

IMPACT OF COVID-19 PANDEMIC ON RESIDENCY PROGRAMS IN ITALY: A CROSS-SECTIONAL STUDY.

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ABSTRACT

The current COVID-19 pandemic has imposed a remodulation of hospital activities. This has resulted in an increase in the workload for those sectors directly involved in the emergency (infectious diseases, hygiene and preventive medicine, intensive care, etc.) and a drastic reduction in the activities of other sectors, especially those related to surgery. In this perspective, the Italian Young Doctors Association (SIGM) conducted a survey with the aim to provide an overview of the impact of COVID-19 on the training programs of Italian medical residents. Overall, 630 medical residents were recruited in the study and completed the questionnaire. In some cases the medical training programs resulted completely interrupted, not only from the point of view of practical activity, but also with regard to frontal didactical activities (classes, seminars, discussion of clinical cases, or audits). A national preparedness and response strategy, including a clear local leadership to avoid a catastrophic impact on residency program in the upcoming emergency settings, should be defined and implemented.

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1. Introduction

The current COVID-19 pandemic has impacted and changed lives on a global scale since its emergence and spread from China in late 2019 [1,2].

Causing more than half a million deaths worldwide, COVID-19 effects were not only limited to these figures [3].

Indirect effects on health ranged from diagnostic delay on other diseases (e.g. cancer or cardiovascular diseases) [4], to the slowdown of humanitarian aid especially in Sub-Saharan Africa [5, 6], Latin America and Asia, the difficulties in reaching vulnerable populations all over the

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world, making them even more fragile than they already were [6-10], to the mental health consequences on general population and health workers [11 – 12].

Of course, healthcare workers (HWs) were recognized among the most affected categories. Medical personnel caring for COVID-19 patients experienced emotional fatigue, physical exhaustion, alienation from families, isolation, stigma and the pain of losing patients and colleagues [12 -13]. Moreover, many of them were infected by SARS-CoV-2 and have died [14].

In Italy and other European countries, a profound indirect impact was also recorded on medical schools, whereas lessons and practical activities were suspended, but above-all the biggest effects were reported on medical residents (MDs) training [15 – 17]. In particular, a great impact on residency programs [18] was mainly due to 3 order of factors, namely I) the healthcare workforce gap (HWG) and the huge number of HWs that acquired SARS-CoV-2; II) re-organization of NHS related to the epidemic; III) the unprecedented public health response by the governments.

As for HWG, since many years, Italy has been experiencing a shortage of HWs, including some categories of doctors, and mostly nurses and other healthcare professionals [19]. The workload related to the epidemic increased the demand of HWs while, at the same time, a huge number of HWs was infected by SARS-CoV-2 and underwent to quarantine measures or hospitalization, result in a big difficult for our NHS in covering the health increased demand. In this scenario, a great role was played by medical resident who were reallocated to the COVID-19 activities or even signed employment contracts shifting from University to NHS ahead of time, becoming fully responsible for patients with the infection. With regard to the re-organization of NHS related to the epidemic, in order to optimize resources and minimize a further spread of the infection, the national number of intensive care beds increased by 79% [20], several hospitals have been completely dedicated to the care of COVID-19 patients and all outpatients' and elective activities, except for oncology and emergency ones, were heavily contracted. This changed framework drove different schools, especially the ones from surgical specialties [18, 21, 22] or the ones mainly devoted to outpatients' activities, to rearrange their daily working activities or to suspend their training [18, 21, 22]. This was also due to the unprecedented public health response given by the Italian government, in fact, in many cases, in order to reduce physical contact and to maintain social distancing measures, the number of daily medical residents present at work was reduced by 50% and most of didactic and research activities were suspended also [18, 21-24].

Herein, we present the results of a survey conducted by the Italian Young Doctors Association (SIGM) with the aim to provide an overview of the impact of COVID-19 on the training programs of Italian medical residents.

2. Material and methods

A cross-sectional nationwide survey was conducted by administrating a 17-item-electronic anonymous questionnaire, developed on an open-source web application (Google Form). Survey participation was voluntary and participants were asked to sign a privacy consent at the beginning.

The questionnaire was composed of 4 different sections, the first one including general information about residency program: typology, the Italian University hosting, the attended year of residency and type of activity routinely performed. The second section explored the possible impacts of COVID-19 on the active participation in frontal didactical activities (classes, seminars, discussion of clinical cases, or audits), clinical training and research activities, while the third section assessed the perception of the impact of COVID-19 on clinical and surgical activities as well as future perspectives after the pandemic in terms of job and possible solutions to recover any training lost. The last section focused on personal experience during the pandemic in terms of possible burn out and dotation of adequate PPE at work.

Lastly, an evaluation of adequacy of training offered prior to COVID-19 epidemic by the different residency programs in terms of professional skills needed and acquired was asked.

Italian medical residents from any specialty and attending any year of their training program were considered eligible for the survey's analysis. The study was conducted during the first wave of pandemic in Italy - from April 18, 2020 to April 30, 2020. Residents were invited via mailing lists, instant message services, and through the main SIGM Social Media Official accounts the on Facebook and Instagram.

Our sample aimed to reach approximately 2% of Italian residents in all specialties based on the annual number of residency scholarship places from 2014 to 2019 and the annual drop-out percentage of residents. Results of the survey were reported according to the CHERRIES Guidelines [25].

Statistical analysis

A descriptive analysis was performed and all results were summarized as numbers (n) and percentages (%). The 50 different typologies of post-graduate medical schools providing the residency programs were categorized in clinical, non-clinical and surgical area according to the Italian Ministry of University and Research classification (DM 68/2015) [26, 27].

3. Results

Overall, 630 medical residents were recruited in the study and completed the questionnaire, equalling to 2% of the estimate of all Italian medical residents currently enrolled in Italian Residency Programs. As for specialists and medical residents, 55% (n.346) were from clinical fields, 29% (n.182) from non-clinical and 16% (n.102) from surgical sectors (Table 1): up to the 50 different typologies of residency programs available in Italy, 44 (88%) were represented (the detailed list is available in Supplementary File – eTable1).

Ninety per cent (n.37) of all the Universities hosting medical residencies (n. 41), accounting for 15 on 20 Italian Regions, were represented (data not shown). In particular, 45% (n.283) of respondents were from Universities of Southern Italy, 36% (n.229) from Central Italy and 19% (n. 118) from Northern Italy (Table 1). Thirty-three percent (n.207) of respondents attended the 1st year of residency, 23% (n. 147) the 2nd year, 23% (n. 147) the 3rd year, 16% (n.102) the 4th and only the 4% (n.27) the 5th year (Table 1).

Before COVID-19 epidemic, 33% (n.189) of the respondents reported to be usually involved in ward activities, 30% (n.189) in outpatients' activities, 16% (n.98) in elective surgery, 10% (n.62) in medical services (eg. radiology, etc.), 8% (n.50) in intensive care, while only 2% (n.13) in emergency surgery and 1% (n.7) in laboratory activities (Table 1).

Impact of pandemic COVID-19 on clinical, training and research activities is presented in Table 2. In particular, 53% (n.334) of respondents reported a significant reduction of activities, with a new organization in rotations, 19% (n.122) reported a complete interruption of all activities related to the residency program, while 17% (n. 104) reported an increase of activity and for the remaining 11% (n.70) no relevant modification was highlighted. Analyzing the impact on clinical activities, while 33% (n.209) of respondents maintained their usual activities, for 17% (n. 108) the clinical activities were heavily reduced and for 27% (n. 168) they were interrupted on a precautional basis (voluntary or following the residency program board directives). Of note, 20% (n.122) of the residents were moved to other clinical setting: 18% (n.112) to a COVID-19 ward and 2% (n.10) to a non COVID-19 ward. The 4% (n.23) of respondents, instead, voluntarily interrupted their Residency Program to start working in a COVID-19 ward (in the same hospital or in another).

As for the 102 surgical medical residents responding the survey, 90% (n.92) of them believed that the COVID-19 pandemic had a negative impact on their surgical training.

With regard to training and research activities, for 29% (n.181) and 27% (n.172) of respondents these kinds of activities decreased or were completely interrupted, respectively; while for 19% (n.120) and 13% (n.82) these activities increased or remained the same; of note 12% (n.75) of respondents reported not to perform frontal education neither research activities also before the pandemic. When asking about involvement on frontal didactic and research activities on the COVID area during the epidemic, 48% (n.302) and 6% (n.38) of respondents declared to have been partially or completely dedicated to these activities, respectively.

Lastly, most of the respondents (73%, n.460) reported to believe that COVID-19 epidemic had an overall negative impact on their clinical training program, while 16% (n.98) a positive impact and 11% (n.71) a no significant impact.

Analysing answers on overall impact on clinical training program only for respondents directly involved in COVID-19 activities (n. 135), it emerged that 49% (n.66) reported a negative impact, 42% (n.57) a positive impact and 9% (n.12) a no significant impact (data not shown).

In table 3 are shown the results of questions about future perspectives after the pandemic in terms of job and possible solutions to restore missed training. In terms of the adequacy of training offered by the residency program prior to the Covid-19 pandemic, more than half of the respondents believed their residency program was insufficient (20%, n.123) or only was partially adequate (48%, n. 304) to train specialists (Table 3).

The final section of the questionnaire explored personal experiences during the pandemic in terms of emotions, potential burnout and dotation of adequate PPE at work. Notably, 46% (n. 291) of respondents reported experience of dissatisfaction with their work, irritability and detachment, 64% (n. 402) during the pandemic were afraid to contract COVID-19 at work and putting at risk their families, 80% (n. 499) declared to have received partially or inadequate PPE and precautionary provisions at work.

N (%)	
Area of residency programs	
Surgical	102 (16%)
Clinic	346 (55%)
Non-Clinic	182 (29%)
Geographic Area of residency programs	
North of Italy	118 (19%)
Center of Italy	229 (36%)
South of Italy	283 (45%)
Attended year of residency	
1st year	207 (33%)
2st year	147 (23%)
3rd year	147 (23%)
4th year	102 (16%)
5th year	27 (4%)
Activities usually performed before COVID-19	
Outpatients	189 (30%)
Elective surgery	98 (16%)
Emergency surgery	13 (2%)
Ward	211 (33%)
Laboratory	7 (1%)
Medical Services	62 (10%)
Intensive Care	50 (8%)

Table 1. General information on residency programs attended by respondents.

N (%)	
Impact of pandemic COVID-19 on all the activities related to the residency program	
Increase of activity	104 (17%)
No relevant modifications	70 (11%)
Significant reduction of activities, with rotations	334 (53%)
Complete interruption of all activities	122 (19%)
Impact of pandemic COVID-19 on clinical activities	
I have heavily reduced my usual clinical activity, with rotations etc	108 (17%)
I have maintained my usual clinical activity	209 (33%)
I have voluntarily interrupted my Residency Program to start working in COVID-19 emergency unit (in the same hospital or in another)	23 (4%)
I have interrupted all clinical activities on a precautional basis (voluntary or following the residency program board directives)	168 (27%)
I have been moved to a COVID Ward	112 (18%)
I have been moved to a non COVID Ward or in Smart Working	10 (2%)
Impact of pandemic COVID-19 on formal education and research activities	
I have increased my usual activity	120 (19%)
I have maintained my usual activity	82 (13%)
I have decreased my usual activity	181 (29%)
I have interrupted my usual activity	172 (27%)
I usually do not perform this kind of activity	75 (12%)
Impact of pandemic COVID-19 on surgical training * (n.102)	
I believe it had a negative impact	92 (90%)
I believe it had a positive impact	10 (10%)
During the COVID-19 Pandemic did you dedicate yourself to formal education and research activities on the COVID area?	
No	290 (46%)
Yes, in part	302 (48%)
Si, completely	38 (6%)
Overall impact of COVID-19 on clinical training program	
I believe it had a negative impact	460 (73%)
I believe it had a positive impact	98 (16%)
I believe it had no significative impact	71 (11%)

*only for medical residents in Surgical Residency Programs (n.102)

Table 2. Impact of COVID-19 pandemic on clinical activities, training and research activities.

	N (%)
Any proposals about the recovery of the training you lost because of the pandemic?	
Convert hours of clinical inactivity in formal education hours	127 (20%)
No recovery	192 (30%)
Recovery of weeks of inactivity at the end of the residency program	107 (17%)
Recovery of weeks of inactivity during the specialty period still to be carried out	204 (32%)
What impact do you think the Pandemic COVID-19 can have on your working future?	
It has substantially changed my aspirations for the future	84 (13%)
I believe it may have widened my working horizons	192 (30%)
Pandemic has negatively impacted my education and therefore my future profession	31 (5%)
Professional needs changed and most working positions has been saturated	16 (3%)
Basically, no impact	307 (49%)
Do you think your residency program, before the Covid-19 pandemic was adequate for the training needs and prepared effectively for your profession?	
Partially	304 (48%)
No	2 (0%)
Yes	203 (32%)

Table 3. General adequacy of the residency programs before the pandemic, possible solutions to recover any training lost, future perspectives after the pandemic.

Residency Programs	N (%)
Allergology and Clinic Immunology	1 (0%)
Anatomic-pathology and Histopathology	4 (1%)
Anaesthesia	97 (15%)
Cardiac Surgery	2 (0%)
General Surgery	18 (3%)
Maxillo-facial Surgery	1(0%)
Plastic Surgery	7 (1%)
Thoracic Surgery	2(0%)
Vascular Surgery	2(0%)
Dermatology and Venereology	7 (1%)
Haematology	5 (1%)
Endocrinology and Metabolic Diseases	9 (1%)
Clinical Pharmacology	2(0%)
Medical Genetics	4 (1%)
Geriatrics	6 (1%)
Obstetrics and Gynaecology	29 (5%)
Public Health and Preventive Medicine	25 (4%)
Cardiology	29 (5%)
Gastro-enterology	7 (1%)
Respiratory Medicine	9 (1%)
Communicable and Tropical Diseases	18 (3%)
Emergency Medicine	11 (2%)
Occupational Medicine	1(0%)
Sports Medicine	7 (1%)
Physiatry and Physical Medicine	17 (3%)
Internal Medicine	43 (7%)
Legal Medicine	4 (1%)
Nuclear Medicine	3 (0%)
Nephrology	13 (2%)
Neuro-surgery	3 (0%)
Neurology	30 (5%)
Infant and adolescent Neuro-psychiatry	22 (1%)
Ophthalmology	16 (1%)
Clinical Oncology	10(2%)
Orthopaedic Surgery	12(2%)
Otolaryngology	7 (1%)
Biochemistry and Lab Pathology	2 (0%)
Paediatrics	40 (6%)
Psychiatry	55 (9%)
Radiology	11(2%)
Radiotherapy	19 (3%)
Rheumatology	15 (2%)
Nutrition Science	2 (0%)
Urology	3 (0%)
Total	630 (100%)

eTable 1. Numbers of respondents stratified by residency program typologies.

4. Discussion

This study aimed to evaluate the impact of COVID-19 pandemic on Italian residency programs on a national scale regardless from the specialty typology.

The lockdown in Italy, which took place between March 11, 2020 and May 4, 2020, led to significant changes in Italian residency programs as documented by the present survey. In particular, half of the sample reported a substantial reduction of all training-related activities, and 20% reported a total interruption in all the activities, including frontal didactic and researches.

The COVID-19 pandemic has developed rapidly with no precedents in the last century. Consequently, the lack of national leadership, coordination or directives for the Italian residency programs, with independent local administration, led to a training disruption widely demonstrated by the answers given by the respondents. As take-home messages from the COVID-19 pandemic, a national preparedness and response plan to protect higher education institutions (HEIs), including medical residency programs, should be provided to prevent such variability and ensure a timely response in the case of similar scenarios [28]. This could be very useful also since the Italian epidemic landscape is continuously changing.

A significant expected heterogeneity was observed between residency programs in specialty deeply involved or not in COVID-19 management, as well as on the bases of the suitability to be replaced by distance education [29], where surgical hands-on training could not be replaced by online activities. If, on one side, for medical residency programs in hygiene and preventive medicine, intensive care, infectious diseases the activities were heavily intensified, also with an impulse in improvement of skills for long time missed such as genomic [30-31-32, 33], on the other side, residents attending surgical residency programs less involved in the COVID-19 management, such as general surgery or plastic surgery, reported that their training programs were completely interrupted. The large majority of the residents recruited in our sample reported a negative effect on the surgical activities, which is consistent with other Italian experiences reporting a severe reduction or total suppression of clinical training in up to 80% of the urology residents [22] and up to 50% of obstetrics and gynaecology ones [34].

For the abovementioned reasons, it could be stated that pandemic impact on the training differed by specialty, with a substantial reduction in elective or nonessential surgical volume, outpatients' visits, elective clinical activities [18, 21, 22, 34, 35], and so different strategies to minimize training deficiencies should be planned accordingly. Also, in certain cases, it has been reported a positive increase in research or e-learning opportunities for medical residents, in these cases the pandemic resulted in an opportunity to explore effective methods of learning that can be valued also in the post-COVID-19 era [28, 34]. However, it should be noted that when exploring possible solutions to restore missed training period, half of respondents preferred only a formal and administrative translation of "lost hours" into "education hours" or non-recovery at all.

In our sample, about one in every five medical residents have been moved from their routine practices to a COVID-19 ward/hospital and 4% of them willingly interrupted their residency program to begin serving as COVID-19 ward/hospital (in the same or in another hospital) as medical executive, ahead of time.

Unfortunately, since in Italy there is still missing a local or national system capable of monitoring and certifying skills acquisition by medical residents in accordance with the core curricula of each specialty, the real loss or benefit in skills acquired due to the pandemic could not be accounted [36]. This finding should give a boost to the Italian academic community to move quickly towards such a residency program training system as it is in other European countries [32].

According to our findings, more than half of the residents experienced anxiety related to fear of contagion, also related to the inadequacy of the available individual protections. Bitonti et al [34] confirmed these figures for Italian obstetrics and gynaecology residents. Furthermore, the majority of participants reported feeling dissatisfied, irritable, inefficient at work, indicating a widespread burnout status among Italian medical residents during the pandemic. Even though the ease of access of residents to mental health professionals to prevent any psychologically traumatic events and providing them with stress-management sessions has been suggested by other experiences to be effective [35], unfortunately possible psychological supportive initiatives put in place were not detected by our survey. However, amidst trying to prevent or mitigate burnout of medical residents, should not be forgotten that the tutors and supervisors are at the same risk of burnout as they are, requiring support too [36-40].

In conclusion, although the sample size in our study could be limited as compared to the total number of Italian medical residents at that time, we believe it could provide a crosscutting snapshot among all different specialties, throughout the country useful for the Italian academic community.

Since the years spent in medical training programs are critical to the career development of all healthcare professionals, protecting medical higher education should be regarded as a critical public health concern. A National preparedness and response strategy, including a clear local and national leadership, should be identified and adopted to avoid a catastrophic impact on residency program in upcoming emergency settings. The transition to a residency programs system based on specific curricula by specialty in accordance with European standards, with skills acquisition adequately accredited [41-43], could promote flexibility in adapting training system to emergency situations - as COVID-19 has been - where the skills gap can be more readily controlled and retrieved.

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