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The immediate impact of the coronavirus disease 2019 (COVID-19) pandemic on burn-out, work-engagement, and surgical training in the Netherlands

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ABSTRACT

Background: The coronavirus disease 2019 pandemic led to major changes in health care and education options for all health care employees. The aim of this study is to achieve insight into coronavirus disease-care participation of surgical residents in the Netherlands, the impact of coronavirus disease 2019 on the experienced quality of surgical training, and the influence on Burn-out and Work Engagement compared with the non-coronavirus disease 2019 period in January 2020.

Methods: In this study, we have conducted 2 digital surveys immediately before and 2 months after the start of the coronavirus disease 2019 pandemic. We surveyed a validated Dutch questionnaire 'Utrecht Burn-out Scale,' derived from the Maslach Burn-out Inventory, and also collected the 'Utrecht Work Engagement Scale' measuring work engagement. Additionally, we describe the coronavirus disease-care participation of surgical residents, the impact on how they experienced the quality of their surgical training, and the influence on 'Burn-out and Work Engagement' compared with the pre-coronavirus disease 2019 period for surgical residents in the Netherlands.

Results: In January 2020, a total of 317 residents completed the online survey, and in April 2020, a total of 313 residents completed the online survey. Of the responders, 48.6%, in April, participated in coronavirus disease-care in both the coronavirus disease ward as well as the coronavirus disease intensive care unit. Residents experienced that the coronavirus disease 2019 influenced their surgical training in 85.2% of responders. In only 5% of the residents did the pandemic not affect the exposure to surgical training in the operating theater. More burn-out symptoms were noted amongst coronavirus disease ward deployed residents versus no coronavirus disease ward deployment, (16.0% vs 7.6%, $P = .06$). The Work-Engagement questionnaire showed a significantly lower work engagement score of 4.2 for residents who were deployed in a coronavirus disease-care intensive care unit versus a score of 4.6 for residents scheduled in a coronavirus disease ward ($P = .02$).

Conclusion: This study shows a significant impact of the first months of the coronavirus disease 2019 pandemic on the Dutch surgical trainee program, with a major redistribution of residents with a decrease of surgical exposure and education. We emphasize the need for adequate guidance of all surgical residents and potentially lengthening the surgical training program.

Introduction

The severe acute respiratory syndrome coronavirus 2, responsible for the development of coronavirus disease 2019 (COVID-19), led to an international disturbance of all health care services and major changes in work activities for all health care professionals.[1–3] The first confirmed COVID-19 case in the Netherlands was reported in February 2020. Since that moment on forward, COVID-19 had a

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major influence on hospital management. Eventually, it ensured massive redirection of medical attention and priority towards the care for the COVID-19 infected patients, especially in the intensive care unit (ICU) environment.[1–5] This resulted in the cancellation of elective surgery, mostly benign surgical procedures (eg, laparoscopic cholecystectomies, herniorrhaphies, proctological procedures), and visits to outpatient clinics.[6,7]

In addition to the profound impact on patients, the pandemic also affected the surgical residents. Recent published articles from Italy concerning urology residency and general surgery residents showed an overall decrease in daily exposure to all training activities from both clinical and surgical perspectives.[7–10] In the Netherlands, a Dutch nationwide survey showed that 41% of cardiology residents suspended their training and worked at COVID-19 cohort units for up to 3 months.[8] In many training hospitals, surgical residents provided assistance in special dedicated COVID-19 wards and the ICU, making them undeployable in the surgical department. This led to a significant temporary decrease of teaching opportunities in their surgical environment. A pandemic has a great psychological impact on individuals, so the mental wellbeing of residents during the COVID-19 pandemic is highly important.[11,12] Even before the COVID-19 pandemic, burn-out symptoms were of great concern. Currently, there is no data available of the influence of the pandemic on burn-out and work-engagement of surgical residents in their training.

The goal of this study is to achieve insight into COVID-care participation of surgical residents in the Netherlands, the impact of COVID-19 on the experienced quality of surgical training, and the influence on Burn-out and Work Engagement compared with the non-COVID-19 period in January 2020.

Methods

The Dutch Association of Surgical residents (Vereniging van Assistent Geneeskundigen in de Heelkunde, VAGH) designed an anonymous questionnaire using the SurveyMonkey (SVMK inc., One Curiosity Way, San Mateo, CA) web application, which is already in use by the VAGH since 2013.[13] All surgical residents in the Netherlands are registered at the VAGH. Survey participation was voluntary, no incentives were offered, and no institutional review board approval was required. In the Netherlands, the general surgical training consists of 4 years of training in General Surgery departments, followed by 2 years of surgical specialty training (gastro-intestinal-, vascular-, trauma-, oncology-, lung- and pediatric surgery). Residents also participate continuously throughout their 6-year training in an on-call surgical roster, providing in-hospital primary surgical care. All surgical residents have to do a 3-month obligatory internship at the ICU during their general surgery training. Therefore, it is interesting to look at the differences between the surgical residents who were deployed at the ICU versus the COVID-19 ward.

Survey

The annual VAGH survey was conducted in the pre-COVID-19 era in January 2020 (from Dec 30, 2019, until the Jan 31, 2020). The survey consisted of 41 questions and was composed into a couple of sections. The first section focused on questions regarding residents' characteristics, such as (1) sex, (2) level of training (1–6 years), (3) age, (4) geographic region of surgical training (8 regions, all connected to academic teaching hospitals), and (5) type of hospital (academic versus non-academic teaching hospital). A validated Dutch questionnaire 'Utrecht Burn-out Scale' (UBOS), derived from the Maslach Burn-out Inventory, was surveyed,[14,15] and the 'Utrecht Work Engagement Scale' (UWES), measuring work engagement, was collected.[16] We have repeated this survey directly after the start of the COVID-19 pandemic in the Netherlands during April 2020 (from Apr 19, 2020, until May 5, 2020), and it was updated with a number of specific questions regarding the pandemic. If residents reported 'yes' to whether they were deployed at a COVID ward, factors associated with their deployment were questioned: duration of deployment (weeks), their feeling of added value (yes/no), safe work environment (yes/no), adequate supervision (yes/no), their feeling of competency (yes/no), availability of personal protective equipment (yes/no), and whether they were infected with COVID-19 (yes/no). If residents reported 'yes' to if they were deployed at a COVID–Intensive-Care-Unit (ICU), the same factors were questioned as mentioned above at COVID-ward deployment.

The influence of the COVID-19 pandemic on surgical training activities was estimated using 3 questions: (1) does COVID effect your training (yes/no), (2) have you been scheduled for the operating room (OR) (same as before COVID, less than before COVID, not scheduled for OR), and (3) have you been scheduled for outpatient-clinic (yes/no).

To be able to look at the difference in Burn-out scale and Work Engagements during COVID-19, we have repeated the UBOS and the EWES questionnaire in April 2020 with the same population of surgical residents. In the final section, residents were asked to grade their current surgical training (scale 0–10), the availability of peer support (yes, sufficient; yes, but could have been more; no) have you missed teaching moments (yes/no), whether extension of surgical training as compensation would be needed (yes/no), if accompaniment of the director of training was sufficient (yes/no), and if residents received any education (yes/no).

Analysis

After the closing date for questionnaire submission, results were downloaded as comma-separated values file to be analyzed via Excel (Microsoft Corporation, Redmond, WA) and SPSS software version 23 (IBM, Armonk, New York, NY). Results of the survey were reported according to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) Guidelines.[17] The Results of the UBOS and UWES were analyzed according to the questionnaire manual.

Burn-out

Burnout is a syndrome of emotional exhaustion, depersonalization, and diminished personal accomplishment, which arises in response to chronic stress in jobs where individuals work with people.[18] Emotional exhaustion refers to feelings of being emotionally overextended and drained by others. Depersonalization refers to development of dehumanized and cynical attitudes toward people who are recipients of one's services. Reduced personal accomplishment refers to a decline in one's feeling of competence and successful achievement in work.[19–21]

Surgical residents were considered as having burn-out by a high score on the exhaustion scale of the UBOS, combined with a highly unfavorable score on at least 1 of the 2 other main components of burn-out; namely (1) cynical attitude and (2) diminished personal accomplishment. The cut-off scores we used in the current study to assess burn-out symptoms were based on well-validated norm scores of the UBOS.[15]

Work engagement

The alleged opposite of burn-out is work engagement. Whilst burned-out workers feel exhausted and cynical, their engaged counterparts feel vigorous and enthusiastic about their work.[22]

Table I
Resident characteristics

	COVID Ward (N = 56)	COVID Intensive Care (N = 96)	P value
Duration of deployment in weeks (median, range)	4.4 (0.3–12)	5.3 (0.1–16)	0.32
Feeling of added value	63.8%	63.8%	0.40
Safe work environment	83.3%	93.6%	0.27
Adequate supervision	83.3%	95.7%	0.46
Feeling competent	74.0%	90.4%	0.39
Availability of PPE	86.3%	96.7%	0.28
COVID-19 infection	12.5%	9.38%	0.25

COVID-19, coronavirus disease 2019; *PPE*, personal protective equipment.

Work engagement is defined as a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption. Rather than a momentary and specific state, engagement refers to a more persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual, or behavior. Vigor is characterized by high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties. Dedication refers to being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge. Absorption is characterized by being fully concentrated and happily engrossed in one's work, whereby time passes quickly, and one has difficulties with detaching oneself from work. Accordingly, vigor and dedication are considered direct opposites of exhaustion and cynicism, respectively.[22,23] Work engagement can be measured using the UWES.[16] This measures engagement on three dimensions: (1) vitality, (2) dedication, and (3) absorption. A high work engagement (scale 1–6) lowers the risk of developing a burn-out.

Descriptive statistics were expressed as median and standard deviation for continuous variables. Differences between groups were calculated by using the Mann-Whitney *U* test for continuous variables. The Pearson χ^2 test or the Fisher exact test, if appropriate, were used for categorical variables.

Results

Survey January 2020: a total 317 resident completed the online survey (response rate 81%). There were slightly more male residents (53%), and the median age was 32 years old (range: 26–40, interquartile range 31–34). The majority of residents (72%) were based in a non-academic hospital. Most residents (68%) were in the first 4 years (general surgery) of their residency.

Survey April 2020: a total of 313 residents completed the online survey (response rate 72%). There were no significant differences in the baseline characteristics between the survey of January and April. More residents were male (n = 172, 55%), and the median age was 32 years old (range: 26–39 years). Again, the majority of residents were based in a non-academic hospital (71%). Just like in January, most residents (n = 217, 69%) were currently in their general surgery period of their residency. The remaining 96 (31%) were in their specialty surgery training.

COVID-care participation

Of the responders, 48.6%, of the surgical residents participated in COVID-care (in both the COVID ward as well as the COVID ICU). In Table I, the results regarding COVID care deployment are reflected. Residents participated more often in COVID ICU (n = 96, 30.7%), than in a COVID ward (n = 56, 17.9%) ($P < .001$, Fig 1). In both the COVID ward as well as the COVID ICU, residents felt of added value in 63.8% of responders. Residents felt more competent on the ICU compared with the COVID ward (90.4 vs 74.0%). In the COVID ward, adequate personal protective equipment was available in 86.3% vs 96.7% on the COVID-ICU. Participation in COVID-care is displayed in Figure 1 according to year of surgical training (1–6 years in training), where the majority of residents were in their first 3 years of surgical training.

Impact of COVID-19 on surgical training quality

Residents experienced that COVID-19 influenced their surgical training in 85.2% of responders (Fig 1). In January, the Dutch residents gave the surgical training education an average mark of 7.4 (on a scale of 1–10) and during the COVID-19 pandemic this mark dropped to 6.7. Almost 1 out of 5 residents were not scheduled for OR and 64.8% less than normal (Fig 1). In only 5% of the residents did the COVID-19 pandemic not affect the exposure to surgical training in the OR. Moreover, residents subjectively received less education and believed they needed extension of their surgical training (Fig 2).

Burn-out symptoms before and during COVID-19 pandemic

A comparison between the UBOS and UWES questionnaire in January 2020 (n = 305) and in April (n = 288) showed more burn-out symptoms for COVID–ward-deployed residents versus non COVID–ward-deployed residents, (16.0% vs 7.6%, $P = .06$, Table II). The prevalence of burn-out symptoms (UBOS) was 9.5% (n = 29, Table III) in January and 9.0% (n = 26) in April and did not differ significantly between males or females. Multiple outcomes regarding burn-out symptoms are registered in Table II. Besides the individual scores of the 3 components of the Maslach Burn-out score gathered from the survey before and during the COVID-19 pandemic are seen in Figure 3.

Work-Engagement before and during COVID-19 pandemic

In January 2020, the UWES questionnaire showed an average work engagement score of 4.6 (scale 1–6). In April 2020, the UWES questionnaire showed a comparable average work engagement score of 4.6 for the whole group (all residents) (scale 1–6). The UWES questionnaire showed a significantly worse work engagement score of 4.2 for residents who were deployed in a COVID-care ICU vs 4.6 of residents scheduled in a COVID ward. ($P = .02$). Multiple outcomes regarding work environment and work engagement are registered in Table IV. Individual scores of the 3 factors determining work engagement are seen in Figure 4.

Discussion

This national study showed a significant decrease in experienced surgical training quality, with almost half of the Dutch

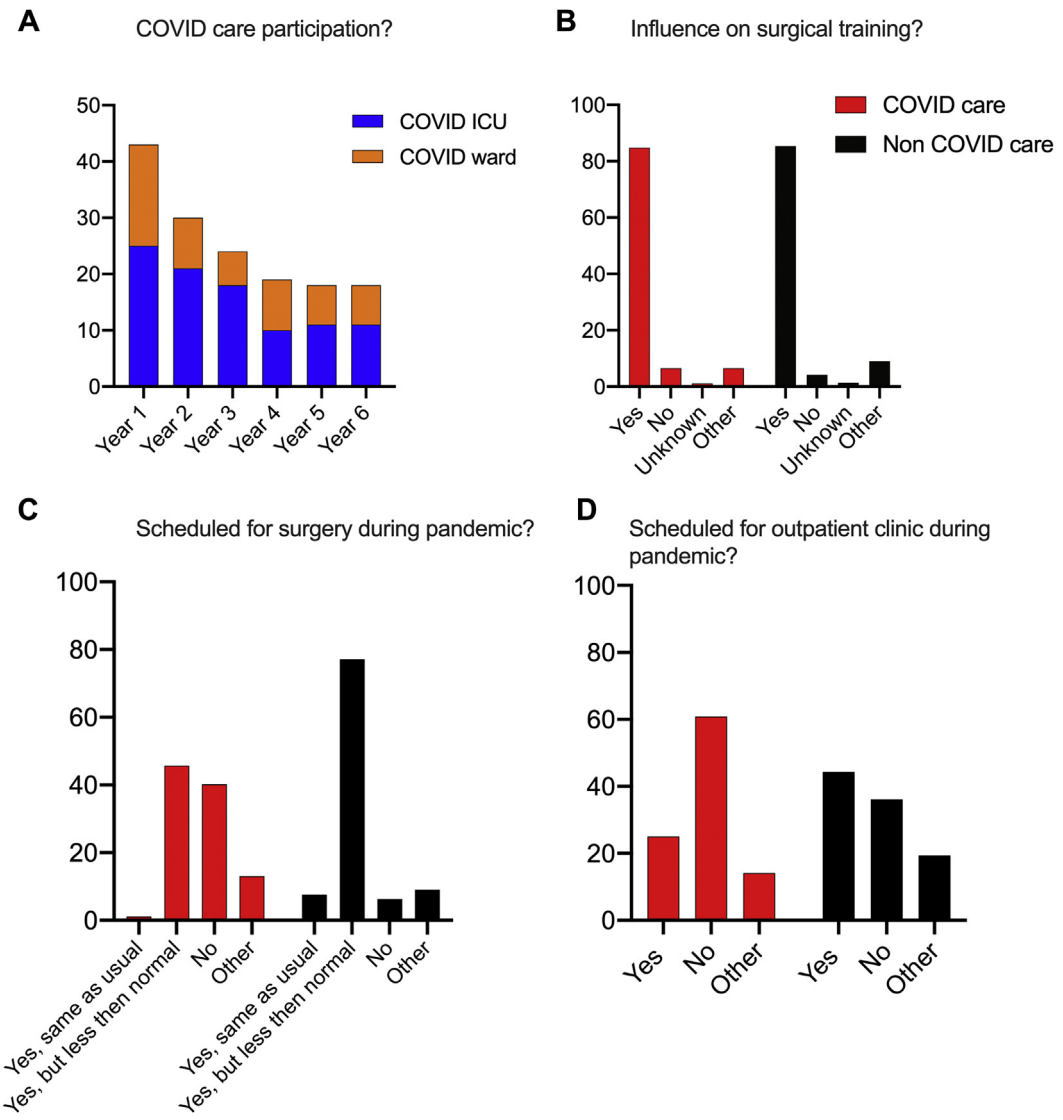

Fig 1. The influence of the COVID-19 pandemic on surgical training and surgical exposure in Dutch surgical residents. *COVID-19*, coronavirus disease 2019.

surgical residents deployed at COVID departments and with a majority working at the ICU during the first two months of the COVID-19 pandemic. More burn-out symptoms were observed amongst COVID–ward-deployed residents and surgical residents deployed at the ICU scored a significant decrease in work engagement.

Working amidst COVID patients, especially during the first months of the pandemic with much uncertainty, caused emotional distress. In Italy, a same redistribution of surgical residents towards COVID care was observed, together with an increase of work-related psychological pressure, emotional burn-out and somatic symptoms among healthcare professionals.[9,24] In contrast to the Netherlands, the majority of all residents (>85%) noticed a negative influence on their surgical training quality. In Italy, 42.2% of the surgical residents reported a positive or a not significative impact of COVID-19 on their training and future ambitions.[9] Pertile et al suggest that the experiences in COVID care have probably led to additional clinical skills that may have been considered useful. Additionally, we conducted a national webinar in which surgical residents were able to share their experiences and discuss best practices of psychological support.

One of the 2 surveys was held and collected 2 months after the start of the national outbreak, showing large differences and change in outcomes in a short period of time. The COVID-care participation of a majority of residents continued after completing the survey. Our data show the overall decrease in daily exposure to all training activities, from education and bed-side teaching towards technical training in just the first 2 months of the pandemic. The final influence of COVID-19 pandemic to surgical training might even be worse than suggested, and a follow-up of the quality and delay of surgical training might be necessary. We are convinced that residents who participated intensively in COVID-care and residents starting their surgical training should be compensated, either with an extension of the surgical training or postponement/redistribution of their training during a COVID peak. Moreover, the authors suggest psychological follow-up and suggest adequate peer support for all (surgical) residents worldwide.

The COVID-19 pandemic led to a major decrease in elective surgery and a decrease of outpatient clinic visits, potentially decreasing training experience and quality. Surgical residents redistributed to the ICU felt more competent compared with residents in the COVID ward (90.4 vs 74.0%), probably owing to the fact

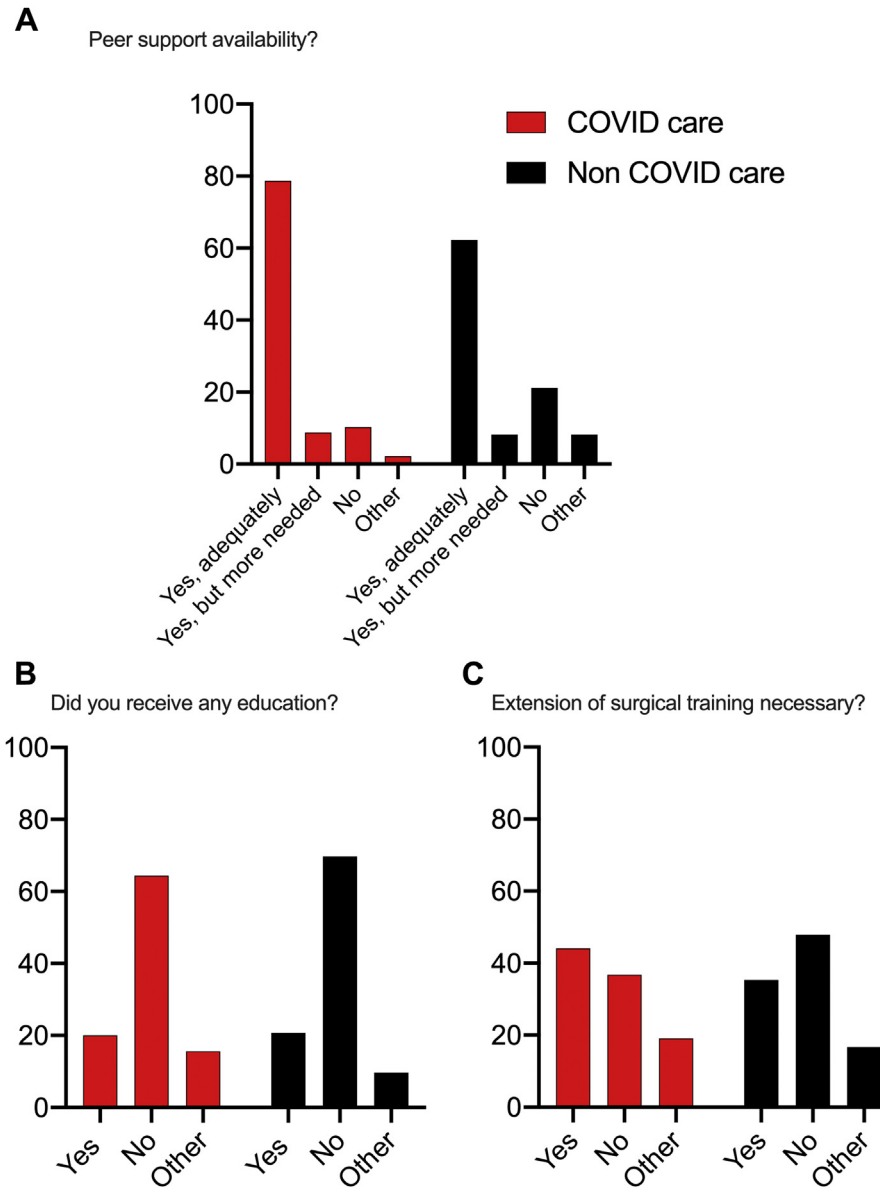

Fig 2. The influence of the COVID-19 pandemic on surgical training and education in Dutch surgical residents. *COVID-19*, coronavirus disease 2019.

Table II
Prevalence of burn-out symptoms during the COVID-19 pandemic

	Burn-Out Symptoms, *N* (%)	P value
Total group ($n = 288$)	26 (9.0)	
Male:Female	13 (8.2%):13 (10.0%)	0.60
Non-academic:Academic	20 (9.6%):6 (7.5%)	0.58
COVID care:No COVID care	16 (11.6%):10 (6.7%)	0.14
COVID infection:No infection	1 (10.0%):5 (9.0%)	0.91
COVID ward:No COVID ward	8 (16.0%):18 (7.6%)	0.06

COVID, coronavirus disease.

Table III
Prevalence of burn-out symptoms in de pre-COVID-19 era

	Burn-Out Symptoms, N (%)	P value
Total group ($n = 305$)	29 (9.5)	
Male:Female	14 (8.6%):15 (10.5%)	0.58
Non-academic:Academic	27 (12.3%):2 (2.3%)	0.007
Having kids:Having no kids	12 (9.7%):17 (9.4%)	0.93
Full-time:Part-time	13 (7.7%):16 (12.8%)	0.18
Year 1–4:Year 5–6	19 (9.9%):10 (8.9%)	0.86

COVID-19, coronavirus disease 2019.

that all surgical residents have to do a 3-month obligatory internship in ICU during their general surgery training, and many of them, to prevent time loss, scheduled this internship during the crisis. Only 20.36% of our surgical residents received surgical education during the pandemic, which is in line with international data showing an overall decrease in daily exposure to all training activities from clinical and surgical perspective.[7,25] However, we see a positive development in online education in the Netherlands, an effect also observed in the USA, which needs to be further developed to guarantee adequate quality.[26,27]

Burn–out-related symptoms were a common problem, even before the COVID-19 pandemic. In 2019, a manuscript published in the *New England Journal of Medicine* reported on discrimination, abuse, intimidation, and burn-out symptoms among surgeons in

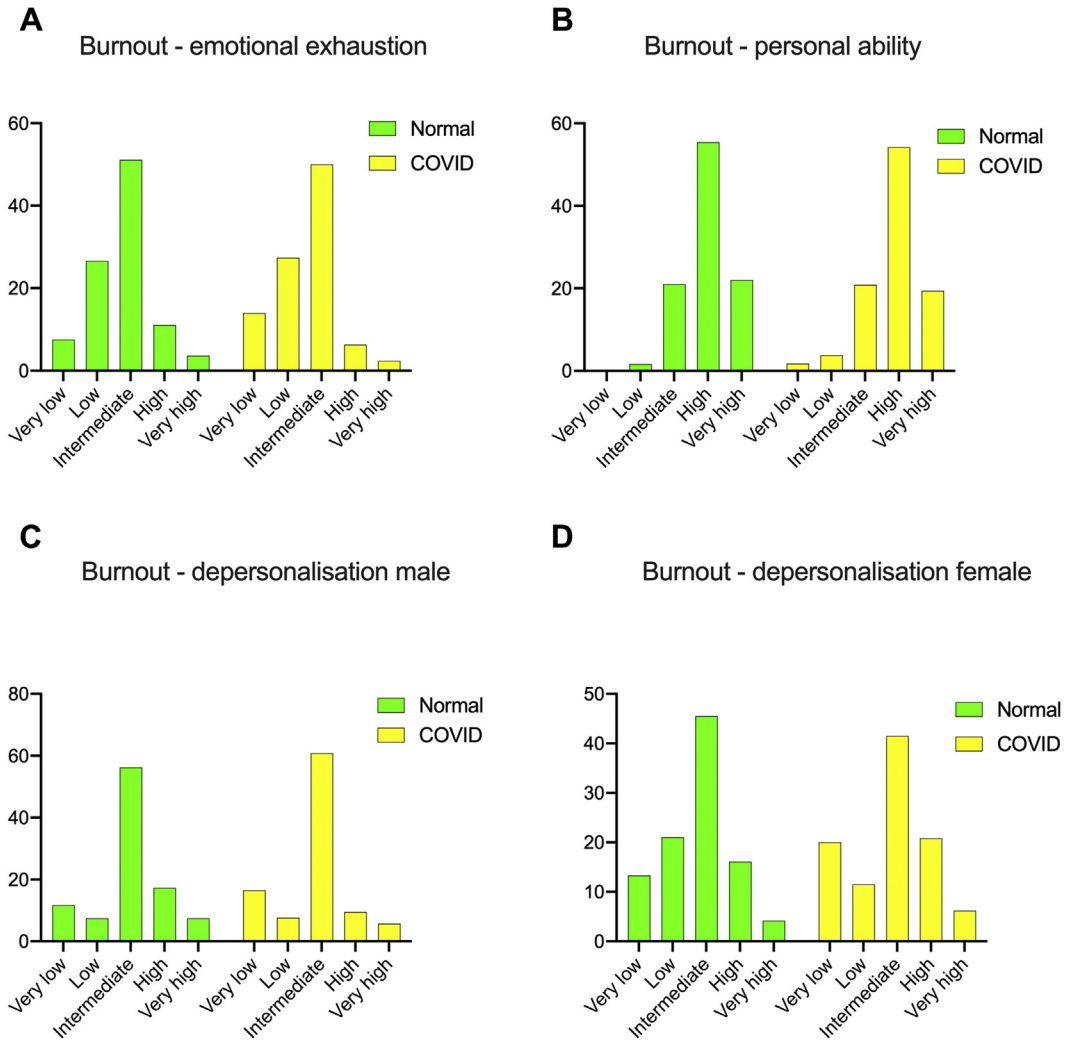

Fig 3. Individual scores of the Maslach Burn-out score before and during the COVID-19 pandemic. *COVID-19*, coronavirus disease 2019.

Table IV
Prevalence of work engagement during the COVID-19 pandemic

	Work Engagement	P value
Total group ($n = 288$)	4.6	
Male:Female	4.6:4.4	0.08
Non-academic:Academic	4.5:4.5	0.39
COVID care:No COVID care	4.4:4.6	0.02
COVID infection:No infection	4.4:4.5	0.86
COVID ward:No COVID ward	4.3: 4.6	0.07
COVID ICU:COVID ward	4.6:4.2	0.02

COVID-19, coronavirus disease 2019.

training, which states that almost 40% suffered from burn-out symptoms every week.[28] In 2018, the Dutch Young Specialist published the results of a national survey among trainees on healthy and safe work environment that comprised 958 Dutch residents, including 56 surgical residents, showing that 19% suffered from burn-out symptoms.[29]

Our survey revealed, respectively, 9.5% (in Jan) and 9.0% (in Apr) of the surgical residents suffer from burn-out symptoms. This is considerably lower compared with the 15% to 19% Dutch resident burn-out rate, but it remains a substantial percentage, showing the fragile balance in a training situation.[29–32] It is feasible that the relatively low percentage of residents with burn-out complaints can be related to the intensive guidance and high standard Dutch surgical training program with attention for the psychological factors of the residents, which may lead to the high level of enthusiasm among the Dutch residents. More burn-out symptoms was seen amongst COVID–ward-deployed residents versus no COVID-ward deployment (16.0% vs 7.6%, $P = .06$). This may be owing to the fact that the surgical resident worked outside his or her comfort zone, resulting in decreased work satisfaction. Perhaps work engagement is related to the amount of surgical exposure. When surgical residents are scheduled in a COVID ward, the lack of surgical exposure and surgical learning might increase the burn-out symptoms. On top of this, a lack of thorough preparation and a fear of making mistakes and working continuously outside the comfort zone might have contributed to burn-out symptoms. Moreover, a decrease in work engagement was observed in COVID–care-deployed residents, although the work engagement is still high compared with the score of all residents in the Netherlands from the Dutch Young Specialist survey (4.1) and the Dutch average (3.7).[33]

Our study has some limitations. First, the data was obtained from self-reported questionnaires. Second, the study was performed in the early outbreak of COVID-19 in the Netherlands,

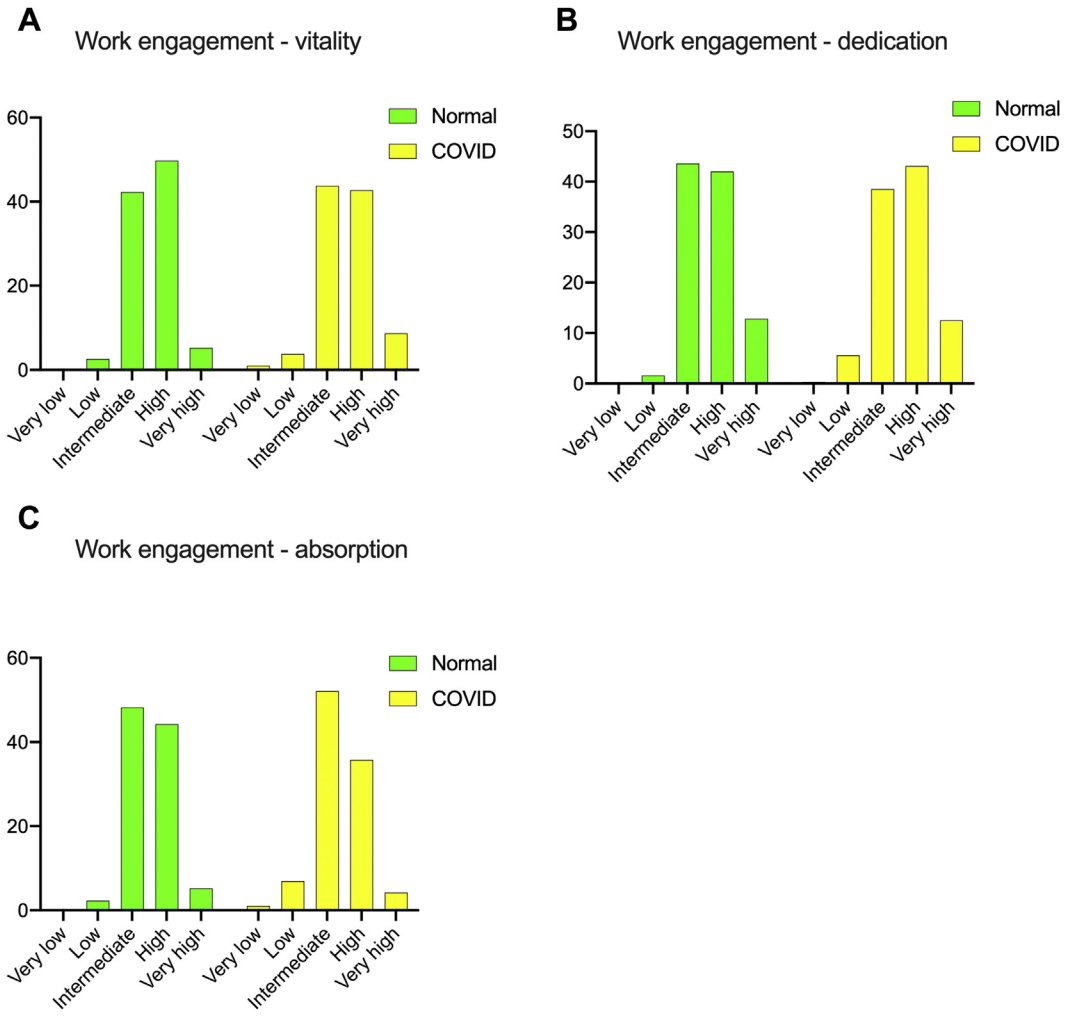

Fig 4. Individual scores of the factors determining work engagement before and during the COVID-19 pandemic. *COVID-19*, coronavirus disease 2019.

possibly underestimating the degree of the problem as suggested above. Follow-up studies are important to assess long-lasting effects of COVID-19 on surgical residents.

In conclusion, this study shows a significant impact of the first months of the COVID-19 pandemic on the surgical trainee program, with a major redistribution of residents with a decrease of surgical exposure and education. We emphasize the need for adequate guidance of all surgical residents regarding surgical training and education. It could be necessary to adjust and/or lengthen the surgical training program for certain cohorts or individual surgical residents based on national guidelines. Last but not least, we would like to underscore the importance of monitoring the physiologic and psychological effects on all young health care professionals during and after the COVID-19 pandemic.

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Conflict of interest/Disclosure

The authors declare that they have no conflict of interest.

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