



Cross-sectional Study

Impact of the COVID-19 pandemic on Caribbean Medical Students: A cross-sectional study

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A B S T R A C T

The COVID-19 pandemic has introduced a wide range of challenges to numerous institutions around the world. One of these vital programs being affected is Caribbean medical schools. To continue to train future physicians, Caribbean medical schools have been forced to deliver lectures through video chat, delaying clinical training years as well as exams. Reveal current shortcomings in medical education to improve future learning strategies based on student perspectives.

To further explore the impact of COVID-19 on medical training in the Caribbean, a cross sectional designed survey was constructed and made available for completion to numerous 2nd, 3rd and 4th year medical students between the dates of Feb 2nd, 2021, and April 1st, 2021. Students reported being less time efficient and paying less attention during online lectures. Many students reported having their Comp, Step 1, Clinical rotations, and research projects delayed because of the lockdown. Most students ranked 10/10 on anxiety and depression scores during the lockdown. The changes made to the Caribbean Medical school system due to the Pandemic have shown to be less effective than previous methods of instruction. It is crucial for programs to consider this for the future to optimize learning and continue to produce highly trained medical professionals even in the face of adversity.

1. Introduction

Coronavirus consists of a family of seven known viruses that cause respiratory tract illnesses. The severity of these ailments may range from being a common cold to a severe acute respiratory syndrome (SARS) [1]. COVID-19 is essentially a novel variant of coronavirus that originated in Wuhan, China in December of 2019. The virus is predominantly transmitted from person-to-person through respiratory droplets and fomites, requiring urgent adaptation to quarantining, social distancing, wearing masks, maintaining proper hand hygiene - amongst all other preventative measures. While individuals from all walks of life are affected, clinical management of COVID-19 patients becomes much more tasking in older patients with multiple comorbidities including obesity, lung disease, heart disease, and diabetes. According to recent reports from WHO, there are at least 124.2 million confirmed COVID-19 cases around the world with more than 2.7 million fatal cases [1]. Apart from the startling statistics, troubling memories, and experiences that the pandemic has brought forth, the aftereffects of COVID-19 on medical education go unparalleled.

For over a decade, medical education has undergone numerous reforms and policies in attempts to improve the healthcare systems of communities. With COVID-19, the course of medical education jolted to a new state of normalcy that has been difficult to grapple with. While professionalism, bedside manner, and personal accountability are paramount to stellar physician etiquette, the pandemic elucidated the lack of preparedness and competency amongst aspiring health professionals in approaching the current and future global healthcare crisis [2]. The COVID-19 pandemic, therefore, not only mandated public health personalities to minimize and contain the catastrophic spread of the virus but also amplified the necessity of medical educators to expand upon the existing competencies of American physicians. In other words, the pandemic became a catalyst in developing new methods for immersive instruction, learning, assessment, and team-building strategies [3]. Similarly, even with limited clinical learning sites, medical educators have extensively engaged in remote, faculty-guided didactic sessions, case conferences, and even videoconferences of inpatient and outpatient encounters to supplement core clerkship experiences and beyond [4]. Even so, in the setting of an unrelenting pandemic and other

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inevitable restrictions, becoming a successful physician in the U.S. as an incoming Caribbean Medical Student increasingly becomes a mightier challenge to overcome than it was once thought.

The path to entering a successful residency has been predictable for the last few years: do well on standardized examinations, give conference presentations, go the extra mile in clinical clerkships and shadowing opportunities, and have meaningful non-academic extracurricular activities - all of which have been designed to best demonstrate a students' knowledge, persistence, collaborative spirit, and dedication to medicine. With COVID-19, a "new norm" is now in place worldwide. The trajectory of modern history and healthcare has drastically changed in the context of this pandemic, especially Caribbean Medical Students who are demanded of even greater persistence and adaptability to stand out as future U.S. residency applicants. They have experienced a substantial shift in their lectures, USMLE Step 1/2/3 studying, clerkship placements, residency interviews, and their personal lives. Regardless, the high-intensity environment and expectations in residency are learned gradually during their crucial clinical clerkship years. However, with insufficient teaching hospitals and valued faculty members, incoming students and residents are burdened by copious amounts of stress, misdirection, and gaps in learning [5]. As such, this paper aims to explore how Caribbean Medical Students experienced the pandemic and how it could affect their chances of matching into their preferred residency programs.

2. Methods

We performed a multi-centric survey during COVID-19 pandemic from Feb 2nd, 2021, to Apr 1st, 2021, via social media sent to second, third and fourth-year students across a multitude of Private Caribbean Medical Schools, including Medical University of the Americas, American University of Antigua, SABA University School of Medicine, St. George University, Ross University, and St. Matthews University. The survey was distributed using co-students, friends' circle, and through social media platforms such as Facebook school groups, Twitter, Instagram, and Snapchat. The survey covers the subjective experience of current Caribbean Medical Students studying and beginning their clinical rotations during the pandemic.

The survey included 15 questions and a total of 104 responses were collected. Databases used to collect literature studies were PubMed, Google Scholar, JSTOR, MEDLINE, and Mendeley. The above-mentioned database search was performed using keywords include 'COVID-19' 'Caribbean Medical Students' 'Medical education' 'Covid-19 Pandemic' and 'Medical Students'.

2.1. Survey questions

- Did your COMP/exit exam get delayed?
- Do you prefer in-class or distance/online learning?
- How time efficient were you during online classes?
- Do you pay more attention during online class or in-class lectures?
- How long did you study for step 1?
- Did your step 1 date get cancelled/rescheduled due to Covid?
- Did you have to retake step 1?
- Did your clinical rotations get cancelled for a brief period?
- How much time did you have off after taking Step 1 and before starting your clinical rotations?
- What did you do with your time off during the lockdown?
- What was your step 1 score range?
- If there was no COVID, when would you have taken Step 1?
- Did any of your research projects or extracurriculars get interrupted?
- How anxious did you feel during the lockdown?
- How depressed did you feel during the lockdown?

This study was registered with Research Registry. The Unique Identifying Number (UIN) is: researchregistry6896 and can be reached at: <https://www.researchregistry.com/browse-the-registry#home/registrat>

[iondetails/60c7c22f901410001e70285f/](https://doi.org/10.1007/s00261-021-02515-1). This paper has been reported in line with the STROCCS criteria [6]. This paper is not in need of any ethical approval as it involves the analysis of anonymous datasets which involved proper retrieval of informed consent.

3. Results

We collected 104 complete questionnaires completed by medical students from more than 6 medical schools in the Caribbean. The estimated response rate was 100% based on 15 online questions. Of the 104 responses collected, a bulk of 61.5% of students listed that they prefer in-class lectures as opposed to online/distance learning, where a mere 21.2% stated that they were 100% time efficient during online learning. 10.6%, 14.4% and 13.5% felt they were only 40%, 60% and 70% time-efficient, respectively. Most of these students, at 66.3%, admitted they pay much more attention during in-class lectures (Fig. 1). Of all, 51% of students listed that their COMP/exit exam was delayed. Excluding students who have not yet taken the step 1 exam, 34.6% of students studied for it for 3 months, 17.3% studied for 5 months, 7.7% studied for 7 months, 8.7% studied for 9+ months (Table 1). Of those who were preparing for the exam, 8.7% stated their step 1 exam date was canceled once, and 11.5% stated their step 1 exam date was canceled more than once (Fig. 2). No students listed that they had to retake step 1. The step 1 score range was 240+ for 14.4% of students, while 9.6% had a 230–240 range, 9.6% had a 220–230 range and 5.8% had a 210–220 range and 9.6% had a 200–210 range (Fig. 3). Interestingly, 46.2% of all students listed that they would have taken the Step 1 exam *sooner* if there was no Pandemic. Furthermore, 27.9% of students listed that their clinical rotations were canceled (Table 1). After taking step 1 to begin clinical rotations, 23.1% of students had a lag period of 2 months, 13.5% had 3 months time off, 5.8% had a lag of 4 months, 4.8% had 5 months off, and 2.9% had 6 months off (Table 1). When asked about what these students did during this unplanned lockdown time off, 29.8% of students stated they studied ahead, 25% said they did nothing, 18.3% said they had a job, 14.4% chose another, and 12.5% said they did something productive (Table 1). During this time, 41.3% of students said they did not have any extracurricular or research projects, and 38.5% said that their projects were interrupted (Table 1). Finally, a majority of 30.8% of students said they felt 10/10 anxious during the lockdown (Fig. 4) and 26.9% of students (Fig. 5) said they felt 10/10 depressed during the lockdown.

4. Discussion

4.1. How COVID-19 affects the pre-clerkship learning environment

Medical school education in the United States has a traditional route with two years of pre-clinical coursework, followed by two years of clinical training. For medical schools, the first two years of basic sciences have primarily been held in large lecture halls, whereas the latter two years are held mostly in the clinical setting. During the preclinical years, students learn the basic sciences, anatomy, pharmacology, and begin practicing basic clinical skills.

Within the last year, there has been a dramatic shift in the learning structure of the first two years due to digital platforms largely replacing in-person learning with respect to social distancing. The necessity of online teaching during the pandemic may in fact go on to become the main source of education in the future as several sectors continue to adapt to the evolving technology. This method of schooling cannot replace face-to-face in-class lectures and its further implications are seen from the survey conducted in this paper. For instance, the survey revealed that of the 104 responses collected, a predominant 61.5% of students stated that they preferred in-class lectures as opposed to online learning, while only a mere 21.2% stated that they were 100% time efficient during online learning. This parallels with the finding that a majority, at 66.3%, admitted they pay much more attention during in-

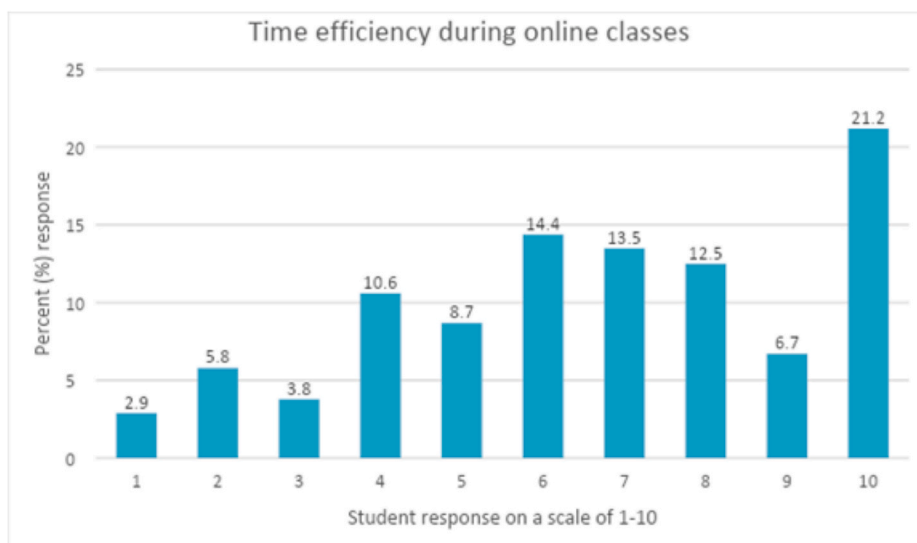


Fig. 1. Shows student time efficiency during online classes on a scale of 1–10.

Table 1

Student response to questions regarding COVID lockdown.

Length of time used for studying for Step 1 (Months)	Total n	Percentage %
3	36	34.6
5	18	17.3
6	8	7.7
9+	9	8.7
N/A	33	31.7
Did clinical rotations get cancelled due to COVID?		
Yes	29	27.9
No	23	22.1
N/A	52	50
Time off after Step 1, and before clinical rotations (Months)		
2	24	23.1
3	14	13.5
4	6	5.8
5	5	4.8
6	3	2.9
N/A	52	50
Activities done during COVID		
Nothing	26	25
Studied Ahead	31	29.8
Had a job	19	18.3
Something very productive	13	12.5
Other	15	14.4
When students would have taken Step 1 had COVID not occurred		
Sooner	48	46.2
Later	1	1
Same time	29	27.9
N/A	26	25
Did students have extracurriculars/research cancelled due to COVID?		
Yes	40	38.5
No	21	20.2
Did not have any projects	43	41.3

class lectures.

The education that medical students receive in the first two theoretical years of medical schooling forms the fundamental basis of their knowledge. Future physicians require the most strict and efficient learning environment to maximize their capabilities in the real world. Several downsides that compromise this environment can be seen for online lectures which may negatively impact the true potential of medical students. For example, not having to sit in class mandatorily,

students have geared more toward self-studying at the comfort of their homes. This method is not very feasible with the sheer volume of information learned in basic sciences, and a clear loss of time management is seen. Studies report the major contribution to poor time management being the hardships of maintaining focus and concentration while sitting in front of a screen alone all day [7]. The reduced student engagement was due to a lack of student focus, more interest in other surrounding environments, and technical difficulties. A different outcome in a study by Rajab et al. found that reduced student engagement levels was a result of reduced monitoring of students [8]. This lack of supervision creates an increased ease of cheating on examinations. Overall, it is obvious that the lack of an efficient environment becomes an underlying theme in a wide range of studies with respect to the effects of online learning. The consequences of this would be seen in the upcoming education level and knowledge base of medical students studying during Covid-19.

If medical schools opt to continue online teaching in the upcoming years, we recommend the implementation of an academic/welfare support framework to ensure that students are coping with the content and are not disadvantaged by receiving their teaching online. This will prevent feelings of isolation and lack of guidance when away from teaching sites. In particular, the move away from schools has greatly impacted teaching via group discussions with case studies, and more specifically in teaching of anatomy. A paper by Rolak et al. documented the difficulties faced by students in understanding anatomy without the tools of dissection, practical teaching, specimens, or slides [9]. They found that 66.7% of their results wanted virtual mentorship programs and virtual surgical skills workshops in addition to their medical school studies. A future concern of anatomists and medical education facilities alike is a lack of cadavers following the COVID-19 pandemic due to the potential risk of infection of the deceased.

In addition to the perplexity of virtual teaching, medical students faced severe isolation while studying for their COMP/basic sciences exit exam as well as for the most important exam, the USMLE Step 1. The survey in this paper demonstrated that COMP was delayed for 51% of students. This was a big gap from the time that the material was taught and resulted in severely increased anxiety levels, which can be seen from the survey where most students reported 10/10 for anxiety. Furthermore, most Caribbean medical schools allow students to take the USMLE Step 1 within 5 months of taking the COMP. While this should have been the case for 100% of the students, our results show a large range with only 17.3% having studied for 5 months, 7.7% for 7 months, and 8.7% studied for 9+ months. A sufficient chunk of students was at home, in

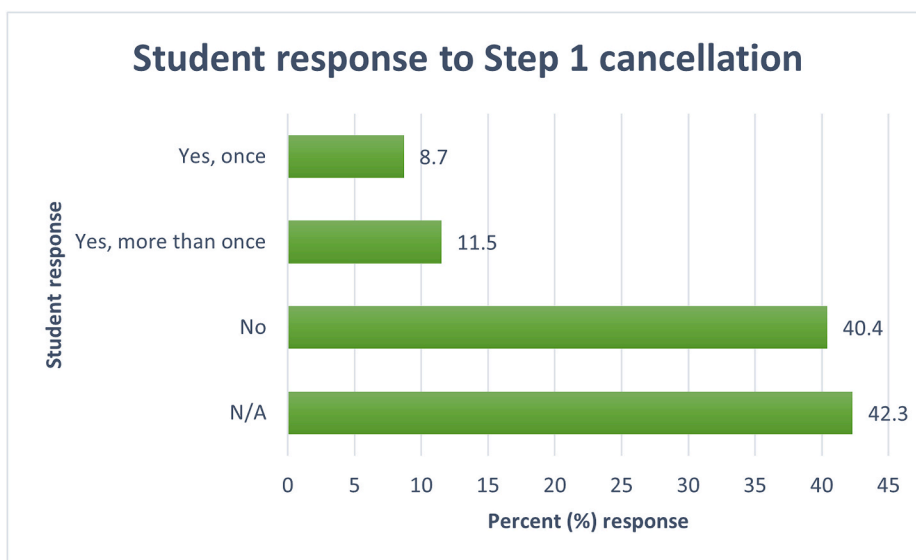


Fig. 2. Represents the percentage of students that had step 1 cancelled/rescheduled due to COVID.

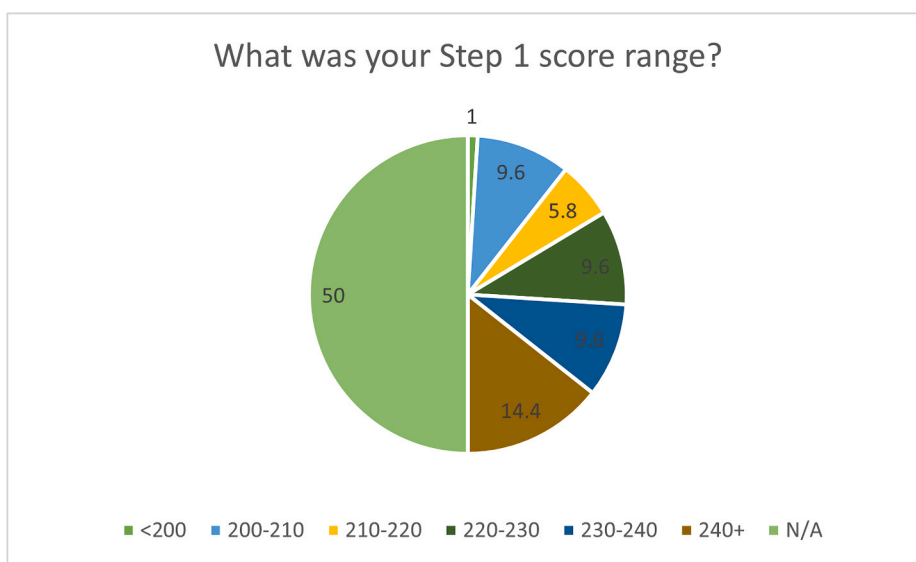


Fig. 3. Shows a distribution of Step 1 scores during COVID from survey respondents.

isolation attempting to retain all the material and keep up their stamina. This also explains why most students reported 10/10 feeling depressed during this time and correspondingly so, 46.2% of all students admitted that they would have taken the Step 1 exam sooner if there was no Pandemic.

4.2. How COVID-19 affects the clerkship learning environment

During the last two years of medical education, students rotate through the different core and elective clerkships, including internal medicine, surgery, obstetrics/gynecology, pediatrics, psychiatry, and many others. Through the supervision of residents and other faculty members, students experience rigorous training in obtaining patient histories, conducting comprehensive physical examinations, writing progress notes, and assisting in surgeries and other medical procedures. While schools have already been working towards self-directed learning to minimize clinical didactic sessions and promoting interprofessional education, the COVID-19 pandemic certainly exacerbated these conditions to the point where the face of medical training has irreversibly

changed [10]. Despite the emphasis on tackling this global emergency with competent healthcare systems and trained medical professionals, the disrupted course of medical education has brought upon new challenges to both educators and students.

Provided that students may potentially acquire or spread the virus asymptotically during patient interactions, the Association of American Medical Colleges (AAMC) had unanimously agreed upon pausing clinical rotations on March 17th, 2020 until further notice [11]. This is in alignment with the survey results where 27.9% of the students said that their clinical rotations have been canceled, while the remaining teaching hospitals endorsed a much lower number of patient interactions. In efforts to avoid jeopardizing the safety of students and patients, a key learning component of clinical medicine has been severely compromised: direct patient care. Consequently, with limited Personal Protective Equipment (PPE) available and strong health hazards in place, the student's role in providing care and treatment to patients confirmed or suspected with COVID-19 has nearly diminished [12]. These unprecedented changes have, nonetheless, contributed to an inevitable gap in one's preparedness to combat another global pandemic

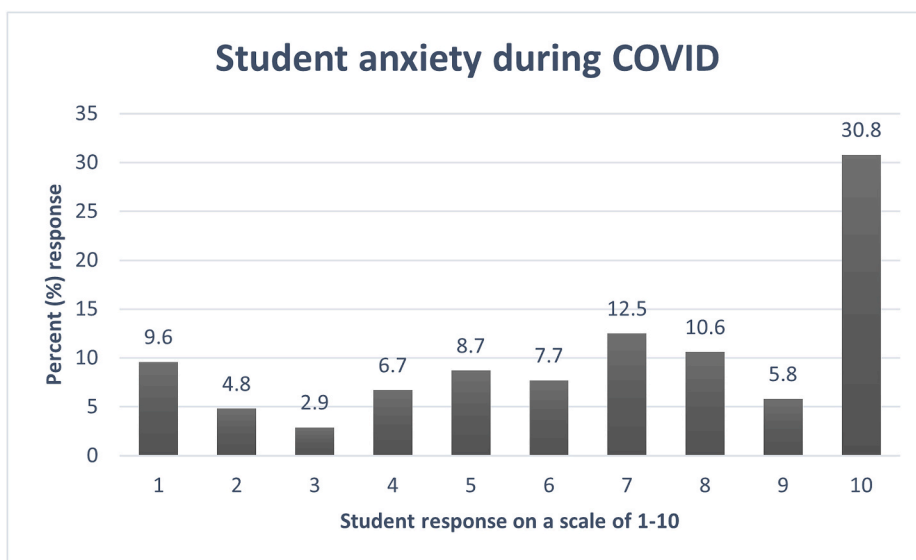


Fig. 4. Shows anxiety of students during COVID on a scale of 1–10.

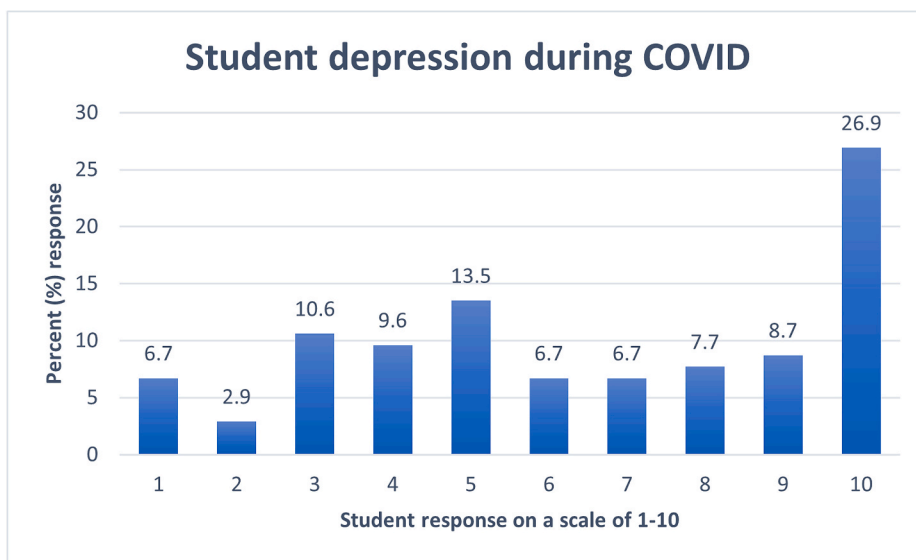


Fig. 5. Represents depression ratings of students during COVID on a scale of 1–10.

in the future, especially when the number of active physicians is most likely to decline due to a multitude of factors including early retirement.

Furthermore, on February 4th, 2021, the AAMC also agreed to cancel the USMLE Step 2 CS which was traditionally an all-day exam that assessed medical students’ readiness in applying their interpersonal and communication skills in a clinical setting [13]. As opposed to a multiple-choice exam, test-takers were required to actively gather patient information, perform physical exams, and collaborate with colleagues about a set of standardized patients. Although the exam most often carried the weight of being too expensive and time-consuming, its permanent cancellation may now bring forth new challenges in evaluating students’ preparedness for their chosen residency programs and beyond. A study by Newman et al. for instance, suggested that the loss of bedside teaching, direct patient care, and feedback from clinicians, halted the progression of the competencies of a medical student [14]. This was further reiterated by Tabatabai et al. who described a life-changing effect in which the loss of clinical attachments during medical school may impact the specialty the student chooses to pursue later in life [15]. Similarly, this is evidenced by the 38.5% of students

who said in the survey that their extracurricular or research projects were interrupted. In this setting, one’s pursuit for personal growth and character becomes questionable, resulting in Caribbean Medical Students to increasingly lose scarce opportunities that might potentially help them outrank American residency applicants during the Match season.

Strengths of this study are that a wide variety of responses from numerous Caribbean medical schools were retrieved, resulting in a larger and more diverse sample size. In addition, the set of questions used in this study touches on a range of potential challenges faced by Caribbean medical students. Limitations of this study include the potential for subjective responses on the quality of education received during the pandemic. Furthermore, the self questionnaire leaves room for subjective bias in terms of an individual’s mental health concerns. The impact of this may result in skewed interpretation of the data findings. In future studies, this may be improved by utilizing more thorough and specific mental health-based questionnaires.

5. Conclusion & future implications

Although the COVID-19 pandemic pioneered modernization of the U.S. medical education system, Caribbean Medical Students are still faced with a tremendous amount of uncertainty and stress prior to even applying for residency programs of their choice. The pandemic has made drastic changes such as lower team-based activities, less practical experience and pass/fail assessments that make this route even more difficult. Based on the survey results, virtual and self-directed learning tools, remote didactic sessions, are generally not considered effective replacements to face-to-face interactions. Reportedly, the abrupt shift from in-person lectures to remote learning has deprived students of their focus, interest, time management skills, while permitting feelings of isolation, depression, and anxiety throughout the duration of the lockdown.

As the pandemic comes to a hopeful end, it is crucial for education programs to understand the necessity to reinstate face to face learning experience. Not only are students paying more attention in a physical classroom, but the social facilitation of school appears to have a positive effect on depression and anxiety levels. The pandemic however, has stirred worldwide isolation and mental health concerns have been on the rise. Social isolation leads to high perceived stress levels, depression, and anxiety which have been found to be negatively correlated with academic performance. The feared outcome of increased mental health concerns is a rise in suicide rates amongst students. Unfortunately, this is not solely an issue that medical students are facing.

A wide range of other undergraduate and postgraduate education programs around the world have made this same shift and plan to incorporate more online learning techniques. The data in this study exhibits that online learning in its current capacity is not a feasible alternative. Thus, it becomes pertinent that further research be done on ways to maintain the education quality received by students during this pandemic. Studies should be conducted to find educational alternatives for students so that they are not missing out on crucial experiences that are not possible through distance learning. Through this research, the hope is that schools become more aware of these negative impacts and do not maintain this approach. Efforts should be made to transition education back into classrooms as soon as possible to further prevent disadvantages to future professionals. This study leads us to the crucial realization that we must be prepared with more effective alternatives should we face another crisis such as the COVID-19 pandemic in the future.

Declaration of competing interest

There is no conflict of interest.

Please state any sources of funding for your research

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Ethical approval

Not applicable.

Consent

Not applicable.

Author contribution

Dr. Dipendra Raj Pandeya was involved in the study concept, design, provided support and mentorship for its development, and revision of the manuscript.

Aaronvir Singh Thind- Was involved in writing the abstract and conclusion distributing the survey, data analysis, designing figures and

tables, editing the manuscript and making final preparations for submission.

Harman Singh- Was involved in survey design, survey distribution, literature research, writing of the introduction, methods, results, discussion, conclusion, editing the manuscript and making final preparations for submission.

Divya Lakshmi Yerramsetty- Was involved in survey design and distribution, literature research, writing of the introduction, discussion, conclusion, peer-reviewing and editing of the manuscript, and making final preparations for submission.

Registration of research studies

- 1 Name of the registry: Research Registry
- 2 Unique Identifying number or registration ID: researchregistry6896
- 3 Hyperlink to your specific registration (must be publicly accessible and will be checked): <https://www.researchregistry.com/browse-the-registry/#home/registrationdetails/60c7c22f901410001e70285f/>

Guarantor

Dr. Dipendra Raj Pandeya. He is the corresponding author for this manuscript.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2021.102515>.

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