Impact of the COVID-19 Pandemic on Residents’ Clinical Training and Psychosocial Well-Being in Saudi Arabia’s Western Region

Reem Alshareef (alshareef.reem@gmail.com)
King Abdulaziz Medical City - Jeddah https://orcid.org/0000-0001-7411-9643

Abdullah Al Zahrani
King Abdulaziz Medical City - Jeddah

Meshari Alzhrani
King Abdulaziz Medical City - Jeddah

Abdulaziz Suwaidi
King Abdulaziz Medical City - Jeddah

Bander Alamry
King Abdulaziz Medical City - Jeddah

Keywords: COVID-19, healthcare systems, demographic data, factors influencing

DOI: https://doi.org/10.21203/rs.3.rs-78112/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License
Abstract

Background: The novel COVID-19 pandemic has imposed a significant burden on healthcare systems. Similarly, it has also affected the performance and well-being of the medical staff working during the pandemic. However, to what extent COVID-19 is affecting medical staff is still unclear, especially among physicians.

Objective: This study aims to evaluate the negative effect of the COVID-19 pandemic on the medical training and psychological well-being of resident doctors practicing in the western region in Saudi Arabia.

Patients and Methods: This is a quantitative cross-sectional study that included a survey distributed to residents physicians working in the western region in Saudi Arabia. The survey included questions on demographic data and factors influencing the academic training, attitude, and daily habits of the residents during the pandemic. Psychological impact was assessed using the Kessler Psychological Distress Scale. Data analysis was executed using IBM SPSS version 26.

Results: A total of 121 residents responded to this survey. Of all respondents, 71.1% were junior residents, 66.9% had a medical specialty; and 33% were family medicine doctors, followed by 17% from general surgery. In regards to work amid the pandemic, 36.1% were in contact with confirmed COVID-19 patients, and 35.5% had to work overtime during the pandemic. Of the respondents, 44% described their training as extremely affected, and 32% strongly agreed and 53% agreed that their psychological well-being was negatively affected. Further, 39.6% were smoking more than they used to. Female and junior residents’ training was significantly more negatively affected than their peers’ (p=0.039 and 0.011, respectively). There was a non-significant difference detected between the residents regarding the factors negatively affecting their psychological well-being.

Conclusion: Residents working during the pandemic in the western area of Saudi Arabia were significantly affected by the pandemic from both professional and psychological perspectives. Further research on how the pandemic is affecting doctors in other areas in Saudi Arabia is needed.

Introduction

SARS-CoV-2 is a newly identified virus that was first detected in the city of Wuhan in Hubei Province in China (Torales et al., 2020). The COVID-19 disease was defined as an epidemic in China after reporting multiple patients with new-onset, severe pneumonia with rapid progression and transmission (World Health Organization, 2020). This novel virus belongs to the coronavirus family, which has caused previous epidemics in Asia, including the MERS-CoV and SARS viruses (Cao et al., 2020).

The major problem with COVID-19 infection is its speed of transmission (Chew et al., 2020). The virus started to spread globally within a very short time, which led to the announcement of COVID-19 as a pandemic in February 2020 (Holmes et al., 2020). This rapid spreading has put the most powerful healthcare systems around the world at risk of collapse (Chen et al., 2020). This is because patients with COVID-19 deteriorate rapidly, which increases their need for hospitalization and sometimes mechanical ventilation in severe cases (Pfefferbaum & North, 2020).

Accordingly, governments began to apply measures to reduce the spreading of the virus and thus lower the burden on healthcare systems (Li et al., 2020). One of these measures was national lockdowns, which stopped
most face-to-face services (Wang et al., 2020). Despite this response, the virus continued to spread, and the pandemic affected not only healthcare systems but also medical staff, particularly the physicians (Kang et al., 2020). Due to the increased workload during the COVID-19 pandemic, many hospitals required their physicians to work overtime hours and sometimes days to care for COVID-19 patients (Rosen et al., 2020). Additionally, most of the educational programs aimed at physicians, such as conferences and lectures, have stopped. All these changes have negatively impacted physicians, especially junior residents, in terms of their medical training and career progress (Amparore et al., 2020).

Furthermore, increasing mortality and infection among medical staff has had a significantly negative impact on doctors’ psychological well-being (Huang et al., 2020). They have had to care for their colleagues or family members, sometimes watch them dying without being able to save them. All these stresses have put the mental and psychological well-being of medical staff at risk (Du et al., 2020).

To our knowledge, no local or international data has been reported to address the issue of the affected medical training and psychosocial impact on both the medical and surgical residents in Saudi Arabia. Therefore, the present study aims to assess the negative impact of this pandemic on the academic education and the psychosocial well-being of the residents practicing in the Western region, Saudi Arabia.

**Materials And Methods**

**Study design**

This is a quantitative cross-sectional study that included resident physicians who were working in the Western region, Saudi Arabia, during the COVID-19 pandemic. The study included all medical and surgical residents without exclusion.

**Data collection**

The study utilized a questionnaire to assess the impact of the COVID-19 pandemic on academic training and the well-being of medical and surgical residents. The questionnaire was distributed through Google Forms. The study purpose was explained on the cover page of each questionnaire. The questionnaire included questions on demographic data and various factors affecting academic training, attitude, and daily habits of the residents during the pandemic. Psychological impact was assessed using the Kessler Psychological Distress Scale.

**Statistical analyses**

Descriptive analysis was carried out through totals and percentages for categorical data, while means and standard deviations were used for numerical data. Chi-square analysis was carried out to compare categorical variables, using a p-value of <0.05. All data analyses were conducted using IBM SPSS version 26.

**Ethical considerations**
Approval for the study was obtained from the institutional ethics board. This study was initiated following the reception of approval from the IRB of King Abdullah International Medical Research Center. Participation was voluntary. The consent form was available on the first page of the questionnaire.

Results

A total of 121 residents from the western region in Saudi Arabia responded to the survey. Responses and respondent demographics are described below.

Characteristics of the respondents

Out of 121 respondents, 57% were female, 24% were smokers, and 59.5% were single. Additionally, 71.1% of the participants were junior residents, and 66.9% had a medical specialty, as shown in Table 1 and figure 1.

| Table 1 |
|---------|
| Respondents’ characteristics |
| Total | Percent |
|---------------------------|---------|
| Gender | Male | 52 | 43.0 |
| | Female | 69 | 57.0 |
| Smoking history | Non-Smoker | 91 | 75.2 |
| | Smoker | 29 | 24.0 |
| | Ex-Smoker | 1 | 0.8 |
| Marital status | Single | 72 | 59.5 |
| | Married | 48 | 39.7 |
| | Divorced | 1 | 0.8 |
| Level of training | Junior | 86 | 71.1 |
| | Senior | 35 | 28.9 |
| Medical specialty | Medical | 81 | 66.9 |
| | Surgical | 40 | 33.1 |

Working conditions during the COVID-19 pandemic

Respondents were asked to evaluate their working conditions amid the COVID-19 pandemic. According to the responses, 36.1% of the residents were in contact with confirmed COVID-19 patients, while 42.1% were not in contact with confirmed or suspected cases. Additionally, the nasopharyngeal swab was done for 33.1% of the residents, and 35.5% had to work overtime during the pandemic, as shown in Table 2.
Table 2
Respondents’ working conditions during the COVID-19 pandemic

| During the COVID-19 pandemic, have you been...? | Total | Percent |
|-----------------------------------------------|-------|---------|
| In contact with COVID-19 patients             | 44    | 36.1    |
| Suspected to have COVID-19                   | 10    | 8.2     |
| Suspected to have COVID-19, in contact with COVID-19 patients | 16    | 13.2    |
| None                                          | 51    | 42.1    |

| Have you received a nasopharyngeal swab for COVID-19? | Total | Percent |
|-------------------------------------------------------|-------|---------|
| Yes                                                   | 40    | 33.1    |
| No                                                    | 81    | 66.9    |

| Have you been working overtime? | Total | Percent |
|--------------------------------|-------|---------|
| Yes                             | 43    | 35.5    |
| No                              | 78    | 64.5    |

Teaching and training during the COVID-19 pandemic

Participants were also asked how much the COVID-19 pandemic has affected their teaching and training. Of all residents, 27.3% mentioned that the number of surgeries had been extremely affected. More than one-third of the residents felt their program teaching activity and the number of clinics, studying hours, conferences and lectures being offered had been extremely affected. However, 38.8% stated that the variety of clinical cases was moderately affected.

Furthermore, almost three-quarters (77.7%) of the resident responded that their clinical rotations were changed, and 46.3% were moved from their departments to help other departments caring for COVID-19 patients, as shown in Table 3.
Table 3
COVID-19 pandemic impact on the teaching and academic training

| Topic                                      | Total | Percent |
|--------------------------------------------|-------|---------|
| Number of operations                       |       |         |
| Extremly affected                          | 33    | 27.3    |
| Severely affected                          | 9     | 7.4     |
| Moderately affected                        | 8     | 6.6     |
| Slightly affected                          | 4     | 3.3     |
| Not affected                               | 5     | 4.1     |
| Not applicable                             | 62    | 51.2    |
| Program teaching activity                  |       |         |
| Extremly affected                          | 42    | 34.7    |
| Severely affected                          | 18    | 14.9    |
| Moderately affected                        | 26    | 21.5    |
| Slightly affected                          | 17    | 14.0    |
| Not affected                               | 17    | 14.0    |
| Not applicable                             | 1     | 0.8     |
| Variety of clinical cases                  |       |         |
| Extremly affected                          | 35    | 28.9    |
| Severely affected                          | 24    | 19.8    |
| Moderately affected                        | 47    | 38.8    |
| Slightly affected                          | 10    | 8.3     |
| Not affected                               | 2     | 1.7     |
| Not applicable                             | 3     | 2.5     |
| Conferences and lectures offered           |       |         |
| Extremly affected                          | 44    | 36.4    |
| Severely affected                          | 29    | 24.0    |
Respondents were also asked how much their medical training was negatively affected by the pandemic; 44% described their training as extremely affected, as shown in Figure 2.
Psychological impact on the residents during the last month amid the COVID-19 pandemic

In regard to the participants’ emotions during this pandemic, more than one-third said they felt tired for no good reason some of the time, and the majority felt nervous, hopeless, restless, or depressed at least some of the time and that all tasks involved a lot of effort, as shown in Table 4.
| In the past four weeks, about how often did you feel tired for no good reason? | Total | Percent |
|---|---|---|
| All the time | 22 | 18.2 |
| Most of the time | 34 | 28.1 |
| Some of the time | 44 | 36.4 |
| A little of the time | 19 | 15.7 |
| None of the time | 2 | 1.7 |

| In the past four weeks, about how often did you feel nervous? | Total | Percent |
|---|---|---|
| All the time | 16 | 13.2 |
| Most of the time | 32 | 26.4 |
| Some of the time | 53 | 43.8 |
| A little of the time | 18 | 14.9 |
| None of the time | 2 | 1.7 |

| In the past four weeks, about how often did you feel so nervous that nothing could calm you down? | Total | Percent |
|---|---|---|
| All the time | 8 | 6.6 |
| Most of the time | 14 | 11.6 |
| Some of the time | 33 | 27.3 |
| A little of the time | 40 | 33.1 |
| None of the time | 26 | 21.5 |

| In the past four weeks, about how often did you feel hopeless? | Total | Percent |
|---|---|---|
| All the time | 10 | 8.3 |
| Most of the time | 25 | 20.7 |
| Some of the time | 38 | 31.4 |
| A little of the time | 22 | 18.2 |
| None of the time | 26 | 21.5 |

| In the past four weeks, about how often did you feel restless or fidgety? | Total | Percent |
|---|---|---|
| All the time | 9 | 7.4 |
|                          | Most of the time | Some of the time | A little of the time | None of the time |
|--------------------------|------------------|------------------|----------------------|------------------|
| In the past four weeks, about how often did you feel so restless you could not sit still? | 28 23.1        | 33 27.3          | 32 26.4              | 19 15.7         |
| In the past four weeks, about how often did you feel depressed? | 28 23.1        | 33 27.3          | 32 26.4              | 19 15.7         |
| In the past four weeks, about how often did you feel that most tasks took more effort than usual? | 28 23.1        | 33 27.3          | 32 26.4              | 19 15.7         |
| In the past four weeks, about how often did you feel so sad that nothing could cheer you up? | 28 23.1        | 33 27.3          | 32 26.4              | 19 15.7         |
Behaviors during the last month

Other behaviors were also evaluated. About 78% mentioned they always wore masks when they left home. More than half of the doctors always performed proper hand hygiene, routinely disinfected surfaces after contact with sick patients, and found that their social life has been affected. Additionally, almost one-third of the doctors found that they were sometimes having difficulty falling or staying asleep, adopting bad eating habits, and could not maintain an optimal body weight, as shown in Table 5.

Social behaviors during COVID-19

Turning to social behaviors, 76% of the doctors performed less than 100 minutes of weekly exercise, 39.6% were smoking more than they used to, and 79.3% were bothered about going to places with more than 50 people, as shown in Table 5.
Table 5
Participants’ Behavior and responses during the last month

|                                    | Count | Percent |
|------------------------------------|-------|---------|
| Wearing a mask when leaving home   |       |         |
| Always                             | 95    | 78.5    |
| Often                              | 12    | 9.9     |
| Sometimes                          | 12    | 9.9     |
| Rarely                             | 2     | 1.7     |
| How many minutes per week do you exercise? |       |         |
| Less than 100 minutes              | 92    | 76.0    |
| 100-150 minutes                    | 12    | 9.9     |
| More than 150 minutes              | 17    | 14.0    |
| For smokers, have you been smoking more? |       |         |
| Yes                                | 21    | 39.6    |
| No                                 | 32    | 60.3    |
| Does it bother you now to go to places with more than 50 people? |       |         |
| Yes                                | 96    | 79.3    |
| No                                 | 25    | 20.7    |

The residents were also asked how much they would agree that the pandemic had negatively affected their psychological well-being; one-third of the doctors strongly agreed and half agreed that their psychological well-being was negatively affected, as shown in Figure 3.

Factors influencing training and psychological well-being during the COVID-19 pandemic

To identify the residents who were more likely to have their psychological well-being and their training affected by the pandemic, their overall level of impact was compared over different variables using chi-square tests (p<0.05). It was found that the female residents and the junior residents’ training were negatively affected compared to their peers (p=0.039, 0.011, respectively), as shown in Table 7.
Table 7
Chi-square comparison on the pandemic negative impact on the medical training

| Gender     | Extremely affected | Severely affected | Moderately affected | Slightly affected | Not affected | Not applicable | P-Value* |
|------------|--------------------|-------------------|--------------------|-------------------|--------------|----------------|----------|
| Male       | 28.3%              | 54.3%             | 57.7%              | 50.0%             | 100.0%       | 0.0%           | 0.039    |
| Female     | 71.7%              | 45.7%             | 42.3%              | 50.0%             | 0.0%         | 100.0%         |          |
| Level of training |         |                   |                    |                   |              |                |          |
| Junior     | 54.7%              | 85.7%             | 84.6%              | 50.0%             | 100.0%       | 100.0%         | 0.011    |
| Senior     | 45.3%              | 14.3%             | 15.4%              | 50.0%             | 0.0%         | 0.0%           |          |
| Specialty  |                    |                   |                    |                   |              |                |          |
| Medical    | 71.7%              | 68.6%             | 53.8%              | 50.0%             | 100.0%       | 100.0%         | 0.467    |
| Surgical   | 28.3%              | 31.4%             | 46.2%              | 50.0%             | 0.0%         | 0.0%           |          |
| Smoking    |                    |                   |                    |                   |              |                |          |
| Smoker     | 34.0%              | 28.6%             | 3.8%               | 0.0%              | 0.0%         | 0.0%           | 0.176    |
| Non-smoker | 66.0%              | 68.6%             | 96.2%              | 100.0%            | 100.0%       | 100.0%         |          |
| Ex-smoker  | 0.0%               | 2.9%              | 0.0%               | 0.0%              | 0.0%         | 0.0%           |          |
| Working overtime |        |                   |                    |                   |              |                |          |
| Yes        | 41.5%              | 40.0%             | 23.1%              | 25.0%             | 0.0%         | 0.0%           | 0.449    |
| No         | 58.5%              | 60.0%             | 76.9%              | 75.0%             | 100.0%       | 100.0%         |          |

*p<0.05.

On the other hand, no significant difference was detected when comparing gender, level of training, specialty, smoking, or working overtime regarding their negative influence on psychological well-being, as shown in Table 8.
Table 8
Chi-square comparison on the pandemic negative impact on the psychological well-being of the residents

|                         | Strongly Agree | Agree | Neutral | Disagree | P-Value* |
|-------------------------|----------------|-------|---------|----------|----------|
| **Gender**              |                |       |         |          |          |
| Male                    | 28.2%          | 50.0% | 50.0%   | 50.0%    | 0.163    |
| Female                  | 71.8%          | 50.0% | 50.0%   | 50.0%    |          |
| **Level of training**   |                |       |         |          |          |
| Junior                  | 82.1%          | 62.5% | 75.0%   | 100.0%   | 0.138    |
| Senior                  | 17.9%          | 37.5% | 25.0%   | 0.0%     |          |
| **Specialty**           |                |       |         |          |          |
| Medical                 | 59.0%          | 71.9% | 62.5%   | 100.0%   | 0.399    |
| Surgical                | 41.0%          | 28.1% | 37.5%   | 0.0%     |          |
| **Smoking**             |                |       |         |          |          |
| Smoker                  | 23.1%          | 25.0% | 18.8%   | 50.0%    | 0.274    |
| Non-smoker              | 76.9%          | 75.0% | 75.0%   | 50.0%    |          |
| Ex-smoker               | 0.0%           | 0.0%  | 6.3%    | 0.0%     |          |
| **Working overtime**    |                |       |         |          |          |
| Yes                     | 35.9%          | 42.2% | 12.5%   | 0.0%     | 0.109    |
| No                      | 64.1%          | 57.8% | 87.5%   | 100.0%   |          |

*p<0.05.

**Discussion**

The COVID-19 pandemic has not only affected healthcare resources and patients’ lives negatively, but it has also had a negative impact on the life of doctors from different perspectives (Chung & Yeung, 2020). Due to lockdowns and social distancing measures, the number of clinical rounds and lectures have been significantly reduced, and doctors’ workloads have also increased, both of which may have put their psychological well-being at risk (Guo et al., 2020). In Saudi Arabia, the pandemic struck particularly hard, which has increased the burden on Saudi medical staff (Lai et al., 2020).

The impact of COVID-19 on medical staff has been examined in different settings. Alvin et al. (2020) examined how COVID-19 affected radiology medical trainees’ training and mental health in the United States. They demonstrated that medical trainees were exposed to a remarkably increased workload and were subject to clinical reassignment to other departments. Further, the medical trainees were exposed to an increased financial burden due to higher costs of childcare services during the pandemic, which they needed because of their increased working hours. In the present study, similar to Alvin et al. (2020), almost one-third of the responding doctors said they had to work overtime during the pandemic; however, financial burdens were not increased in the present sample, which could be because the majority of participants were junior and single doctors who do not have childcare responsibilities.

Another study by Tan et al. (2020) examined the psychological impact of the COVID-19 pandemic on Singaporean doctors. They included doctors from two tertiary hospitals who had duties in departments with COVID-19 patients. They found that the incidence of depression and anxiety was significantly higher during the
pandemic, and female doctors were the most affected. In the present study, female and junior doctors reported the highest negative impact to their training during the pandemic; however, there was no significant impact on psychological well-being among all doctors.

Furthermore, Montermurro et al. (2020) examined the pandemic’s emotional impact on medical staff. They found that Asian doctors were exposed to extreme emotional stress, which resulted in the appearance of novel psychological symptoms in doctors who did not have any previous history of psychological distress.

The present study not only examined the pandemic’s negative influence on psychological well-being but also examined its negative impact on medical training. Findings demonstrated that medical training was affected in terms of the number of clinical rounds, study hours, operations, and lectures and conferences.

It should be noted that the present investigation had some limitations. This study included residents from one region of Saudi Arabia, which makes the extrapolation of the results more challenging. Additionally, due to the survey design, the study outcomes are based on the subjective opinion of the included physicians, which might affect the reliability of the results.

**Conclusion**

The COVID-19 pandemic has significantly influenced the psychological well-being and medical training of residents working in the Western area of Saudi Arabia. Accordingly, decision-makers in the healthcare sector should consider these findings to prevent any additional burden on medical staff in future pandemics.

**Declarations**

**Declaration of Conflicting Interests**

The Authors declare that there is no conflict of interest.

**Funding**

This study did not receive any funding from public or private sectors.

**References**

1. Alvin, M. D., George, E., Deng, F., Warhadpande, S., & Lee S. I. (2020). The impact of COVID-19 on radiology trainees. *Radiology, 296*(2), 201222. https://doi.org/10.1148/radiol.2020201222

2. Amparore, D., Claps, F., Cacciamani, G. E., Esperto, F., Fiori, C., Liguori, G., Semì, S., Trombetta, C., Carini, M., Porpiglia, F., Cheuccci, E., & Campi, R. (2020). Impact of the COVID-19 pandemic on urology residency training in Italy. *Minerva urologica e nefrologica, 72*(4), 505–509. https://doi.org/10.23736/S0393-2249.20.03868-0

3. Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research, 287*, 112934. https://doi.org/10.1016/j.psychres.2020.112934
4. Chen, Q., Liang, M., Li, Y., Guo, J., Fei, D., Wang, L., He, L., Sheng, C., Cai, Y., Li, X., Wang, J., & Zhang, Z. (2020). Mental health care for medical staff in China during the COVID-19 outbreak. *The Lancet Psychiatry, 7*(4), E15–E16. https://doi.org/10.1016/S2215-0366(20)30078-X

5. Chew, N. W., Lee, G. K., Tan, B. Y., Jing, M., Goh, Y., Ngiam, N. J., Yeo, L. L., Ahmad, A., Khan, F. A., Shanmugam, G. N., Sharma, A. K., Komalkumar, R. N., Meenakshi, P. V., Shah, K., Patel, B., Chan, B. P. L., Sunny, S., Chandra, B. Ong, J. J., & Sharmab, K. (2020). A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain, Behavior, and Immunity, 88*, 559–565. https://doi.org/10.1016/j.bbi.2020.04.049

6. Chung, J. P., & Yeung, W. S. (2020). Staff mental health self-assessment during the COVID-19 outbreak. *East Asian Archives of Psychiatry, 30*(1), 34. https://doi.org/10.12809/eaap2014

7. Du, J., Dong, L., Wang, T., Yuan, C., Fu, R., Zhang, L., Liu, B., Zhang, M., Yin, Y., Qin, J., Bouey, J., Zhao, M., & Li, X. (2020). Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan. *General Hospital Psychiatry*. https://dx.doi.org/10.1016/j.genhosppsych.2020.03.011

8. Guo, J., Liao, L., Wang, B., Li, X., Guo, L., Tong, Z., Guan, Q., Zhou, M., Wu, Y., Zhang, J., & Gu, Y. (2020). Psychological effects of COVID-19 on hospital staff: A national cross-sectional survey of China mainland. *The Lancet*. https://dx.doi.org/10.2139/ssrn.3550050

9. Holmes, E. A., O’Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R. C., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A.,…Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry, 7*(6), P547–560. https://doi.org/10.1016/S2215-0366(20)30168-1

10. Huang, J. Z., Han, M. F., Luo, T. D., Ren, A. K., & Zhou, X. P. (2020). Zhonghua lao dong wei sheng zhi ye bing za zhi [Mental health survey of medical staff in a tertiary infectious disease hospital for COVID-19]. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi*, 38(3), 192–195. https://doi.org/10.3760/cma.j.cn121094-20200219-00063

11. Kang, L., Ma, S., Chen, M., Yang, J., Wang, Y., Li, R., Yao, L., Bai, H., Cai, Z., Yang, B. X., Hu, S., Zhang, K., Wang, G., Ma, C., & Liu, Z. (2020). Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. *Brain, Behavior, and Immunity, 87*, 11–17. https://doi.org/10.1016/j.bbi.2020.03.028

12. Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Wu, J., Du, H., Chen, T., Li, R., Tan, H., Kang, L., Yao, L., Huang, M., Wang, H., Wang, G., Liu, Z., & Hu, S. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open, 3*(3), e203976. https://doi.org/10.1001/jamanetworkopen.2020.3976

13. Li, Z., Ge, J., Yang, M., Feng, J., Qiao, M., Jiang, R., Bi, J., Zhan, G., Xu, X., Wang, L., Zhou, Q., Zhou, C., Pan, Y., Liu, S., Zhang, H., Yang, J., Zhu, B., Hu, Y, Hashimoto, K.,…Yang, C. (2020). Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain, Behavior, and Immunity, 88*, 916–919. https://doi.org/10.1016/j.bbi.2020.03.007

14. Montemurro, N. (2020). The emotional impact of COVID-19: From medical staff to common people. *Brain, Behavior, and Immunity, 87*, 23–24. https://doi.org/10.1016/j.bbi.2020.03.032
15. Pfefferbaum, B., & North, C. S. (2020). Mental health and the Covid-19 pandemic. *New England Journal of Medicine, 383*, 510–512. https://doi.org/10.1056/NEJMp2008017

16. Rosen, G. H., Murray, K. S., Greene, K. L., Pruthi, R. S., Richstone, L., & Mirza, M. (2020). Effect of COVID-19 on urology residency training: A nationwide survey of program directors by the Society of Academic Urologists. *The Journal of Urology*. https://doi.org/10.1097/JU.0000000000001155

17. Tan, B. Y., Chew, N. W., Lee, G. K., Jing, M., Goh, Y., Yeo, L. L., Zhang, K., Chin, H. K., Ahmad, A., Khan, F. A., Shanmugam, G. N., Chan, B. P. L., Sunny, S., Chandra, B., Ong, J. J. Y., Paliwal, P. R., Wong, L. Y. H., Sagayanathan, R., Chen, J. T.,...Sharma, V. K. (2020). Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Annals of Internal Medicine, 172*(9), 577–582. https://dx.doi.org/10.7326%2FM20-1083

18. Torales, J., O’Higgins, M., Castaldelli-Maia, J. M., & Ventriglio, A. (2020). The outbreak of COVID-19 coronavirus and its impact on global mental health. *International Journal of Social Psychiatry, 66*(4), 317–320. https://doi.org/10.1177%2F0020764020915212

19. Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health, 17*(5), 1729. https://doi.org/10.3390/ijerph17051729

20. World Health Organization. (2020, March 29). *Modes of transmission of the virus causing COVID-19: Implications for IPC precaution recommendations*. https://www.who.int/news-room/commentaries/detail/modes-of-transmission-of-virus-causing-covid-19-implications-for-ipc-precaution-recommendations

**Figures**
Figure 1

Respondent medical specialty

Figure 2

COVID-19 pandemic impact on the medical training among the residents
Figure 3

COVID-19 pandemic impact on psychological well-being of the residents