

Impact of the COVID-19 pandemic on urology residency training in Italy

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ABSTRACT

In the global emergency scenario caused by COVID-19 pandemic, the Urology residents' training might be critically affected. To provide insights on this issue, a 25-item online Survey was sent to all Italian residents one month after the first case of COVID-19 in Italy, to evaluate their routine involvement in "clinical" (on-call duty, outpatient visits, diagnostic procedures) and "surgical" (endoscopic, open and minimally invasive surgery) training activities before and during the COVID-19 period. Overall, 351 of 577 (60.8%) residents completed the Survey. Before the COVID-19 pandemic, the proportion of residents routinely involved in "clinical" and "surgical" activities ranged from 79.8% to 87.2% and from 49.3% to 73.5%, respectively. In the COVID-19 period, the proportion of residents experiencing a severe reduction (>40%) or complete suppression (>80%) of training exposure ranged between 41.1% and 81.2% for "clinical" activities while between 44.2% and 62.1% for "surgical" activities. This reduction was even more pronounced for residents attending the final year of training. Our study is the first to provide real-life data on how Urology residency training can be impaired during an emergency period. To address this challenge, strategies aiming to increase the use of telemedicine, "smart learning" programs and tele-mentoring of surgical procedures, are warranted.

KEY WORDS: COVID-19; Coronavirus; Medical education; Surveys and questionnaires; Urology.

Since December 31st, 2019, when the Chinese authorities notified the WHO regarding a novel coronavirus, the COVID-19 pandemic has now spread across all Continents and Countries.¹ As of 5th April 2020, 1,174,652 cases and 64,400 deaths were recorded worldwide.²

Italy is the Country reporting the highest number of deaths due to COVID-19 in the world.

In this unprecedented scenario, healthcare systems had to rapidly reshape their organization to cope with the emergency, aiming to optimize resources and minimize a further spread of the infection.

Notably, addressing this challenge caused an inevitable shift from patient-centered medicine to a community-centered approach.¹ As such, also surgical specialties, including Urology, faced the challenge to review their prioritization strategies regarding both out-patient services and surgical procedures.³⁻⁵ In addition, many Urologists across the Country had to dedicate part, if not all, of their practice to the management of COVID-19 patients.

Overall, this process has rapidly led to a substantial decrease in clinical and surgical urology practice across all Centers in Italy. In this context, the Urology residents' training might be critically affected.^{6, 7} However, how and to what extent the daily involvement of Urology residents in clinical and surgical activities was compromised by the COVID-19 pandemic is currently unknown.

Aiming to provide an overview on the impact of the COVID-19 pandemic on urology residency training in Italy, we developed a 25-item, 48-hour online survey, that was sent to all Italian residents via email on March 27th 2020, approximately one month after the first case of COVID-19 in Italy.

Demographic data included: center of training, region, gender, and residency year.

The proportion of responders out of the eligible urology residents was estimated considering the yearly number of grants provided for Urology by the Ministry of Health and stratified by year of residency.

For the purpose of this study, residents were asked to evaluate their routine involvement in different training activities in the pre-COVID-19 period (on-call duty, outpatient visits, diagnostic procedures [prostatic biopsy, cystoscopy, *etc.*], endoscopic surgery, open major surgery and minimally invasive surgery [MIS]) and to score the percentage decrease of their involvement in each of the above-mentioned activities during the COVID-19 pandemic (0-40% vs. 40-80% vs. 80-100%).

Reductions of 0-40% in residents' involvement were classified as slight, while reductions of 40-80% as severe. Reductions of 80-100% were considered complete suppression.

Potential differences across residency years

regarding both the baseline involvement in each activity and the proportion of residents experiencing a complete suppression in such involvement, were evaluated using the χ^2 test.

Moreover, in light of the reduction of urology daily practice, the participants were asked to indicate the number of hours available per day for "smart learning" purposes.⁶ Lastly, they reported on their potential involvement in COVID-19 wards and whether they received a specific training in this regard.

The results of the Survey are shown in Figure 1.

Overall, 351 of 577 (60.8%) residents from 35 Italian Urology Centers (27 Schools of Urology) responded (Figure 1A). Ten centers, each providing >3% of all participants, contributed the most to the survey (60% of all responders).

Of all responders, 71.2% were male. There was no evidence of late responder bias.

The proportion of responders attending the first, second, third, fourth and final year was 25.6% (N.=90), 21.7% (N.=76), 22.2% (N.=78), 16.2% (N.=57) and 14.3% (N.=50), respectively (Figure 1C).

This proportion represented the 58% of all eligible urology residents for both the first and second year of training, while the 61%, 46% and 42% for the third, fourth and final year, respectively.

No differences were found among responders of different years regarding gender, region and center of training.

In the pre-COVID-19 period, the proportion of residents routinely involved in on call duty, outpatient visits, diagnostic procedures, endoscopic surgery, open major surgery and MIS was 87.2% (N.=306), 88.0% (N.=309), 79.8% (N.=280), 68.9% (N.=242), 73.5% (N.=258), and 49.3% (N.=173), respectively (Figure 1D).

The histograms in Figure 1E show the percentage decrease of Urology residents' involvement in each training activity during the COVID-19 pandemic. While the involvement in on call duties was severely reduced or suppressed in 41.1% of residents, such proportion was 81.2% for ambulatory visits, 74.1% for diagnostic procedures, 62.1% for endoscopic surgery, 57.8% for open surgery and 44.2% for MIS.

Table I shows the stratification of residents'

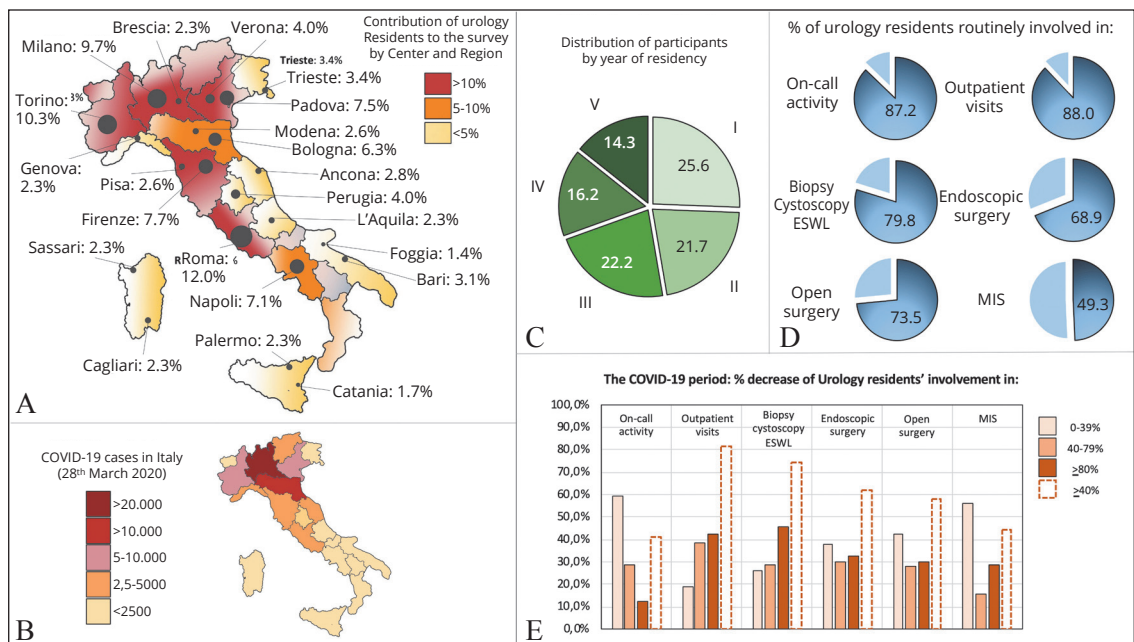


Figure 1.—Overview of the survey results: A) contribution of urology residents to the survey by center and region; B) regional distribution of COVID-19 cases in Italy at the time of the survey (28th March 2020); C) distribution of participants by year of residency; D) proportion of urology residents routinely involved in “clinical” and “surgical” activities before the COVID-19 pandemic. E) Percentage decrease of urology residents’ involvement in “clinical” and “surgical” activities during the COVID-19 period.

involvement in each activity by year of training in the pre-COVID-19 period, and the proportion of those who completely suppressed their training (decrease in involvement of 80-100%) in the COVID-19 period.

There was no significant difference across residency years regarding the proportion of residents routinely involved in on call duty ($P=0.3$). On the contrary, a significant difference was recorded for the involvement in outpatient visits ($P=0.013$), diagnostic procedures ($P<0.001$), endoscopic surgery ($P<0.001$), open surgery and MIS ($P<0.001$).

Considering a cut-off of 75% for the residents’ exposure to each activity as a surrogate metrics for “high involvement” in the pre-COVID period, first year residents were routinely highly involved only in on-call duties and outpatient activity (85.6% and 77.8%, respectively). Beyond these activities, second year residents were also highly involved in diagnostic procedures (82.9%). Residents in their third and fourth year were also highly involved in endoscopic (83.3% and 80.7%) and open major surgery (82.1% and

86.0%). Finally, fifth year residents were highly involved in all the above-mentioned training activities, including MIS (82.0%) (Table I).

In the COVID-19 period, there was no significant difference across the years of training in the proportion of residents who completely suppressed their activities, except for open surgery (20.0% vs. 34.2% vs. 25.6% vs. 33.3% vs. 44.0% going from the first to the final year, respectively, $P=0.03$) and MIS (14.4% vs. 28.9% vs. 28.2% vs. 35.1% vs. 46.0%, respectively, $P=0.002$).

Considering a cut-off of 40% for the proportion of residents who completely suppressed their activities as a surrogate metrics to define residents’ training as “compromised”, first year residents did not experience any impairment in their activities, while second-, third-, fourth- and fifth-year residents’ training was compromised regarding both outpatient visits and diagnostic procedures. In addition, for residents in their last year, the training in all surgical activities (endoscopic, open and MIS), was also compromised (Table I).

Finally, most residents (85.2%) reported to

TABLE I.—Stratification of residents’ routine involvement in each activity by year of training in the pre-COVID-19 period, and proportion of those who completely suppressed their training (decrease in involvement of 80-100%) in the COVID-19 period. A cut-off of 75% for the residents’ exposure to each activity was used as surrogate metrics for “high involvement” in the pre-COVID period (^{HI}). A cut-off of 40% for the proportion of residents who completely suppressed their activities was used as surrogate metrics to define residents’ training as “compromised” (^C).

Training activity		Overall	Year of residency					P value
			1	2	3	4	5	
On-call activity	Residents routinely involved	306 (87.2%)	85.6% ^{HI}	90.8% ^{HI}	91.0% ^{HI}	86.0% ^{HI}	80.0% ^{HI}	0.3
	Residents who suppressed their training in the COVID-19 period	43 (12.3%)	10.0%	13.2%	14.1%	10.5%	14.0%	0.9
Outpatient visits	Residents routinely involved	309 (88.0%)	77.8% ^{HI}	90.8% ^{HI}	93.6% ^{HI}	89.5% ^{HI}	92.0% ^{HI}	0.013*
	Residents who suppressed their training in the COVID-19 period	149 (42.5%)	35.6%	46.1% ^C	32.3% ^C	40.4% ^C	52.0% ^C	0.4
Diagnostic procedures	Residents routinely involved	280 (79.8%)	48.9%	82.9% ^{HI}	93.6% ^{HI}	93.0% ^{HI}	94.0% ^{HI}	<0.001*
	Residents who suppressed their training in the COVID-19 period	160 (45.6%)	40.0%	46.1% ^C	47.4% ^C	42.1% ^C	56.0% ^C	0.5
Endoscopic surgery	Residents routinely involved	242 (68.9%)	36.7%	72.4%	83.3% ^{HI}	80.7% ^{HI}	86.0% ^{HI}	<0.001*
	Residents who suppressed their training in the COVID-19 period	114 (32.5%)	24.4%	39.5%	32.1%	28.1%	42.0% ^C	0.1
Major open surgery	Residents routinely involved	258 (73.5%)	54.4%	71.1%	82.1% ^{HI}	86.0% ^{HI}	84.0% ^{HI}	<0.001*
	Residents who suppressed their training in the COVID-19 period	105 (29.9%)	20.0%	34.2%	25.6%	33.3%	44.0% ^C	0.03*
MIS	Residents routinely involved	173 (49.3%)	23.3%	36.8%	55.1%	70.2%	82.0% ^{HI}	<0.001*
	Residents who suppressed their training in the COVID-19 period	100 (28.5%)	14.4%	28.9%	28.2%	35.1%	46.0% ^C	0.002*

*Statistically significant value.

have at least two hours per day available for smart learning purposes, of which 38.1% reporting even four or more hours.

At the time of the survey, 7.7% residents were involved in COVID-19 wards. Of these, 63% received specific training to manage COVID-19 patients.

To the best of our knowledge, this is the first nationwide Survey providing insights on the variation in urology residency training in a European Country that has been hit hard by the COVID-19 pandemic.

The residents’ response rate was rather high, and the cohort of participants was sufficiently representative of the whole population of Italian urology residents.

Interestingly, a larger proportion of participants came from northern and west-central regions, mirroring the spread of the COVID-19 epidemic in Italy (Figure 1B). This finding suggests a higher interest in this topic among residents working in regions more hit by the infection, being their daily practice highly impaired by the healthcare emergency. Of note, 7.7% of residents were even involved in COVID-19 wards.

As shown in Figure 1, in the pre-COVID period, the proportion of residents involved in “clinical” activities across the years was very high, ranging from 79.8% to 88.0%, while resulted lower for “surgical” ones, ranging from 49.3% to 73.5%. This result finds a rationale considering the differential involvement in each training activity by year (Table I). Indeed, the daily involvement of residents in surgical activities increased progressively with the year of residency, reflecting the organization of our training program based on modular acquisition of competences.

Overall, our survey confirmed that the COVID-19 epidemic has substantially compromised the daily urology practice and consequently also the routine exposure of residents to both clinical and surgical training activities.

The involvement of resident in on-call duty was not particularly reduced, outlining the essential nature of this activity, especially in high-volume centers.

The large decrease in residents’ participation to outpatient visits can be explained by their forced interruption for several urological areas

(i.e. all non-oncologic diseases).³ To keep the exposure of residents to this activity, strategies taking advantage of telemedicine should be implemented.⁸

The reduction of residents' involvement in diagnostic activities may be partly due to deferring non-urgent procedures,³ partly to the higher proportion of consultant urologists performing such activities during the emergency, aiming to minimize the number of healthcare workers exposed to hospital-acquired infections. Similarly, the decrease in residents' exposure to all surgical activities can be explained considering the recent recommendations to limit surgical procedures to experienced surgeons.^{3, 5, 9} This is even more relevant for MIS, due to the increasing concerns regarding its safety in light of the potential risk of dissemination of coronavirus infection *via* laparoscopic gas.³ Moreover, the suspension of all deferrable surgeries, with the consequent reduction of daily surgical activity, further contributes to explain this finding.^{1, 3}

Finally, our Survey showed that, while training in "clinical" activities (outpatient visits and diagnostic procedures) was severely compromised in all residents except those attending the first year, residents in their final year had their exposure significantly reduced also in all "surgical" activities. As such, these are the residents whose training resulted more critically impaired by the COVID-19 pandemic. This finding is even more relevant, considering that, not only a larger exposure to surgery occurs in the last years of residency, but those residents will sooner take up employment.

Conclusions

In conclusion, this is the first nationwide Survey providing insights on how the COVID-19 pandemic impacted the training of urology residents. There was an overall decrease in daily residents'

exposure to all training activities from both clinical and surgical perspectives. This decrease was even more pronounced for residents attending the final year of training.

Our real-life data provide the foundation to implement strategies aiming to continue the training of Urology residents during emergency periods such as the COVID-19 pandemic. In this regard, an increased use of telemedicine, as well as of simulation and "smart learning" educational programs, including tele-mentoring of surgical procedures, might be the key to reach these goals.

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Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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