barriers between the patients and the residents and it seems that the practice of physical distancing has actually distanced the surgeon from surgery in COVID era.(14)

**Major operative procedures and Basic procedural skills:**

The Operation Room [OR] is considered as the keystone of surgical care where a resident gets exposed to various major surgeries including both emergency and elective procedures. Basic procedures like hand-washing, scrubbing, gowning, gloving and the acclimatization to the use of various instruments and machines used in surgery is learnt in the OR. A resident learns about surgical safety and observes various surgeries and their steps. When scrubbed, he learns about surgical assistance and surgical etiquettes. Surgery is all about skills. A resident develops his skill in the operation theatres where he gets exposed to open surgeries as well as minimally invasive surgeries using laparoscopes and Robots. There is learning by direct observation where he sees and learns the techniques as well as the practice based learning where he learns how to hold and use a scalpel and how to suture wounds.(15) He also learns the post-operative management and care of the patient. Basic procedural skills like venepuncture, urinary catheterization, central venous catheterization, venesection and surgical skills like excisions, incision and drainage, suturing along with critical care procedures like intubation, cardiopulmonary resuscitation, cricothyroidotomy, tracheostomy and tube thoracostomy form the basis of surgical training. A resident is expected to learn and excel in these procedures by the time he graduates. But the COVID era has deleteriously affected the learning of basic procedural and surgical skills. As COVID is an air borne disease, surgical personnel are at an increased risk of contracting this virus while performing aerosol generating procedures like intubations, tracheostomies, CPR or surgical procedures like tube

thoracostomies, drainage procedures or peritoneal lavage which exposes them to bodily fluids.(16) The Centre for Disease Control [CDC] has advised to keep the staff in the operation theatre to a minimum and remove all non-essential personnel from the OT while doing aerosol generating procedures.(17) This is done to reduce the exposure and risk of transmission of the virus. Similarly, all surgical and critical care procedures are to be done by an experienced individual with minimum number of attempts. Due to this, the newly joined or the less experienced are not getting enough opportunities to learn and practice these routine procedures. There is limited 'in theatre' educational opportunities which is causing a hindrance in learning these skills.(18) This is most noticeable in the residents who are in their final year of training and will soon be starting their professional career. A reduction in the number and quality of cases has significantly lowered the surgical experience of a third year postgraduate.(4)

Moreover, laparoscopic and endoscopic procedures are being avoided due to the theoretical risk of aerosol production by creation of pneumoperitoneum or the use of diathermy.(19) This has led to a reduced exposure of the minimal invasive surgeries to the residents, which has now become an essential aspect of a general surgeon.

**Academics, conferences, presentations:**

Besides the "in OT" role, a major part of resident training is formed by the academic classes, ward rounds, lectures and presentations. The 'in-ward teaching' develops clinical skills in a resident. Apart from institutional teaching, various national and international conferences and CMEs are held which give an opportunity to the residents to attend, interact, learn and share experiences with their counterparts. They encounter many renowned faculties who are masters of their field which builds a vigor to excel in one's field. This also exposes him to a healthy competition and keeps him updated while at the same time develops a zeal in him to explore and learn more. This helps in overall development of a resident.

With the advent of COVID era, post graduate classes and conferences have been suspended in order to maintain physical distancing so as to minimize the

risk of transmission of the virus. This has affected the academic aspect of the residents. The suspension of clinical rotations has deprived the residents, the opportunity to assess and observe various aspects of surgery, learn various specific skills and plan his future accordingly. Moreover, the postponement of exams and certifications has blurred the future of the newly graduated and has put their professional life to a standstill.

### **Research:**

Research forms an essential part of any academic curriculum. Surgical research has suffered enormously in the COVID era as both the clinical and laboratory-based research has been suspended and the residents and faculty have been deployed to treat the COVID inflicted patients.(20)

### **Interpersonal relationships and professionalism:**

Surgery residency demands tough training and there may be moments of fatigue, burnouts and helplessness. The role of colleagues and seniors comes into play here. They act as stress busters and help lighten the mood. Moreover, interaction with seniors yields the maximum learning about how to manage wards and patients and learn the basic procedural and communication skills. This also develops professionalism in a resident. But due to the deployment of residents to COVID areas along with long routines and inadequate rest and quarantine has led to both physical and mental exhaustion. Those posted in COVID wards are asked to maintain self-isolation, reduce meetings with other colleagues, family, friends which serves as an added psychological strain on them and may lead to depressive symptoms.

### **Deployment to various areas and the effect of PPE:**

The surgery residents have been assuming many roles since the COVID era.(21) The whole staff is now divided into COVID and non COVID teams where they assume alternating roles in the management of patients. The surgical residents are deployed to various non-surgical areas and are expected to manage patients with medical conditions or critical illness. Moreover, wearing a PPE is not an easy job. Routine stuffs like dressings, wound care, palpating the abdomen, rectal examination becomes a

tedious job in the PPE due to lack of vision, restricted movement and excessive perspiration. This may also adversely affect the health of a resident, if not taken care of. The non-COVID team cares for the unaffected and is placed either in the surgical wards or telemedicine OPDs where they work from a distance in order to reduce the exposure to the unexposed. They also serve as a backup for the COVID team. It can be said that the current practice of medicine has been divided into “on the edge” and “beyond the edge”.(22) There has been a drastic change in the approach to patient management and care and this has led to a drastic effect on the overall development of a surgical resident.

### **Steps to recover the surgical training:**

The COVID era seems never-ending. So, we need to implement a strategy for surgical training of residents which is sustainable, flexible and adaptable in these times.(23)

Ample research has been done in forming strategies and guidelines on how to effectively go with surgical training of residents.

### **Ensuring resident's well being:**

The residents are the frontline warriors in this pandemic dealing directly with the COVID inflicted patients and are at the maximum risk of contracting the virus. Steps to ensure their safety must be taken which include adequate provision of personal protective gear, education about the use of PPE and proper donning and doffing techniques, hand hygiene and ensuring physical distancing as much as possible. CDC has published illustrated steps on how to wear and remove PPE and steps of hand hygiene which must be followed by every institute.(24) Proper rest, nutrition and quarantine are essential elements to ensure a resident's well-being. The division of task-force into COVID and non COVID teams ensures alternating roles, providing adequate rest and quarantine to each team. Daily screening of residents posted in COVID areas is being done and they are asked about the development of symptoms. If a resident is symptomatic, he/she is immediately taken off duty and sent to isolation / quarantine after a nasopharyngeal and oropharyngeal swab. A quarantine or home isolation for 14 days is ensured and the resident is called on duty only after the second swab sample is

negative and he is asymptomatic. Social distancing from friends and family may have a psychological effect on a resident. Thus, steps must be taken to ensure psychosocial support through virtual counselling sessions to uplift the spirits of the residents.

### **Resident education:**

COVID 19 has caused a serious hit to the education system. With classes and clinical rotations suspended, concerns regarding resident training surfaced. Three types of Educational approaches for surgeon education that included Institutional group education, Travel for group education and web-based learning were being practiced in the pre COVID era.(15) In the COVID era, with physical distancing and quarantine, technology has become a key asset. The institutional academics is being managed by online classes, pre-recorded video library of lectures, expert tips and webinars with live commentary, clinical case discussions and 'virtual' rounds.(22) The travel for group education including various national and international conferences is now being replaced by webinars and videoconferencing by using pre-recorded videos of various surgeries and rare cases. Emphasis is put on online paper or topic presentations in order to ensure all round development of a resident.

Simulation based learning is steadily gaining impetus.(25)(26) Basic surgical and procedural skills can be learned over these high-fidelity mannequins which mimic real life scenarios, without the fear of transmission of the virus. Similarly, endoscopic and laparoscopic procedures can be taught through laparoscopic simulators and demo videos which are beneficial for the final year graduates to learn basic hand-eye co-ordination as well as handling of the instruments. Here, opportunity must be taken to utilize the time of the off-duty residents or the residents posted in the non COVID surgical wards.(15)

### **Research:**

Due to the suspension of both laboratories and clinics, research work came to a standstill. However, many academic institutions have re initiated their research work while abiding by the rules of social distancing. The concept of virtual research is gaining popularity nowadays. The residents can use videoconferencing to interact with their mentors and dis-

cuss about their research work. A weekly or monthly research meeting can be held where research techniques and specific statistical analyses can be reviewed by the peers as well as the other faculty in detail.(4)

### **Examinations and certification:**

In various parts of the world, online exams and graduations are being conducted which provide an opportunity to the graduates to complete their residency and move ahead in their future. Many institutions are offering online fellowships which can be utilized by the newly graduates to enhance their surgical knowledge and skills. Moreover, a mail based monthly assessment for the residents is an effective way to keep them on their toes and in a constant learning environment.

### **Interpersonal relationship:**

The constant anxiety and fear of contracting the virus is not only prevalent among the patients, but also among the residents. Online meets and video calls with friends and family helps in maintaining the sanity of the residents who are working continuously in this adverse environment and ensures safety of their loved ones.

### **Post COVID era:**

#### **Technology, virtual reality:**

Technology has formed the basis of education in the COVID era and emphasis is now given to computer based learning and online teaching.(26)(27) The conferences and CMEs are being held via videoconferencing using pre recorded videos of surgeries and discussions is opened for all members.

Virtual reality [VR] has emerged as a novel concept in surgery. The VR creates a realistic, three-dimensional environment involving visual feedback from body movements which creates a life-like surgical experience and is being used in majority of workshops on laparoscopic, endoscopic or endorobotics.(28) Both virtual reality and surgical simulators are the future of surgical training.

#### **Resumption of elective surgeries and outpatient services:**

The suspension of elective surgeries created an enormous backlog and has caused a significant impact

on the capacity of surgical system. Post COVID era will see gradual resumption of elective surgeries with strict adherence to the guidelines on recovery of surgical services after COVID 19. Physical distancing, lesser number of cases per OR per day, pre operative COVID testing are the general norms. Moreover, Laparoscopic and endoscopic procedures will be resumed after assessing the risk benefit ratio and performed in select cases which can be justified clinically (29) with incisions as small as possible, insufflation pressures kept to a minimum and smoke evacuation systems and filtration devices used to remove the CO<sub>2</sub> after the surgery is completed and before the retrieval of specimen and port closure.(30)(31)With the resumption of these services, the residents can have an exposure to the real surgical scenario apart from the simulation based learning.

## 2 | CONCLUSION :

The COVID pandemic has had a profound impact on the healthcare system as well as the resident training. The surgeons and residents are assuming different roles and inclining more towards practicing the safe non-surgical alternatives.(21) There are physical, social and emotional barriers between the surgeon and the patient.(14) Various guidelines have been formulated regarding safe resumption of surgical services taking care not to increase the risk of transmission to the health care workers. The resident training has also seen a shift from the traditional classroom teaching to a more technological friendly teaching. The surgical resident is now more dexterous in simulations and VR instead of scalpels and scissors. There has been a drastic turn of events which may have caused a lot of changes in the method of surgical teaching but as Winston Churchill once said, “To improve is to change; to be perfect is to change often”.

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