






Main Strategies for Supporting Medical Student Mental Health During Global Pandemics: Covid-19 Lessons

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Abstract: In the present study we found that at the beginning of the global pandemic, temporary transition to distance learning is not only a good preventive measure to contain the pathogen spread, but also a significant factor that support medical student mental health. For the first time it was shown that vaccination is not only necessary to protect against moderate and severe disease forms, fatal outcomes, and post-infectious complications in medical students, but also to stabilize their mental health. Our findings are of particular importance in the context of developing main strategies for supporting mental health of medical students and their education quality during global pandemics.


1 INTRODUCTION


The global pandemic, caused by a new coronavirus infection, officially ended on May 5, 2023. According to the numerous scientific data from Russia (Mosolov, 2020), Japan (Shigemura et al. 2020), China (Xiang et al. 2020), Italy (Mazza et al. 2020), and other countries (Fountoulakis et al. 2022) the rapid spread of a dangerous infection around the world is accompanied by a significant deterioration in the mental population health. It was shown that the negative information flow, the severe disease course, high mortality rate, fear of infection, worry for loved ones, self-isolation regimen and constant need for hygiene requirements are associated with an increase in anxiety-depressive disorders in the society (Mosolov, 2020).


Medical students are the special risk group in the pandemic situation as they have a high infection risk because of their frequent visits to different patients


and their emergency practice in hospitals (Aliev et al., 2020). Therefore, medical students are known to be more prone to anxiety-depressive disorders due to their greater awareness of the dangers of diseases and their serious complications (Nguyen et al., 2020; Arima et al., 2020; Morote-Jayacc et al., 2021). Adverse changes in the psychological status are manifested, primarily, in the vegetative disorder development and impaired adaptive mechanisms (Settineri et al., 2019). There is evidence that the success of medical student training also largely depends on their mental health (Bruffaerts et al., 2018).


The aim of this study was to study anxiety-depressive disorders of medical students during the periods of rapid SARS-COV-2 spread in COVID-19 pandemic and to assess the impact of the introducing distance learning and vaccination to develop effective strategies of managing medical student mental health and education quality during global pandemics.

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2 METHODS

2.1 Study Design and Participants

1250 medical students of Sechenov University aged 16 to 27 years (17.9±0.97 years) were included in this study conducted during the periods of rapid SARS-COV-2 spread in COVID-19 pandemic 2020-2022. This study was cross-sectional online anonymous survey that was carried out on the Google Forms platform (Alphabet, USA) in accordance to STROBE guidelines and consisted of three evaluation stages: the first – during the rapid SARS-COV-2 spread 2020 with traditional training; the second – after the transition of the university education to distance learning during the rapid SARS-COV-2 spread 2021; the third – during the rapid SARS-COV-2 spread 2021-2022 in vaccinated students and in those who did not participate in the SARS-COV-2 vaccination campaign. By this time, all students had the opportunity to be vaccinated against COVID-19 for more than six months from the vaccination start as in Moscow COVID-19 vaccination began on December 2020, and medical students were among the first since they have a high SARS-COV-2 infection risk (Szmyd et al. 2021). The reference to the questionnaires was distributed among students via social networks and Internet channels. Using G*Power software statistical package made in ChristianAlbrechts-Universität, Olshausenstr, Germany (Faul et al. 2007) and based on a moderate effect size 0.3, power 95%, and alpha≤0.05, the minimum sample size needed for this study was calculated to equal 462 students. The calculations for the minimum sample size are shown below (Fig. 1).

$$N_1 = \left\{ z_{1-\alpha/2} * \sqrt{\bar{p} * \bar{q} * \left(1 + \frac{1}{k}\right)} + z_{1-\beta} * \sqrt{p_1 * q_1 + \left(\frac{p_2 * q_2}{k}\right)} \right\}^2 / \Delta^2$$

$$q_1 = 1 - p_1$$

$$q_2 = 1 - p_2$$

$$\bar{p} = \frac{p_1 + k p_2}{1 + k}$$

$$\bar{q} = 1 - \bar{p}$$

$$N_1 = \left\{ 1.96 * \sqrt{0.525 * 0.475 * \left(1 + \frac{1}{1}\right)} + 1.28 * \sqrt{0.45 * 0.55 + \left(\frac{0.6 * 0.4}{1}\right)} \right\}^2 / 0.15^2$$

$$N_1 = 231$$

$$N_2 = k * N_1 = 231$$

Figure 1: Sample size counting for present study.

2.2 Anxiety and depression evaluation

The State-Trait Anxiety Inventory, (STAI) test, was used to study the reactive anxiety level (Guillén-Riquelme et al., 2014). The Beck Depression Inventory (BDI) test was used to assess depressive disorders (Jackson-Koku, 2016).

2.3 Ethics statement

The study was conducted with the consent of the Local Ethics Committee of Sechenov University (Protocol No. 04-19 dated 06.03.2019) in compliance with the ethical standards of the Helsinki Declaration. All students were recruited on a volunteer basis and gave informed consent before the study. Respondents understood the survey purpose and were told how to fill in the questionnaire. No reward was offered to participants.

2.4 Statistical analysis

RStudio software was used for statistical processing and comparative analysis of the obtained results. The reliability of differences was assessed by Student's t-test for quantitative indicators and by Fischer's criteria – for qualitative indicators. The differences were considered significant at p<0.05. The results were counted twice by two independent researchers.

3 RESULTS

3.1 Assessing student mental health in traditional training

During the period of rapid SARS-COV-2 spread in COVID-19 pandemic, STAI test showed that most of medical students had reactive anxiety exceeding 45 points in traditional training (Fig. 2). The mean score for the whole group was 51.9±5.7.

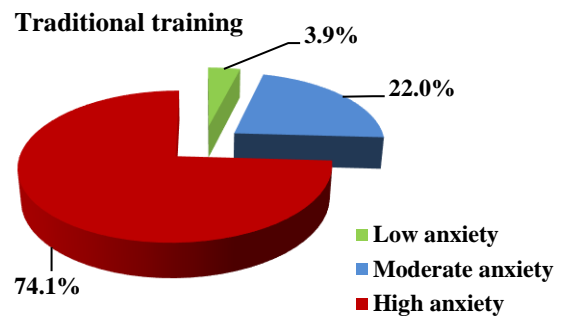


Figure 2: Student reactive anxiety in traditional training.

The high anxiety level is known to lead to additional stress of adaptation mechanisms, contributing to the depression development (Puthran et al., 2016; Steiner-Hofbauer et al., 2020; Rodríguez-Hidalgo et al., 2020). Indeed, during the period of rapid SARS-COV-2 spread in COVID-19 pandemic BDI test

revealed that more than half of first-year medical students ($53.7\pm 5.4\%$) showed varying signs of depressive manifestations in traditional training. The average score for the whole group was 12.7 ± 3.4 , which corresponds to the mild depression (Fig. 3).

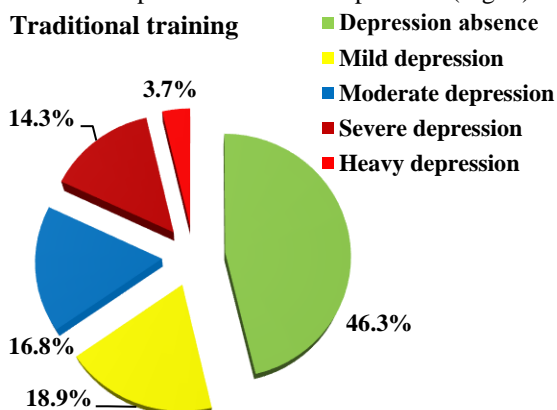


Figure 3: Student depressive manifestations in traditional training.

3.2 Assessing student mental health in distance learning

It was found that, despite the increased study loads due to exam preparation, medical students in distance learning showed improvement in mental health (Fig. 4). Thus, the STAI test revealed a significant decrease in the percentage of students with high anxiety (from $74.1\pm 4.7\%$ to $34.9\pm 5.2\%$, respectively; $p<0.05$). Accordingly, the mean anxiety score in the whole group significantly decreased (from 51.9 ± 5.7 to 40.9 ± 4.4 , respectively; $p<0.05$), which already corresponded to the moderate reactive anxiety.

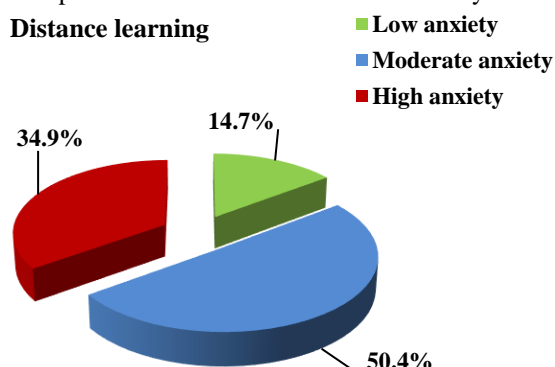


Figure 4: Student reactive anxiety in distance learning.

BDI test revealed that in distance learning depressive disorders also decreased significantly (Fig. 5): there was a significant increase in the percentage of students who were not depressed (from 46.3 ± 5.7 to 88.3 ± 3.4 , respectively; $p<0.05$). The total depression score normalized to 8.9 ± 1.2 points.

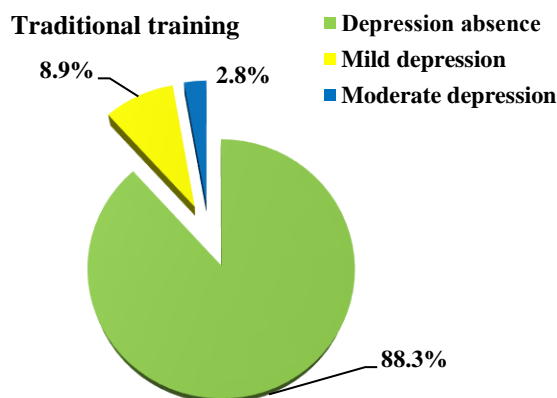


Figure 5: Student depressive manifestations in distance learning.

3.3 Assessing student mental health in vaccinated and unvaccinated students in traditional training

Analyzing the student mental health depending on their behavioral attitude towards COVID-19 vaccination revealed that the vaccinated students were characterized by significantly greater psychological stability. Thus, unvaccinated students were characterized by a high reactive anxiety (46.0 ± 3.3 points) and mild depressive disorders (12.1 ± 2.1 scores). Students, who were vaccinated, did not have depressive disorders at all (7.6 ± 2.1 points). The level of their reactive anxiety was significantly lower compared to unvaccinated students and amounted to 37.4 ± 3.1 points.

4 DISCUSSION

Numerous studies showed that most medical students are characterized by moderate reactive anxiety associated with the difficulties in adapting to the training specifics (Brenneisen et al., 2016; Moutinho et al., 2017; Quek et al., 2019). Global pandemics, usually caused by dangerous infections, are accompanied by a significant deterioration in the mental population health because of rapid pathogen

spread, high mortality, severe complications and the lack of effective therapies (Mosolov, 2020; Shigemura et al. 2020; Xiang et al. 2020; Mazza et al. 2020; Fountoulakis et al. 2022). During global pandemics medical students have additionally to deal with such challenges as constant complying strict hygiene requirements, worrying about how not to get infected and about their relatives (Aliev et al., 2020). In addition medical students are recognized as a risk group for developing anxiety-depressive disorders during global pandemics because of their high infection risk and their deeper understanding of diseases (Quek et al., 2019; Hu et al., 2019; Liu J. et al., 2020).

The reactive anxiety value allows determining the intensity of stressful situation impact (Zsido et al., 2020). Thus, in our study most medical students had a high reactive anxiety during the period of rapid SARS-COV-2 spread. There is evidence that the success of medical student training also largely depends on their mental health (Bruffaerts et al., 2018). In our study for the first time it was shown that at the beginning of the global pandemic, temporary transition to distance learning is not only a good preventive measure to contain the pathogen spread, but also a significant factor that support medical student mental health. Indeed, despite the increase in training loads at that time the anxiety severity was significantly decreased, depressive disorders were corrected that according to our previous studies is of great importance for the effectiveness of the educational process (Sankova et al., 2021).

During the first pandemic year a considerable amount of scientific information on the COVID-19 pathogenesis and SARS-CoV-2 interaction with the human immune system was accumulated, that made it possible to create effective COVID-19 vaccines (Awadasseid et al., 2021; Castells et al., 2021; Chakraborty et al., 2021). Vaccination is well known to be the most reliable and effective method to prevent the spread of serious vaccine-preventable infections (Kytko et al., 2022; Sankova et al., 2023). In our study for the first time it was shown that vaccination is a compulsory event during a pandemic since it is a significant factor in stabilizing medical student mental health. Indeed, the vaccinated students were characterized by significantly greater psychological stability compared to those who did not participate in the SARS-COV-2 vaccination campaign.

The relatively small number of senior students compared to freshmen may be likely a limiting factor on this study results. In the further study we will

choose proportional number of students. That is why this study results must be read as initial stage of multicentral research for understanding problems of medical student mental health and education quality during global pandemics and rapid infection spread.

5 CONCLUSIONS

In the present study we found that at the beginning of the global pandemic, temporary transition to distance learning is not only a good preventive measure to contain the pathogen spread, but also a significant factor that support medical student mental health. For the first time it was shown that vaccination is not only necessary to protect against moderate and severe disease forms, fatal outcomes, and post-infectious complications in medical students, but also to stabilize their mental health. Our findings are of particular importance in the context of developing main strategies for supporting mental health of medical students and their education quality during global pandemics.

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