The Impact of Coronavirus Disease 2019 on Plastic Surgery Training: The Resident Perspective

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Background: The coronavirus disease 2019 (COVID-19) pandemic has led to marked changes in surgical training, including that of plastic surgery residents. We performed a survey to gain an insight into the self-reported current and future impact of COVID-19 on plastic surgery residents.

Methods: A 20-point questionnaire was designed by a panel of surgical trainees and trainers, which was filled in by Belgian plastic surgery residents and their international network of peers between 19 and 26 April 2020—week 6 of stringent Belgian lockdown measures. Questions covered the impact of COVID-19 on surgical activity, surgical training, and the future of training.

Results: Thirty-five of 38 plastic surgery residents in Belgium filled in the questionnaire, as did 51 of their international peers from 9 other countries. Decreased surgical activity of >75% was reported by 86% of Belgian trainees and by 73% of international colleagues. All consultations were stopped for 26% of Belgian trainees and 37% of international peers. Forty-six percent of Belgian trainees and 27% of international peers were reassigned to different departments. Eighty-five percent of all trainees felt surgical training had suffered, yet 54% of Belgian residents and 39% of international peers felt training should not be prolonged. Anxiety regarding the pandemic was present in 54% of Belgian residents and 69% of international colleagues.

Conclusions: This is the first report, expressing the voice of a representative group of plastic surgery residents, showing a significant impact of COVID-19 on training and activity. A joint effort is needed to provide continued forms of education by virtual education and skills-based learning. (Plast Reconstr Surg Glob Open 2020;8:e3054; doi: 10.1097/GOX.0000000000003054; Published online 16 July 2020.)

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has had an immense impact worldwide on society and healthcare.1 This has led to a significant reorganization of hospitals, wards, and operating theaters.2–4 Surgical residents have also seen a substantial alteration of their responsibilities and their training.5–8 Many of our colleagues have been asked to swap the operating theater for emergency triage or the intensive care unit to help where needed.

At the same time, we must remember the age-old adage of surgical training: see one, do one, teach one.9 In light of the current pandemic, we are seeing a significant decline in surgical activity.10–13 This in turn has a critical impact on the training of surgical residents due to lessened operating activity and therefore decreased learning opportunities. This is particularly true for plastic surgery trainees, as our training involves both emergency and elective procedures, a number of which may be for aesthetic purposes.14–16 To this aim, we evaluated the self-reported surgical activity of plastic surgery residents, their current role in the hospital, the impact on their training, and the effect on their future.

METHODS

A questionnaire was designed by a panel of plastic surgery residents and responsible trainers across 3 hospitals and 2 universities in Brussels, Belgium (see appendix, Supplemental Digital Content 1, which displays the questionnaire used in this study, http://links.lww.com/PRSGOX/A380). Related Digital Media are available in the full-text version of the article on www.PRSGlobalOpen.com.
**RESULTS**

The survey ran for 1 week and was completed by 86 plastic surgery residents across 10 countries. In Belgium, 35 of 38 plastic surgery trainees in their last 4 years of training answered the survey questions (92.1%), giving a representative overview of plastic surgery trainees in our country. The average age among these was 31 years. Nine trainees were in their third year, 8 in their fourth year, 9 in their fifth year, and 9 in their sixth year.

Fifty-one responses from 9 other countries were recorded: India (13), Romania (12), Israel (6), Italy (6), Colombia (6), United Kingdom (5), France (1), The Netherlands (1), and Slovakia (1). The average age of the international residents was 31 as well. Here, answers were accepted from all years of training due to varying training systems.

**Surgical Activity**

Thirty-four percent (12 of 35) of Belgian plastic surgery residents reported a decline in surgical activity of 90%–100%, 52% (18 of 35) reported a reduction of 75%, 11% (4 of 35) reported a decline of 50%, and 3% (1 of 35) reported a fall of 25%. In this group, 6% (2 of 35) were not performing any surgery at all; 11% (4 of 35) were still performing some form of elective surgery, besides emergencies and cancers. Fifty-seven percent (20 of 51) of respondents reported performing skin cancer procedures, and 46% (16 of 35) were still partaking in breast reconstructions.

Forty-five percent (23 of 51) of the international group of residents had a 90%–100% decrease in surgical activity, 27% (14 of 51) had a 75% reduction, 20% (10 of 51) had a 50% drop, and 6% (3 of 51) had a 25% decrease.

With regard to consultations, 26% (9 of 35) of Belgian residents reported not performing any form of consultations, 40% (14 of 35) were doing only consultations in person, and 34% (12 of 35) were undertaking a combination of physical and telephone consultations. For our international respondents, 37% (19 of 51) were not doing any consultations, 16% (8 of 51) were undertaking only telephone consultations, 18% (9 of 51) were doing only consultations in person, and 29% (15 of 51) were doing a combination of both.

In Belgium, 46% (16 of 35) of plastic surgery residents were asked to work in different departments, when compared with 27% (14 of 51) among their international peers. Of the 16 residents in Belgium, 31.2% (5 of 16) were working in the emergency department only; another 31.2% in the COVID-19 medical unit only, and 31.2% in both the emergency department and the COVID-19 unit. One resident was asked to work in the intensive care unit (ICU). Among our international colleagues, 64% (9 of 14) were helping in the COVID-19 medical unit, 21% (3 of 14) in ICU, 1 in both ICU and the emergency department, and 1 in all 3 mentioned departments.

Of the 86 residents who responded, 5 (6%) reported to have been infected by the COVID-19 virus, diagnosed by a polymerase chain reaction (PCR) swab test or a computed tomographic scan. None had had a serology test. Of these 5 residents, 4 were from Belgium, giving an infection rate of 11.5% (4 of 35) in Belgian plastic surgery residents. The higher proportion in Belgian plastic surgery residents may be linked to the higher number of residents who were asked to work in COVID-19-related departments. In Belgium, 2 of our resident colleagues who tested positive for COVID-19 had been working in COVID-19 medical units.

Nonetheless, in Belgium, as of 1 May 2020, there is no generalized testing for healthcare staff, and this is only done on the onset of symptoms. As such, this number does not include residents displaying COVID-19 symptoms who were sent into quarantine without being tested (especially in the early phases of the pandemic when testing capacity was lower) and those who were infected without showing symptoms (asymptomatic carriers). A future study examining immunity by antibodies may reflect the true infection rate more accurately.

**Surgical Training**

Among Belgian residents, 20% (7 of 35) of plastic surgery residents reported that they did not have adequate...
supervision or guidance from their responsible trainer, whereas 31% (11 of 35) felt they did; 49% (17 of 35) did not comment on how adequate their supervision was. This was similar among their international peers: 20% (10 of 51) did not feel they had adequate supervision, 39% (20 of 51) felt they did, and 61% (31 of 51) did not comment. In Belgium, 60% (21 of 35) of trainees received continuous education by their department head and internationally 71% (36 of 51) did. Seventy-seven percent of all respondents (41 of 57) reported that this was by webinars and/or journal clubs by videoconference. In Belgium, 74% (26 of 35) of trainees received continuous education by their department head and internationally 71% (36 of 51) did. Seventy-seven percent of all respondents (41 of 57) reported that this was by webinars and/or journal clubs by videoconference. In Belgium, 74% (26 of 35) managed to do an increased amount of research activity during this time, and 91% (32 of 35) felt they had more time to deepen the theoretical aspect of their specialty.

This was 61% (31 of 51) and 88% (45 of 51), respectively, for their international peers.

When Belgian residents were asked on how the COVID-19 pandemic has impacted on training; 11% (4 of 35) felt it led to no change, 63% (22 of 35) were of the opinion that their surgical training had suffered; however, they had been able to use this time to perform research and increase their theoretical knowledge about the specialty. Twenty-three percent (8 of 35) felt that their training had

Fig. 1. Decline in surgical activity. A, The graph shows that 34% (12 of 35) of Belgian plastic surgery residents reported a decline in surgical activity of 90%–100%, 52% (18 of 35) a reduction of 75%, 11% (4 of 35) a decline of 50%, and 3% (1 of 35) a fall of 25%. B, The graph shows that 45% (23 of 51) of the International group of residents had a 90%–100% decrease in surgical activity, 27% (14 of 51) a 75% reduction, 20% (10 of 51) a 50% drop, and 6% (3 of 51) a 25% decrease. One respondent did not notice any change in his surgical activity.

Fig. 2. Changes in consultation activity. A, The graph reflects that 26% (9 of 35) of Belgian residents reported to be not currently performing any form of consultations; 40% (14 of 35) were doing only consultations in person; and 34% (12 of 35) were undertaking a combination of physical and telephone consultations. No residents were doing telephone consultations alone. B, The graph shows that for our international respondents, 37% (19 of 51) were not doing any consultations, 16% (8 of 51) were undertaking only telephone consultations, 18% (9 of 51) were doing only consultations in person, and 29% (15 of 51) were doing a combination of both.
suffered in general. One respondent felt that his training had benefited. Among the international network, 16% (8 of 51) felt there was no change, 49% (25 of 51) felt surgical training alone had suffered, and 35% (18 of 51) felt all of the training suffered. None responded that the training had benefited (Fig. 3).

Yet, the majority of Belgian trainees (54%; 19 of 35) did not feel training ought to be prolonged, with the youngest residents most against the idea of training prolongation (Table 1). Twenty-nine percent (10 of 35) opined that prolongation would only be appropriate if measures lasted 6 months, and 6% (2 of 35) if measures lasted 3 months. Nonetheless, 11% (4 of 35) felt that training should already be prolonged in the current situation. Internationally, the answers were more evenly spread: 39% (20 of 51) were against training prolongation, 18% (9 of 51) for if measures lasted 6 months, and 27% (14 of 51) if measures lasted for 3 months; 16% (8 of 51) felt that training should already be prolonged (Fig. 4).

Finally, 54% (19 of 35) of Belgian residents showed some level of anxiety for the health of loved ones, their own health, and the future of their surgical training; 46% (16 of 35) did not report any anxiety. Concurrently, 69% (35 of 51) of international peers reported a degree of anxiety regarding the impact of the COVID-19 situation on themselves and their training, and also on the well-being of their friends and family.

**DISCUSSION**

With a 92% response rate (35 of 38), our study gives a representative opinion from plastic surgery residents in Belgium. A snapshot comparison with our residents’ international network was also performed to gain an insight into how training is impacted beyond our borders. There is a significant reduction in surgical activity. With regard to type of surgery, we note that across the board in Belgium and internationally, there is a steep reduction in skin cancer surgery and breast cancer reconstruction: 43% and 56% in Belgium and 65% and 82% internationally.

This has clearly had an impact on training; about 85% of Belgian residents and their international network of peers feel that their surgical training has suffered, with on average 30% feeling that their training in general has been hit. This decrease in surgical training carries significant implications for plastic surgery residents to reach adequate proficiency. Most would agree that the key to acquiring surgical skills is continued practice. The literature has evidenced this by studies showing that improvement in a surgeon’s or in a center’s outcome is correlated with increased volume.18–20 If the current measures carry on, it is clear that operative caseloads and surgical learning opportunities would markedly decline.

Nonetheless, mere repetition of the same procedures tends to improve performance up to a plateau that is less than the maximal level.21 An important concept is that of deliberate practice and the time spent doing this—for example, the number of anastomoses performed in a microsurgery laboratory, as opposed to the quantity of time spent in surgery—to achieve the maximum level of expertise and outcomes.22,23 Deliberate practice is used to improve performance by actively setting new goals and higher performance standards and by seeking out training situations to achieve one’s objectives. This period may be considered an ideal time to improve one’s deliberate practice: the occasion to reconnect with colleagues, to build a new network, to improve particular skills, and to team up with a research group.

And it is this positivity we must aim to carry forward. Our survey showed that a high number of trainees were...
provided with continuous training opportunities by their trainers on a virtual platform. A remarkable surge was seen in webinars, online training modules, and virtual journal clubs promoting the continued transfer of knowledge from trainer to trainee. About 9 in 10 of all our respondents felt they were able to deepen their theoretical knowledge of the specialty, focus on improving gaps in surgical skill, and achieve aims that a lack of time may have not allowed before. A strong example is that 74% of Belgian trainees and 61% of their international peers managed to do an increased amount of research activity.

At the same time, we must take into account a potential second wave and the likelihood that it will be a long time before life returns to how we used to know it. This would mean we would have to get used to a new normal, which may consist of alternative options for surgical training. Options such as web-based seminars and video-based surgical skills training, have already existed for a while; however, these are often not incorporated into formal learning, and uptake has been limited. As such, we must provide structure to future plastic surgery training following simple principles (Table 2). First of all, systemic organization of webinars and online meetings is essential. Currently, we are seeing a plethora of different webinars. Trainers can use this opportunity to evaluate their national curriculum and advise trainees on online learning opportunities that match these by sending a schedule of web-based learning opportunities. Second, we must truly embrace the power of virtual learning; attempts should be made to record and stream videos of surgeries so that residents at home can follow and learn essential surgical steps. Preexisting surgical videos must be organized and made available by departments, training boards, or national associations. Third, presentation of challenging cases and scientific discussions can be promoted on a wide, multicenter, and international basis by web-based case meetings and journal clubs, allowing interactivity and knowledge sharing. Although virtual case meetings and journal clubs were not done extensively before the lockdown measures, many departments and universities, including ours, are organizing these to promote continued investigative thoughts and critical analyses. Fourth, we must incorporate skills-based learning in the curriculum to address specific surgical educational aims such as microsurgery training, cadaveric dissection, and deliberate practice on specific surgical steps. The same accounts for medical students.39

The COVID-19 pandemic could truly be the paradigm shift in surgical training. Each one of us will have to

### Table 1. Perspectives of Belgium Residents (by Year) on Whether Training Should Be Prolonged

| Year     | Total (n =) | Yes, If Measures Last for 6 mo | Yes, If Measures Last for 3 mo | Yes, Already Prolonged |
|----------|-------------|-------------------------------|-------------------------------|------------------------|
| Year 3   | 9           | 8 (89%)                       | 1 (11%)                       | 0                      |
| Year 4   | 8           | 2 (25%)                       | 6 (75%)                       | 0                      |
| Year 5   | 9           | 4 (44.5%)                     | 0                             | 1 (11%)               |
| Year 6   | 9           | 5 (56%)                       | 3 (33%)                       | 0                      |
| Year 1 & 2|             |                               |                               |                        |

Year 1 and 2 are not included in these results, as Belgian residents rotate through General Surgery departments in their first 2 years. We note that in year 3, the majority is against the idea of prolongation, likely related to the idea that they have sufficient years to catch up on training. In later years, the responses tend to vary more.

**Fig. 4.** Should training be prolonged? A, The graph shows that the majority of Belgian trainees (54%; 19 of 35) did not feel training ought to be prolonged; 29% (10 of 35) opiniated that prolongation would only be appropriate if measures lasted 6 months, and 6% (2 of 35) opiniated that prolongation would only be appropriate if measures lasted 3 months. Nonetheless, 11% (4 of 35) felt that training should already be prolonged in the current situation. B, The graph shows that internationally, 39% (20 of 51) were against training prolongation, 18% (9 of 51) for prolongation if measures lasted 6 months, and 27% (14 of 51) if measures lasted for 3 months; 16% (8 of 51) felt that training should already be prolonged.
adopt new ways of education if we want our residents to have a well-founded formation. With regard to training, we cannot ignore that there will be a trade-off between acquisition of pure surgical skill and theoretical knowledge. As such, we must find a way to continue promoting surgical excellence during these times. Whether providing a modified curriculum encompassing virtual learning and deliberate practice alone will suffice remains a point to reflect and decide on. It is likely that serious consideration will need to be given by different educational boards on whether training should be prolonged in the case of continued reduced experience due to prolonged measures or a possible second wave. In our study, only 11% of Belgian residents already felt training should be prolonged, and 54% was against it. This remains a point of further reflection; nonetheless, provisions to design a new curriculum using virtual learning opportunities, such as journal clubs and webinars, and use of surgical videos and simulation procedures can already be done as described above. 30

Our study is the first report expressing the voice from a representative national group of plastic surgery residents in view of the COVID-19 pandemic. This was done in the form of a quantitative questionnaire (see appendix, Supplemental Digital Content 1, which displays the questionnaire used in this study, http://links.lww.com/PRSOG/B453). We feel it is crucial to have a representative perspective of trainees to help trainers in deciding the future course of action. To add an extra dimension to the study, we wanted to have an insight into a comparable number of responses internationally to view how Belgian residents stand among their peers. We recognize that different countries have different policies for COVID-19, and also have different training systems, as such we did not want to undertake statistical comparisons between Belgium and other countries. We feel that country-specific surveys are needed to truly understand the opinions of plastic surgery residents, so that national boards can act accordingly as per their training curriculum.

Besides all of this, one must not forget that plastic surgery residents remain as susceptible to the impact of the virus as the rest of the population. We have seen some of our colleagues being infected by the virus, and some requiring intensive care. We also noticed that a large proportion of our resident colleagues reported anxiety regarding the ongoing crisis (54% in Belgium and 69% among international peers), either for themselves and their training or for their loved ones. This underlines that residents can be impacted by the current situation and may not only need continued training and education, but may also look at their trainers for support, guidance, and direction.

CONCLUSIONS

The COVID-19 pandemic has had a significant impact on the functioning of hospitals and on training. In our study, we found that there was a significant decrease in surgical activity among plastic surgery trainees, coupled with genuine concern regarding their training progression. At the same time, we noted that there were possibilities of continued education with virtual education and skills-based learning. As such, we underline the importance of ongoing education by alternative means and encourage trainers and trainees to come together and discuss how the acquisition of surgical skills can be ensured. This will safeguard that the coming generation of plastic surgeons will be well trained, well prepared, and able to face the future with confidence.

ACKNOWLEDGMENTS

We acknowledge all Belgian Residents in Plastic Surgery and, in particular, the board of the BRPS (Belgian Residents of Plastic Surgery) for their support in this project. We also thank all trainers for their efforts in providing continued education during this time.

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