

The Perceived Influence of the COVID-19 Pandemic on the Medical Education of Residents in 2021 and 2022

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ABSTRACT

Background Recent studies reported how the COVID-19 pandemic influenced the medical education community. However, little is known about the further influence of the pandemic over time and about the impact across the different medical disciplines.

Objective Our objective was to investigate how residents working in different disciplines and on different tracks (full- vs part-time) perceived the influence of the COVID-19 pandemic in 2021 and 2022 on their education.

Methods The data were collected with a questionnaire (developed by the Swiss Federal Institute of Technology and the Swiss Institute for Medical Education) as part of the Swiss national annual survey on medical education. We assessed the influence of the pandemic on medical residents from different specialties in 2021 and 2022 with 3 items: global effect on education, available time for education, and effect on teaching.

Results The questionnaire had a response rate of 70% (8496 of 12 137) in 2021 and 2022 (8823 of 12 604). In 2021, residents reported that the pandemic had a negative influence (3.5 of 5; $P < .001$; 95% CI 0.49, 0.53) and impaired their education. The negative influence declined ($t = 7.91$; $P < .001$; 95% CI 0.07, 0.11) but remained noticeable in 2022 (3.4 of 5; $P < .001$; 95% CI 0.41, 0.44). This pattern of results was similar among the different medical specialties. In both years, residents working full-time reported a more severe influence of the pandemic than those working part-time (eg, in 2021 impaired education: 3.1 of 4 vs 2.9 of 4; $P < .01$; 95% CI -0.26, -0.14).

Conclusions The negative influence of the pandemic declined across all medical disciplines.

Introduction

The consequences of the COVID-19 pandemic for the medical community have been investigated in various studies.¹⁻¹⁰ Yet, working and educational conditions for medical residents (herein referring to junior doctors undertaking postgraduate medical training) were changing rapidly within the COVID-19 pandemic, even from 2021 to 2022. There is a lack of studies on the consequences of the pandemic over time and across different medical disciplines.

Although the working conditions of the medical staff were already known to be difficult (eg, contributing to high burnout rates),¹¹ the sudden disturbance of the COVID-19 pandemic had a massive effect on the daily life of health care workers.^{12,13} Aside from the loss of their habitual routines,² additional clinical demands, social distancing, and concern for their own personal health/safety,⁶ medical residents also had to face feelings of isolation⁵ as well as the shift to digital teaching and education.^{1,2,6,14} These changes resulted in feelings of grief,² resignation, and anxiety, alongside

with worries about the loss of hands-on experience and their future careers.^{4,8} These worries seem to be justified since learning opportunities³ did decline, and remote learning may be less effective.^{3,9} Residents reported a decreased motivation/concentration as a consequence of the restrictions imposed on their educational training.⁵

Aside from its negative consequences, the COVID-19 pandemic has also led people in the medical community to feel positive emotions, such as relief.² Research has revealed that the COVID-19 pandemic was sometimes seen as a formal excuse to slow down, and many were fond of the autonomy and the benefits brought by digital teaching and meetings.^{1,2,6} In Switzerland, residents have the opportunity to work part-time (ie, they can negotiate to work less than 95% per contract). Part-time working among the medical community is rare but is becoming more popular in Switzerland. Approximately 16% of the physicians working in Swiss hospitals work part-time. Part-time work could theoretically have protected residents against COVID-19 pandemic effects because the organization of the education (time and duration) allows for more flexibility

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(eg, time frames for completing educational requirements are longer).

There are concerns about whether residents had received enough exposure in specific specialties during the height of the pandemic, and whether the effects of the pandemic led to lower examination performances or reduced preparedness for autonomous practice.¹⁵ Though many studies have analyzed the influence of the COVID-19 pandemic, there is a lack of data on its consequences^{16,17} or on whether the detrimental impact of the pandemic has diminished completely.¹⁸ Knowledge about the long-term consequences of the COVID-19 pandemic, such as delays or extension in education or competency development, is essential for the organization of the medical education system, for the continuous provision of medical treatments and care for the population, and to meet national demand. It is therefore important to study the consequences of the COVID-19 pandemic on the medical education system more thoroughly over time. An examination across the different medical disciplines, as well as in terms of residents' work status (ie, part- vs full-time) appears necessary.

Methods

The data were collected in summer 2021 and 2022 as part of the annual quality assessment of institutions delivering postgraduate medical education in Switzerland.¹⁹ The questions were developed by the Swiss Federal Institute of Technology (ETH) and the Swiss Institute for Medical Education.

In both years, approximately 12 000 residents from Switzerland received a hard-copy questionnaire¹⁹ from their supervisors. Residents returned the completed questionnaires to the ETH anonymously via mail. The full methods are described elsewhere.¹⁹

Measures

To assess the influence of the COVID-19 pandemic, we used the following items in both years: General negative influence of the COVID-19 pandemic was assessed with a 5-point bipolar item and had the following wording: "The COVID-19 pandemic affected my education... (5=very negatively, 1=very positively)." For the assessment of "reduction of time for education/training" we included the item: "During the course of the pandemic the available time for my education... (5=decreased a lot, 1=increased a lot)." The "impairment of education" was assessed with the item: "The teaching of education content has been impaired by the pandemic (eg, due to digital teaching)," using a 4-point response scale (1=does not apply, 4=applies completely).

We used 1-sample *t* tests against the scale mean to analyze the residents' opinion regarding the influence of the pandemic and unpaired *t* tests for the comparison across time, as well as for detecting potential differences between part-time and full-time working residents. Additionally, *t* tests were conducted for investigating the effects separately for the different specialties.

Ethical approval for this research was given by the ethics committee from the ETH Zürich (EK-2021-N-93-A).

Results

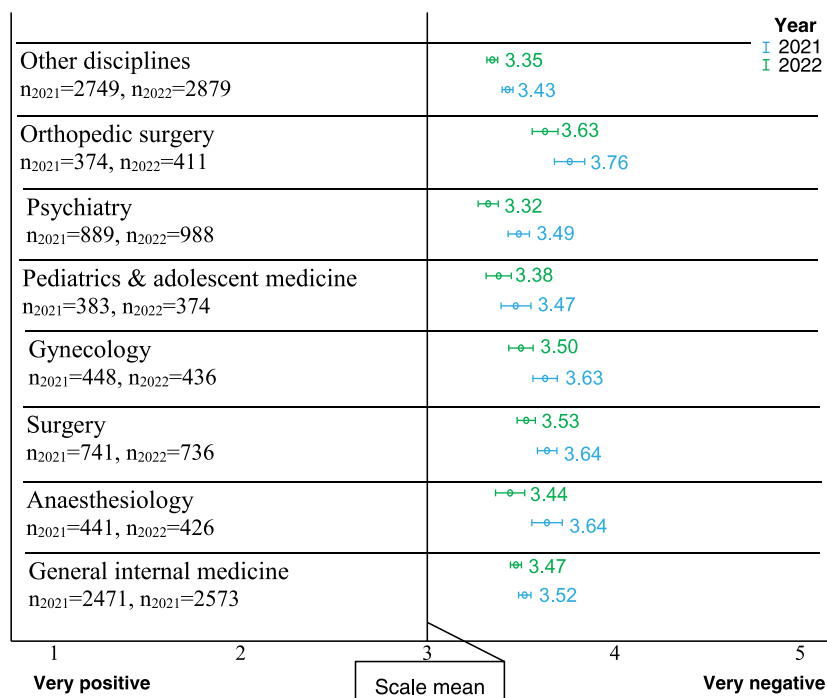
The overall response rate for both years was 70% (2021=8496 of 12 137 total residents and 2022=8823 of 12 604). Our analyses for 2021 are based on $N_{2021}=8496$ postgraduate medical residents (3643 male and 4794 female residents; 104 selected other response options). Regarding 2022, we had a sample of $N_{2022}=8823$ residents (3792 males and 4929 females; 102 selected other response options). The majority of residents (>85%, in 2021: 7389 of 8487 and in 2022: 7465 of 8731) reported working full-time in both years and around 15% (in 2021: 1098 of 8496 and in 2022: 1266 of 8731) reported working part-time (ie, residents reporting to work less than 95%). The number of residents per discipline is reported in the FIGURE. Numbers vary due to single missing values and because residents staying for <2 months were excluded from analysis.

Residents' Perception of the COVID-19 Pandemic

In 2021 and 2022 the general influence of the COVID-19 pandemic was perceived as clearly negative (both Cohen's $d>0.55$, see *t* tests parameters reported in the TABLE). Across all medical disciplines, a similar negative influence was observable. As the FIGURE displays, the orthopedic surgery residents reported the most negative influence in both years ($M_{2021}=3.76$, $M_{2022}=3.63$), while pediatrics and adolescent medicine residents reported the least negative scores in 2021 ($M_{2021}=3.47$) and psychiatry residents in 2022 ($M_{2022}=3.32$).

We used unpaired *t* tests to compare the data from 2021 and 2022 (TABLE) and found that the influence of the COVID-19 pandemic declined in 2022 ($d_{2021vs2022}=0.12$). This decline was significant across disciplines ($P<.05$) except for pediatrics and adolescent medicine ($P>.10$), which had reported the least impact of the COVID-19 pandemic in the 2021 survey.

In both years, residents reported a reduction in the time available for education/training ($d_{2021}=0.76$, $d_{2022}=0.13$), and that their education had been impaired by the COVID-19 pandemic ($d_{2021}=0.69$,



FIGURE

Residents' Responses Regarding the Item "General Negative Influence of the COVID-19 Pandemic" Across the Years 2021 and 2022 and Across the Different Medical Disciplines

Note: Error bars: 95% CI other disciplines contain all further less frequent disciplines.

$d_{2022}=0.42$) as displayed in the TABLE. *T* tests against the scale mean showed an effect for both years. These results were similar across disciplines, except that in 2022 residents from pediatrics and adolescent medicine did not indicate a reduction in their time for education ($P>.59$, FIGURE). Comparing 2021 and 2022, residents from all disciplines reported relatively less reduction of education time in 2022 than in 2021 ($d_{2021vs2022}=0.61$) and less impairment of their education in 2022 than in 2021 ($d_{2021vs2022}=0.26$).

Residents Working Part-Time vs Full-Time

Further analyses showed that residents working full-time reported a significantly stronger negative influence of the COVID-19 pandemic ($d=-0.08$), more reduction of their education time ($d=0.17$), and more impairment to their education ($d=-0.23$) than residents working part-time in 2021 (see TABLE). In 2022, both subsamples judged the influence as less severe than in 2021, also in terms of education time and education impairment. Despite the decline, differences between the subgroups remained significant in 2022: Full-time working residents still perceived the influence of the pandemic as more negative ($d=-0.05$) and the education to be more impaired ($d=-0.18$) than did residents working part-time.

Discussion

Residents indicated that the negative influence of the COVID-19 pandemic was still present in 2022, although less severe than in 2021. This pattern was similar across different medical disciplines. The findings show a decline in the ratings, which seems promising for the medical community. Nevertheless, there are continuing negative consequences of the COVID-19 pandemic that need to be resolved; what is more, understanding the vulnerability of the resident education system may facilitate the development of adaptation strategies and mechanisms to ensure a more efficient handling of future challenges.

In 2021, residents working full-time perceived the influence of the COVID-19 pandemic to be more severe than did those working part-time. The differences declined in 2022 but remained significant, especially regarding the perceived impaired education. Working part-time might have provided more flexibility to deal with the challenges brought about by the situation. The observed effects were rather small (most Cohen's *d* scores were below 0.20 suggesting only small effects) and based only on single-item measures. Future research is warranted to gain more insight into the relationship between work status and perception of the COVID-19 pandemic.

TABLE

Descriptive Statistics and Parameters of 1-Sample *t* Tests Against Scale Mean and Unpaired *t* Tests_{2021vs2022}

Statistics of Full Sample	Descriptive Statistics		<i>t</i> Tests Against Scale Mean (2021 and 2022)				Unpaired <i>t</i> Test (Comparing 2021 vs 2021)	
	M ₂₀₂₁ (SD)	M ₂₀₂₂ (SD)	t ₂₀₂₁ (df)	t ₂₀₂₂ (df)	95% CI ₂₀₂₁	95% CI ₂₀₂₂	t _{2021vs2022} (df)	95% CI
A. General negative influence	3.52 (0.81)	3.42 (0.76)	58.51 ^a (8483)	51.85 ^a (8717)	0.49, 0.53	0.41, 0.44	7.91 ^a (17200)	0.07, 0.11
B. Reduction of education time	3.65 (0.86)	3.12 (0.88)	69.60 ^a (8410)	12.33 ^a (8691)	0.64, 0.67	0.10, 0.14	40.23 ^a (17101)	0.51, 0.56
C. Impairment of education	3.11 (0.89)	2.88 (0.91)	62.44 ^a (8234)	37.48 ^a (8078)	0.59, 0.63	0.36, 0.40	16.47 ^a (16312)	0.20, 0.26

Statistics of Part- and Full-Time Subsamples	Descriptive Statistics for Comparison of Part- vs Full-Time				Unpaired <i>t</i> Tests (Comparing Part- vs Full-Time Within 2021 and 2022)				Unpaired <i>t</i> Test (Comparing 2021 vs 2021 for Part- and Full-Time)			
	M _{part-time2021} (SD)	M _{full-time2021} (SD)	M _{part-time2022} (SD)	M _{full-time2022} (SD)	t _{part_full_21} (df)	t _{part_full_22} (df)	95% CI ₂₀₂₁	95% CI ₂₀₂₂	t _{part_21vs22} (df)	t _{full_21vs22} (df)	95% CI	95% CI
A. General negative influence	3.46 (.78)	3.53 (.82)	3.39 (.77)	3.43 (.76)	-2.49 ^b (8404)	-1.72 ^b (8642)	-0.12, -0.01	-0.08, -0.00	2.24 ^b (2334)	7.56 ^a (14694)	0.01, 0.13	0.07, 0.12
B. Reduction of education time	3.53 (.80)	3.67 (.87)	3.15 (.87)	3.11 (.88)	-5.16 ^a (8333)	1.10 (8598)	-0.20, -0.09	-0.02, 0.08	11.04 (2325)	38.43 ^a (14606)	0.32, 0.45	0.53, 0.59
C. Impairment of education	2.94 (.93)	3.14 (.87)	2.74 (.92)	2.90 (.90)	-6.87 ^a (8157)	-5.69 ^a (7995)	-0.26, -0.14	-0.22, -0.11	5.00 ^a (2248)	15.52 ^a (13904)	0.12, 0.27	0.20, 0.26

^a *P* < .001.^b *P* < .05.

Note: n_{part-time2021}=1098, n_{full-time2021}=7398, n_{part-time2022}=1266, n_{full-time2022}=7465; for items A and B scores ranged from 1=very positively/increased a lot to 5=very negatively/decreased a lot; for item C from 1=does not apply to 4=applies completely.

The beneficial effect of working part-time aligns with the literature showing a positive effect of part-time work in general on work control and patient satisfaction.²⁰ Working part-time might also be recommended, given that previous studies have consistently shown that the work quality of part-time workers is similar or even higher^{21,22} and that patients receiving medical treatments are at least equally satisfied with part-time workers.^{20,23,24}

The present research is based only on samples from Switzerland. However, the large size of the samples and the fact that we found similar results across different medical disciplines support the assumption that the effects would be similar in other countries.

Conclusions

The COVID-19 pandemic had detrimental effects on graduate medical education in Switzerland in 2021 and 2022. According to the residents, the negative influence continued but declined to a substantial extent for all medical disciplines. Residents working part- (vs full-) time reported a less severe influence of the COVID-19 pandemic in both years.

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