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Abstract

The Coronavirus (COVID-19) pandemic has caused an unexpected disturbance in healthcare systems as well as medical education worldwide. This article aims to provide an overview of the circumstances experienced by medical students during the COVID-19 pandemic. As this disease can cause life-threatening conditions, it has presented challenges to medical educators and students as they must adapt to changes in their medical education to ensure lectures are given safely as well as effectively. Many medical students feel the sudden change in their education system impacted their training negatively; 74% of students surveyed by members of McGill University reported a decrease in the quality of their education since the start of COVID-19. As well as a negative impact on medical education, this pandemic has caused unprecedented psychological stress on numerous people around the world, especially individuals in the medical field. 48% of medical students at a Canadian university reported feeling more depressed since the onset of COVID-19. The sudden changes, isolation, and worries about health have impacted students' mental health drastically. On the other hand, some students have reported that this pandemic has made a positive impact on their mental health as they had more time to focus on their mental well-being and they felt an overall reduction in pressure and stress. As COVID-19 remains to impact individuals worldwide, effective strategies towards improving mental health and quality of education should be provided to medical students affected by the challenges of this pandemic.

Keywords: COVID-19, Medical school, Online learning, Medical student, Medical education, Depression, Mental Health

1. Introduction

Coronavirus Disease-19 (COVID-19) is an infectious respiratory disease caused by SARS-CoV-2. COVID-19 spread quickly throughout the world and has resulted in significant morbidity, mortality, as well as negative psychological impact. In March of 2020, WHO declared Coronavirus (COVID-19) a global pandemic.¹

Since then, due to its highly transmissible nature as well as rising mortality among populations around the world, many countries declared lockdowns requiring their populations to quarantine to control the spread of this horrific disease. These

restrictive measures, while showing success in controlling the spread of COVID-19, have caused negative consequences to many individuals' mental wellbeing.² This pandemic enormously affected the education field too; with the virus spreading, schools and educational institutions were compelled to temporarily close or make sudden changes to their teaching methods. The educational system changed abruptly, as on-site education turned into non-contact remote teaching and learning. The alteration to the educational system during the COVID-19 lockdown has affected medical students in negative as well as some positive ways. This paper reviews studies from Pubmed and Google

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Scholar found using keywords such as “medical students”, “anxiety”, “depression”, “online education” and “COVID-19”. This review analyzes the impact of the COVID-19 pandemic on medical education, mental health as well as coping strategies and positive impacts.

2. Impact of COVID-19 on medical education

As well as the enormous effect on the physical and psychological well-being of medical students, the education of medical students became a low priority in healthcare settings due to an increase in demand for healthcare services.³ The extended lockdowns due to the pandemic resulted in a reduction in the volume of clinical teaching received by medical students.⁴ As COVID-19 infection rates increased, medical schools began to remove students from their in-person clerkships and on March 17, 2020, the Association of American Medical Colleges provided guidelines that suggested medical schools support pausing clinical rotations for medical students.⁵ In February of 2020, Singapore's Ministry of Health elevated its Disease Outbreak Response System Condition (DORSCON) to ‘Orange,’ the third-highest of the four DORSCON categories, which caused all clinical activities for medical students to be paused and students' permission to enter health care institutions to be suspended.⁶ A study done by members of McGill University showed that 74% of students reported a decrease in the quality of their education since the beginning of this pandemic.⁷ A survey done in Changzhi medical college on undergraduates sampled by cluster sampling in china during the covid-19 pandemic indicated a positive correlation between academic delays due to the pandemic and anxiety, especially for the students living away from their friends and families. This study was composed of a structured questionnaire packet as well as a 7-item Generalized Anxiety Disorder Scale (GAD-7). The GAD-7 includes seven items which are based on seven core symptoms and it inquires the frequency the respondents suffered from these symptoms within the last two weeks. The respondents then report their symptoms using a 4-item Likert rating scale ranging from 0 (not at all) to 3 (almost every day); the total score ranges from 0 to 21.⁸ Due to the ongoing pandemic, medical students are getting reduced exposure to clinical settings which will have a noticeable impact on medical education, particularly on third and fourth-year medical students as they are expected to gain certain structured competencies and skills before entering their residency. Significant number of third year medical students considered taking a gap year due to

the pandemic.⁹ Traditional face-to-face and hands-on teaching has been replaced by several novel virtual training methods such as online lectures, tutorials, and webinars but the efficacy of these methods remains untested.¹⁰ In response to canceled clinical rotations, many medical schools were able to successfully transition to videotaped vignettes, recordings, and online lectures to replace clinical experience. Over the past few years, some medical schools in the UK have shifted to distance and electronic learning. Students at Imperial College London were being given access to online recordings of patient interviews and cases.¹¹ While stimulation online is a good alternative for replacing clinical teaching, it lacks fidelity and realism.¹² As the online methods have been providing some exposure to patients, many students would agree that the in-person experiences help them learn more and feel more confident in clinical settings. The experience of direct patient care motivated students to keep up with the academic demands of medical school. According to a survey conducted in the United States during the early stages of the pandemic, 43.3% felt unprepared for their clerkships and 56.7% felt unprepared for their national board exams during the COVID-19 pandemic. The majority of the students (66.2%) were not satisfied learning practice-oriented subjects such as anatomy online.⁴ In addition to many students feeling like the online experience was not enough, there are a great number of medical students who did not have adequate resources to participate in some of the online learning and training methods. Medical students from low-income countries faced technical challenges due to a lack of resources. Lack of infrastructure and technology was a huge barrier for medical education.¹³ According to a cross-sectional survey conducted in Libya in the early stages of the COVID-10 pandemic (May to June, 2020) with medical students from more than 13 medical schools, 2232 out of the 3348 medical students felt that e-learning was not properly implemented in their country. A small proportion of students also reported having to perform clinical tasks without adequate supervision.¹⁴ Another important factor that impacted medical students worldwide is the financial effects of COVID-19. A cross-sectional study done in Jordan showed that 53% of Jordanian medical students indicated that they were affected financially by the COVID-19 pandemic and 34% of students were not able to pay the university fees due to the pandemic. This survey had students select between disagree, neutral and agree to statements such as “I could not pay the university fees due to the pandemic”, “My household suffered financially”, “The pandemic made me think of my budgeting more carefully”, as

well as “Technical issues facing online teaching makes it difficult as, poor Wi-Fi connection, lack of computer or mobile device”. This data collection was conducted between November 17th 2020 and December 23rd 2020 which was an early stage of the COVID-19 pandemic as the cases in Jordan started rising tremendously in October 2020.¹⁵ A reduction in family income, limited access to digital resources, and the high cost of electronic devices and the internet have disrupted the academic life of students from underdeveloped countries.¹⁶

Not only students in low-income countries were deeply impacted by the new regulations around medical education due to COVID-19, students in countries such as the US and Canada also felt these regulations alter their daily lives. Students in highly affected areas such as Detroit, United States were banned from providing any direct patient care during the Covid-19 pandemic. The Association of American Medical Colleges (AAMC) issued guidelines in April 2020 to interrupt the participation of medical students in direct patient care.¹⁷ The greatest impact was felt by fourth-year students in the United States who in their final year are focused on maximum clinical encounters, building consultation, and diagnostic skills as they transition from a student to a resident physician. Online learning along with minimal to non-existent patient contact led to the production of medical graduates who felt incompetent in their clinical and diagnostic skills.¹⁸

Students at this point in their medical education are usually deciding or have decided which medical specialty they would like to pursue in their residency. Many students may miss the opportunity for a full rotation in a specialty of interest which then limits exposure to various areas of medicine.¹² A great number of students were delayed from progressing to the next stage of their training, including applying to postgraduate training and residency programs.¹² All aspects of medical education; classes, clinical clerkships, electives abroad, matching in residency programs, and postgraduate training have been influenced by this COVID-19 pandemic.¹⁹

3. Negative impacts of COVID-19 on mental health

The individuals impacted by the psychological stress associated with this pandemic include medical students and people in the medical workforce.² Medical students are generally known to have higher levels of stress, depression, and anxiety than the general population due to the high-pressure environment of medical school and training.²⁰ A meta-analysis done by members of the National University

of Singapore shows that almost one-third of medical students globally are affected by depression. Some of the main stressors contributing to depression in medical students include difficult academic requirements, time pressure and large workloads. Medical students also often go through social adjustments and pressures in clinical environments.²⁰ The sudden shift to online education contributed more to already existing mental health conditions due to lack of direct interaction among peers and lack of concentration.²¹ COVID-19 is considered to be an additional source of stress to most people, especially individuals in the healthcare field.

248 medical students from 13 schools across Canada took part in an online survey conducted by members of McGill University used to assess changes in mental health, health habits, and quality of education during the COVID-19 pandemic. Of these students, about half of the cohort felt more depressed (48%) and 52% felt more lonely. As well as students' overall health habits worsening during the pandemic, alcohol drinking, time spent seated, and screen time also increased. The average amount of alcohol consumed weekly increased by 20%. Time spent seated increased 50% from an average of approximately 7 h per day to an average of approximately 10.5 h per day. The survey also showed a 60% increase in front of a computer screen.⁷ According to a poll done in Hong Kong, exam delays due to the pandemic have caused students to lose appetite and develop sleep problems due to stress. Out of the 757 candidates surveyed, 20% reported the stress levels to be 10 out of 10 (100%) due to exam delays.²² A survey done at the American University of Beirut in the early stages of the pandemic surveyed medical students about various topics relating to the covid-19 pandemic's effects on their lives. Included in this survey were questions pertaining to the attitudes of medical students towards going to the hospital and having clinical rotations, questions related to the attitudes of medical students towards canceling on-campus classes and moving towards online learning, as well as to the general attitudes of all medical students towards the pandemic. Most medical students agreed when asked if the quarantine affected their social lives negatively.¹⁷

Recently published studies about the impact of COVID-19 on the mental health of students show that students have increased concerns regarding their own health, and the health and well-being of their families and loved ones. In addition, their sleeping patterns have been disrupted as well as feelings of isolation due to the lockdown have been increasing.²³ Professional and personal pressures lead to the derangement of the personal lives of medical students. There was a loss of personal

support to medical students during the Covid-19 pandemic which added to the existing challenges to morale and mental and physical health of medical students.²⁴

4. Covid-19 coping strategies

Students all around the world have been coping with COVID-19 provoked challenges through various methods. They have been engaging in physical activity, video chats, social media apps, and meditation. A nationwide survey completed in the UK stated that physical activity was the most common activity used by students to help with their mental well-being. Respondents were asked to provide a score from 0 to 100 of their mood (0 being the worst and 100 being the best mood they could imagine). Physical activity was found to be the most common activity used by these survey respondents to help with their mental well-being. 83.7% of medical students and 72.3% of interim foundation doctors stated that exercise provided means to manage negative emotions and improved their mental health.²⁵ Interestingly, according to a study done in Switzerland, Medical students involved in Covid-19 frontline care showed reduced levels of emotional burnout ($p < 0.001$) as compared to their non-involved peers. This study was performed 2 weeks after the end of the 6-week lockdown in Switzerland, when the pandemic curve had flattened (May 9 to 14 2020).²⁶

5. Positive impacts of COVID-19

The COVID-19 pandemic has not only had negative effects on medical students, but it has also affected some medical students in positive ways as well. Over the past many years, with the advancement of technology-assisted learning, teachers have been increasingly using online learning platforms. Some examples of these online learning platforms are Zoom, Google Classroom, and Microsoft Teams. The use of online education during the pandemic helped in engaging large groups of students at one time for synchronous learning. Online education during the pandemic allows students the flexibility to learn at their own pace. It also gave students to get one to one feedback from their teachers which may not have been possible in large group face-to-face sessions. Online teaching also allowed faculty to co-teach units with experienced staff, hence promoting mentorship.²⁷

At the University of Geneva in Switzerland, in addition to online teaching and learning, most exams were moved from summative to mandatory but formative evaluation. A study done by members

of the University of Geneva, just three months after the beginning of the pandemic, showed that the majority of students found this decision had a positive impact on their mental health as they felt it had a large reduction in pressure and stress. Many students mentioned that it even increased their motivation to study the course material. Some students also found that the shift to online learning made an enhancement in the quality of their studies as they had more time to dedicate to studying materials.²⁸ Students from Dow University of Health Sciences, Karachi, Pakistan, and Lahore Medical Dental College, Lahore, Pakistan reported a 93.1% satisfaction rate with the online study modules^{29,30}. Along with many medical students around the world, physicians and scientists from Fudan University in China have demonstrated positive impacts by actively becoming involved in scientific research and clinical work during this outbreak.³¹ A benefit of e-learning is that the students are able to participate in accordance with their own time and ability. Students were also able to create virtual communities among their peers to fight social isolation.³² Another beneficial effect is that medical schools are finding new innovative ways to continue teaching and exposing their students to clinical settings. Telemedicine is a growing field that has been endorsed by various medical organizations including the American Medical Association. Online learning systems are web-based softwares designed to distribute and manage courses over the Internet. Softwares contain features like whiteboards, chat rooms, polls, quizzes, and surveys for teachers and students to communicate and share content side by side.³³ Virtual reality enhanced classrooms and the application of game theory via online escape rooms were explored to stimulate clinical experiences for medical students.³⁴ Remote learning is also preparing medical students on how to communicate better and carry out telemedicine visits professionally in the future world of technology.³⁵

6. Conclusion

The COVID-19 pandemic has made a significant impact on the mental health, education, and daily routine of medical students. Medical students and health care institutions around the world face the challenge of balancing students' education, clinical experience and risk considerations in clinical environments. With the challenge of a sudden COVID-19 outbreak, disruptions in medical education are inevitable across the world. Remote learning has had many negative impacts on medical education, mainly related to the loss of clinical experiences and

increased feelings of anxiety, stress, and isolation. However, students also experienced positive aspects of remote learning including increased flexibility, reduction in pressure and stress, as well as increased time to focus on wellness. Despite the challenges, many resourceful initiatives are being introduced, leading to progress in medical education.

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Declaration of competing interest

The Author(s) declare(s) that there is no conflict of interest.

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