

## Surgical Stasis: Anomalies & Scarcities in Surgical Residents Training in the Covid-19 Period

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### Rezumat

*Staza chirurgicală: anomalii și deficiențe în pregătirea rezidenților de chirurgie generală în timpul pandemiei de COVID-19*

*Introducere:* Pandemia de COVID-19 a condus la o scădere importantă a numărului de proceduri chirurgicale efectuate precum și la numeroase alte schimbări în practica medicală. Am căutat să aflăm care este efectul acestor schimbări produse de pandemie asupra pregătirii rezidenților din specialitățile chirurgicale.

*Metodă:* Am investigat, cu ajutorul registrelor operatorii și al unui chestionar completat de 67 de medici rezidenți din diferite specialități chirurgicale (chirurgie generală, ortopedie-traumatologie, obstetrică-ginecologie, neurochirurgie), cum a variat numărul de intervenții chirurgicale la nivel individual, rolul operator desemnat medicului rezident, participarea la congrese medicale și cursuri practice, timpul folosit pentru studiu individual, precum și impactul modificărilor din rotația pe modulele de pregătire.

*Rezultate:* Majoritatea medicilor rezidenți au raportat o scădere a numărului de proceduri la care au participat și o frecvență mai mică a procedurilor la care au realizat timpi operatori critici. Aceștia consideră, în majoritate, că pregătirea lor a stagnat în perioada pandemiei dar apreciază ca folositoare experiența obținută în timpul perioadelor de detașare.

*Concluzii:* Impactul real produs de pandemia COVID-19 asupra pregătirii rezidenților din specialitățile chirurgicale trebuie cercetat în continuare, prin studii prospective care să identifice valori prag pentru fiecare tip de procedură în parte precum și cele mai bune strategii compensatorii.

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Cuvinte cheie: COVID-19, rezidenți din specialități chirurgicale, instruire chirurgicală

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## Abstract

*Introduction:* The COVID-19 pandemic has led to a marked decrease in surgical procedures performed worldwide and to numerous other changes in medical practice. We investigated the effect of these changes on surgical trainees.

*Method:* We searched medical records and asked a total of 67 surgical residents from different specialities (general surgery, obstetrics-gynecology, orthopedics-traumatology, neurosurgery) to answer a questionnaire investigating how the total number of surgical procedures and operative role varied for each respondent during the pandemic, the number of medical congresses and hands-on courses they attended during this time, how much study time was available to them and how the changes in their training modules affected them.

*Results:* Most respondents reported a marked decrease in the number of surgical procedures performed, performing key operative steps with a lower frequency. Most of them believed that their training stagnated or suffered a setback. However, most residents consider the changes in their training during the pandemic a useful experience.

*Conclusions:* The real effect of the COVID-19 pandemic on surgical training should be further studied. Future prospective studies should identify threshold values for each surgical procedure and the most effective compensatory strategies.

Key words: COVID-19, surgical resident, surgical training

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## Introduction

Like many other aspects of social and professional life, residency training has seen severe disruptions in the last 2 years. Of all the elements contained in the curriculum, operative volume has a determinant role for the acquisition of surgical skill and specialist expertise. We have investigated the variation of this volume during the COVID-19 pandemic and its impact on the training of surgical residents.

Access to surgical treatment was reduced during the ongoing COVID-19 pandemic due to lack of resources (human resources for anesthesia and intensive care, operating rooms, personal protection equipment, specific forms of advanced treatment, etc.) (1,2,3). Residents from all surgical specialties saw their practical training affected by the decrease in the number of surgical procedures, impossibility to physically

attend hands-on courses and medical congresses (only partially compensated by online events) and the need to assist colleagues from medical specialties in dire need of personnel (4,5,6).

## Materials and Methods

We have searched for parameters known to influence surgical residents training and verified how these parameters varied during the COVID-19 pandemic with the help of a questionnaire that was answered by 67 surgical residents (general surgery, obstetrics and gynecology, neurosurgery, orthopedics, and vascular surgery), and by searching the operative records.

The identified parameters were: operative volume, operative role, number of hands-on courses and medical congresses attended, and the changes in training modules that occurred during the pandemic.

## Results

### Operative Volume

The ability to perform surgical procedures is influenced by the frequency with which these are performed especially for emergency surgery where high risk procedures need to be performed (7) and a correlation between operative volume and surgical performance is described in the literature (8).

The number of surgical procedures available for surgical residents during the pandemic was reduced because most elective procedures could not be performed (most resources were used for the treatment of emergency cases and COVID-19 patients) (Figs. 1-4).

### Operative Role

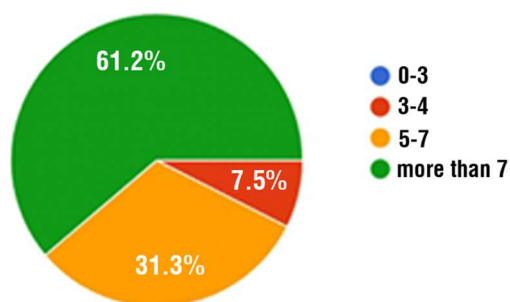
Surgical residents did not only participate in a reduced number of surgeries, they were also given less responsibility during these

procedures, possibly to minimize as much as possible procedure length of COVID patients (Figs. 5, 6).

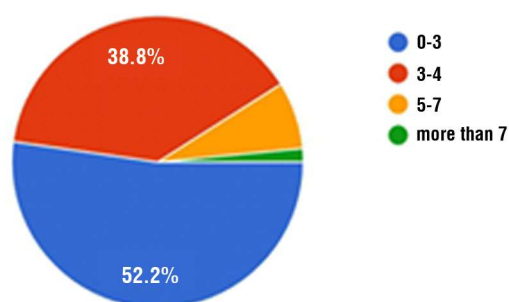
The introduction of limits on working hours for residents in the USA led to an increase in the operative responsibilities for senior residents at the expense of junior residents. This resulted in increased professional stress for younger residents (fear regarding their capacity to perform clinical responsibilities) (9).

The same restrictions did not affect the total number of procedures where residents performed key operative steps, but the total number of procedures where residents scrubbed in decreased (10).

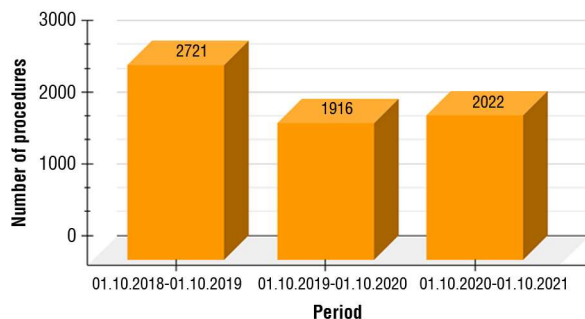
A similar trend was observed in Romania, only these differences between junior and senior residents have been gradually decreasing in the last 3-4 years along with other changes (improvement in the relationship between residents and their trainers, an increase in the number of female residents in surgical specialties compared to 2000-2010 period).



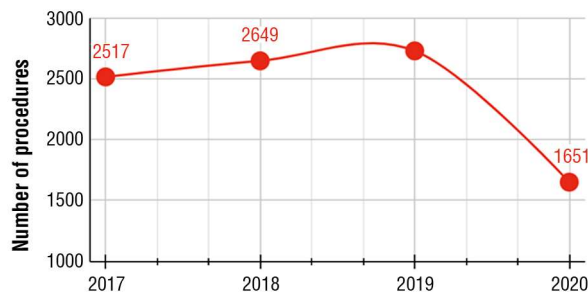
**Figure 1.** What is the number of surgical procedures you scrub in (in a week) before the pandemic? 67 answers



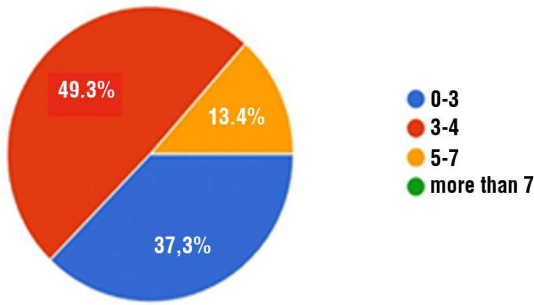
**Figure 2.** What is the number of surgical procedures you scrub in (in a week) during the pandemic? 67 answers



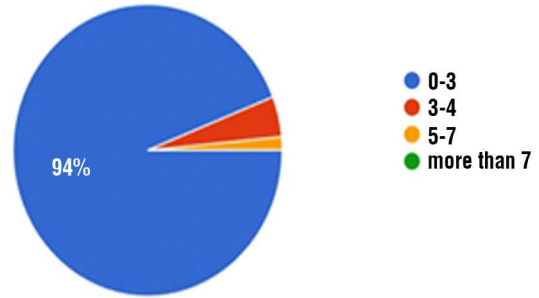
**Figure 3.** Number of surgical procedures (general surgery)



**Figure 4.** Surgical procedures performed 01 Jan 2017 - 31 Dec 2020



**Figure 5.** In how many of these procedure did you perform key operative steps? (before the pandemic) 67 answers



**Figure 6.** In how many of these procedure did you perform key operative steps? (during the pandemic) 67 answers

**Medical Congresses and Hands-on Courses**

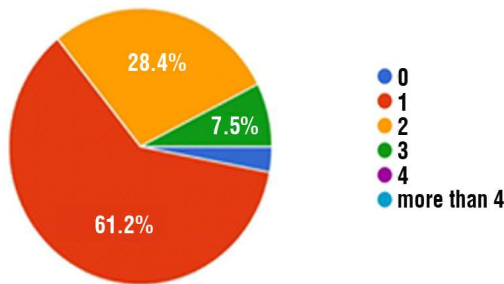
Most respondents reported an increase in attendance at medical congresses (mainly online) and a decrease in attendance at hands-on courses (Figs. 7-10).

Surgical residents across all specialities considered online workshops could not fully compensate for hands-on courses decreasing frequency, or cancellation (6).

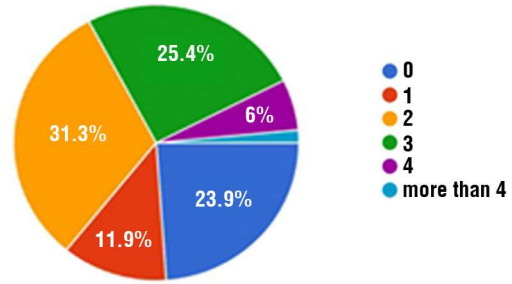
**Residency Training**

Most respondents reported they considered their training either stagnated or suffered a setback during the COVID-19 pandemic (Fig. 11).

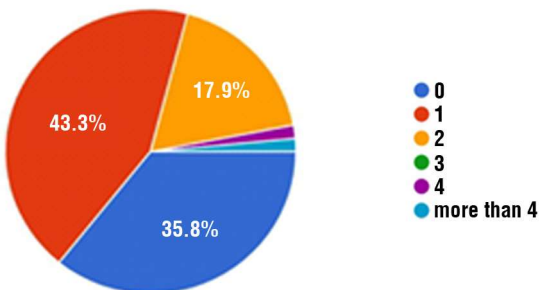
In part, as a consequence of the decrease in elective procedures, but also to shorten operative time and limit the infectious risk to medical personnel, surgical residents were often bypassed while the existing cases were



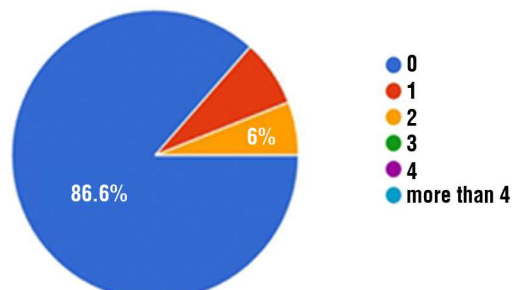
**Figure 7.** How many medical congresses a year did you participate in before the pandemic? 67 answers



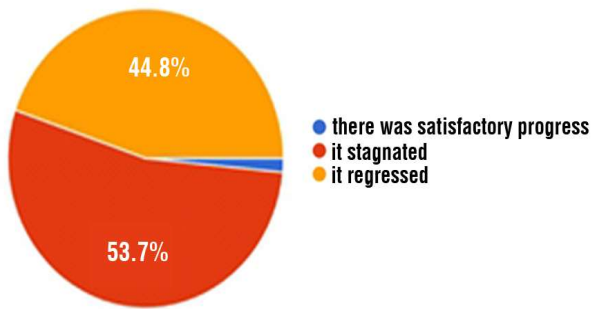
**Figure 8.** How many medical congresses a year did you participate in during the pandemic? 67 answers



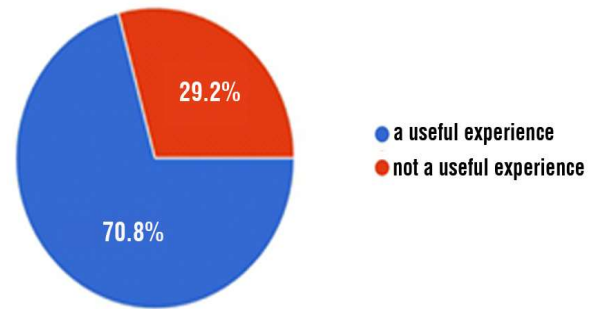
**Figure 9.** How many hands-on courses did you participate in before the pandemic? 67 answers



**Figure 10.** How many hands-on courses did you participate in during the pandemic? 67 answers



**Figure 11.** How did your training progress during the pandemic? 67 answers



**Figure 12.** What do you think about the changes in your training modules? 67 answers

handled by specialists. All surgical procedures require a learning curve, regardless of their open or laparoscopic nature. Until this pandemic, a year 2-3 resident could perform with confidence a short surgical procedure under supervision (appendectomy, perianal abscess drainage, adhesiolysis). During the pandemic the number of procedures performed by residents dropped substantially, and so did the residents' confidence.

Another example of this loss of confidence can be seen in the refusal of some residents to attend their speciality examination - some surgical residents do not feel entirely ready to perform surgeries without supervision.

Other factors contributing to professional stress were: pandemic length, risk of infection (personal, for those close to the residents), lack of perspective and viable alternatives.

### Changes in Training Modules

Surgical resident - a resource during the pandemic:

No matter the institution surgical residents trained in during this pandemic, during all waves of COVID-19 infection, surgical residents helped with patient triage and treatment in the following ways:

- year 1 and 2 surgical residents were transferred across the country for patient triage;
- senior residents volunteered in vaccine centers or helped deliver vaccines at home for patients who could not travel;
- senior residents took shifts in emergency

and intensive care departments

This variation in surgical resident training led to a decrease in the number of surgeries residents performed, but provided experience with the care of the critical patient. The 2-month intensive care rotation general surgery residents used to do was commonly superficial before the pandemic. In the last 2 years, the surgical resident received real training in the treatment of ICU patients. This change was seen as an advantage by most respondents (11) (*Fig. 12*).

The following changes were made at our institution to compensate for this decreasing number of surgical procedures:

- an extra resident was added to the on-duty team so that as many residents as possible could take part in emergency surgeries;
- surgical technique courses were organized and video recordings of different procedures were discussed;
- as many resident medics as possible scrubbed in at every surgical procedure.

### Conclusions

The impact of the changes that occurred in the training of surgical residents should be investigated further by a prospective, randomized, controlled trial. This investigation should provide answers at least to the next questions: what is the minimum number of procedures a resident should perform for each type of surgical intervention? How many procedures under supervision should a resident perform, and

how does simply assisting in surgery help a resident acquire surgical skills?

Some of the strategies used during the introduction of working hours restrictions could be used to compensate for changes in training during the pandemic: mentorship programs, continuous support in the first years of speciality (12).

Data on surgical resident training should be collected to help monitor residents' evolution, efficacy of training modules, surgical simulators, and other training programs. An APP that delivers protocols and necessary steps, while centralizing resident input, customized for each speciality, would be an welcomed accessory (13).

These changes should replace the “resident notebook”- that has never been truly implemented - with a digital record for each resident that will allow for a more uniform residency training across centers.

### *Conflict of Interest*

The authors declare no conflicts of interests.

### *Ethics Approval*

The confidentiality of the respondents was respected.

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