The Medical Student Experience in the Era of COVID-19: Reflections on the Transformation of Medical Education

Aisha Terry
George Washington University Medical Center

Janet Miller
George Washington University Medical Center

Stephanie Rodriguez
George Washington University Medical Center

Mairin Haley
George Washington University Medical Center

Sivan Ben-Maimon
George Washington University Medical Center

Jessenia Knowles
George Washington University Medical Center

Taylor Wahrenbrock
George Washington University Medical Center

Jai Photovath
George Washington University Medical Center

Neel Duggal
George Washington University

Research Article

Keywords: medical student, medical student experience, covid-19, coronavirus pandemic

Posted Date: December 14th, 2021

DOI: https://doi.org/10.21203/rs.3.rs-981777/v1

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

Phenomenon:

The American medical student perspective on the coronavirus pandemic, particularly in terms of its effects on medical education and future curricular approach, is valuable. This study seeks to provide future physicians with a voice to share their personal experience with distance learning and suggestions for medical education reform in the era of COVID-19.

Approach:

A virtual focus group of medical students was conducted on April 30, 2020. Each student was asked to broadly and candidly reflect on their personal experiences relative to the COVID-19 pandemic, and to specifically expound upon how their personal growth and medical education has been impacted. Consent was obtained. Data was coded by key ideas and themes. The content of the discussion was analyzed.

Findings:

Seven third-year medical students attending a United States traditional school of medicine consented to participate. All participants provided extensive responses to the question. The focus group lasted for 2 hours. The group expounded upon five self-initiated themes: guilt, anxiety, self-awareness, volunteerism, and autonomy. Analysis of these themes from the context of medical student wellness and the future of medical curricula led to the conclusion that three general concepts should be emphasized in reforming medical education.

Insights:

The coronavirus pandemic has uniquely affected medical students. Their perspectives can inform medical education reform relative to curricular design and student wellness. Key concepts to consider include prioritizing routine virtual delivery of content through innovative technology, encouraging increased student autonomy and self-directed learning through less prescriptive schedules, and emphasizing reflection training and sharing.

Introduction:

In the United States, the year 2020 began with the arrival and subsequent far-reaching devastation of the novel coronavirus SARS-CoV2. This positive sense, single-stranded RNA based virus, also known as COVID-19, insidiously spread across the globe infecting millions and swiftly taking the lives of hundreds of thousands. In an effort to promote awareness and decisive action, the World Health Organization (WHO) declared an official coronavirus pandemic on March 11, 2020. Dramatic measures of social
distancing and closure of non-essential operations followed. Every aspect of life - from picnics at the local park to the daily Dow Jones industrial average – became impacted in ways never imagined.

Perspectives about the impact of the pandemic on people's lives have been shared from the vantage point of public health champions, community advocates, business leaders, and individual citizens. Yet, the voices of the ones who will ultimately be charged with putting the pieces of the health care system back together again in terms of managing the future health outcomes that result from this pandemic have been largely silent. America's future physicians – the nation's approximate 92,000 medical students – have much at stake as related to the pandemic and offer a unique perspective that should be heard. Their medical education and future careers as physicians has profoundly been altered by this unprecedented public health crisis. Therefore, in an effort to adequately prepare our future medical workforce in the era of COVID-19, it is essential that the medical student experience and perspective be sought, understood, and incorporated into future medical education curriculum design.

**Background:**

Compared to other countries, the United States’ medical education process is considered to be elaborate and competitive. It typically involves a minimum of 11 years of formal training and multiple high stakes standardized examinations as a requirement to ultimately attain full medical licensure as an attending physician. Traditionally, students matriculate in a 4-year medical school after completing an undergraduate bachelor's degree (Mowery, 2015). Most medical school curricula consists of 2 pre-clinical years of classroom didactics followed by 2 years of clinical training and bedside teaching in hospital and clinic settings. The United States Medical Licensing Examination (USMLE) requires three tests. Customarily, students take USMLE Step 1 at the end of the second pre-clinical year, USMLE Step 2 at the end of third year following a year of clinical experience, and USMLE Step 3 at the end of the first year of residency.

This study is a focus group session consisting of medical student participants. The purpose is to glean meaningful insight about the effects of the COVID-19 pandemic on medical students and their future careers as physicians, as well as medical education. Participants were a little over half way through their 3rd year of medical school when the coronavirus outbreak began in the United States. They had all just completed some combination of traditional, in-person clinical rotations in Pediatrics, Obstetrics/Gynecology, Internal Medicine, Primary Care, Surgery, and Psychiatry. During these 4 to 8-week long rotations, students were assigned to a team of physicians who cared for a set of patients.

In response to institutional and government mandates to socially distance in an effort to stop the spread of COVID-19, these medical students, along with the rest of their medical school classmates, were asked to leave campus and embrace distance learning from home by way of virtual lectures and online assignment submission in mid-March to early April of 2020. All clinical rotations were suspended for these medical students and they were no longer allowed to provide in-person care of patients. In some
instances, they were required to participate in asynchronous learning, which included lectures and telemedicine visits, as an alternative to hands-on clinical experience.

While there have been published studies which sought to evaluate health care workers’ perceptions of COVID-19 and the psychological effects of COVID-19 on Chinese medical college students, to our knowledge, there have been no studies done which specifically assess the American medical student experience with this pandemic, particularly in terms of its effects on their medical education and personal wellness, as well as future medical education curricular efforts (Bhagavathula, 2020; Cao, 2020). This study is unique in that it provides future physicians with a voice to share their personal perspectives and associated suggestions for medical education reform.

The coronavirus pandemic has magnified discussions that were already underway about what some refer to as the inevitable transformation of medical education. In an effort to determine how to most effectively deliver medical education, there has been widespread debate about topics such as the optimal length of preclinical versus clinical years of education, ideal curricular format and content, adequacy of quality patient outcomes, the role of technology and innovation, and wellness (Emanuel, 2020). In the era of COVID-19 - an unprecedented disruption in the traditional delivery of medical education - there is now even greater opportunity to reform medical education through the lens of the medical student experience during a public health crisis.

**Methods:**

Each participant provided written consent to have their responses recorded and analyzed for the purposes of a focus group study. A group of seven third-year medical students was gathered virtually on April 30, 2020 by way of an online video communication technology. They were each asked to broadly and candidly reflect on their personal experiences related to the COVID-19 pandemic. They were more specifically asked to expound upon how their personal growth had been impacted. The session was facilitated by two faculty instructors. Data was coded by key ideas and themes. The content of the discussion was analyzed.

**Results:**

Seven third-year medical students who attend the same traditional 4-year medical school consented to participate in the focus group. Participant ages ranged from 24 to 29 years old. Of the 7, only 1 self-identified as male while the other 6 self-identified as female. Self-reported race/ethnicity was: 3 Whites, 2 Asians, and 2 Latinos. Three had careers prior to matriculating into medical school, only one of which was in the medical field. All participants provided extensive responses to the question. The focus group lasted for 2 hours.

**Student Responses:**
Student 1:

"I feel like I have been going through the stages of quarantine. In the beginning (of our time off) I decided to take a break from schoolwork and focus on research for my gap year. I am one of the lucky ones because I was able to finish my core rotations and my [USMLE] Step 2 was not cancelled...yet. I was supposed to be finishing up my psych rotation and then moving onto a 4-week elective before starting my research year. After taking a few days off I tried to get into a Step 2 study rhythm but found it difficult to focus with everything going on. I struggled with feelings of guilt over whether I was studying enough, practicing enough self-care, not being on the wards with all the other frontline staff, being there for my boyfriend who was experiencing a family crisis, and being present with my own family and friends. As we continued to receive weekly updates my guilt failed to subside and I found myself preoccupied with uncertainties in curriculum changes, such as Step 2 scheduling and Prometric closures. I tried to remind myself that we were in the middle of a pandemic and to put things in perspective. I found myself wishing I could do more and help in a meaningful way. I was becoming frustrated with the situation of 'business as usual Step 2 studying.'

I found that self-care through journaling and yoga was something I had to prioritize. I started babysitting a boy with special needs last week and helping him with his homework; navigating the school system's online learning system has been very humbling! It's reminded me of how other people are going through this experience and all of the challenges people are facing right now."

Student 2:

“When this all started about 6 weeks ago and we were told that clerkships were cancelled I initially felt some guilt mixed with general uselessness. My first thought was that I didn't go to medical school to stay home during a pandemic. And those initial reactions made me realize how much of my identity or even my self-worth is tied up in helping others, and I felt like that ability was gone. I've just felt useless.

Over the past several weeks I've also been feeling a lot of anxiety over what is going to happen in coming months; when will we get to return to school?; what this is going to mean for our overall education and maybe even graduation? ...Even though right now everything is set to proceed on schedule and we've been told we're going back in the summer. And I've been telling myself that even if I'm not directly doing anything, it is helpful that I am staying home and isolating.

I had to stop watching the news as often to help reduce my anxiety and my anger over how this has been handled on a federal level. Now I just read the headlines once per day. That has helped.

Overall, it's been a lot of ups and downs; there have been good parts as well. I've been able to catch up on sleep, spend some quality virtual time with family and friends, study, and volunteer a bit. This all helps to put things in perspective. It hasn't all been bad but it's still tough."

Student 3:
“I was 2 weeks into my surgery rotation when the decision was made to remove us from clinical rotations, so up until last week I was still doing virtual surgery which is an interesting endeavor, but we had a daily lecture run by students so we each got to present a case on a topic. Our attending was super reassuring and transparent and ensured us that we would be fine and get through this.

I have been experiencing some guilt as well. Both of my brothers’ have girlfriends. Many members of my family and friends have come to me asking for medical advice during this time. Although I try to remain up to date on as much as I can, given the rapidly changing information associated with the pandemic. I feel helpless. It is just a very weird feeling of knowing that people think I know all the answers when really I am sitting at home like everyone else. This feeling of helplessness and lack of knowledge reminds me of what it might feel like to be a frontline provider and ED doc who is faced with taking care of patients, attempting to provide them with the best medical care, but not knowing the answers.

Sometimes I revert to feeling guilty for being stressed or anxious about the unknown, or trivial things like our 4th year schedule. But I feel the way I feel, and we are who we are. I’ve had to validate my own emotions during this time and remind myself that I’m not selfish in feeling how I feel. I understand that this isn’t about us, and this pandemic is having devastating effects worldwide, but that perspective does not eliminate my daily individual stresses. It’s a larger pandemic but my issues are my issues. I’m trying to maintain perspective without allowing that to result in guilt for my initial anxiety or stress, however I continue to struggle with this.”

**Student 4:**

“There was an assertion early on in the pandemic that ‘COVID-19 is the great equalizer.’ However, we now know from data and experiences by individuals and communities that that is not true. It’s true we are all experiencing the pandemic together, but on the flip side, there are people who are affected by it in a worse way. We know that certain races and socioeconomic groups fare worse. For example, African Americans and Latinos have higher rates of COVID-19 infection and death. Now I feel that that assertion is a bit toxic, as the reality is that the pandemic affects each of us very uniquely.

Thinking about the pandemic in this way is important in understanding how the pandemic affects me personally. For example, many of my classmates say they miss the structure of our regular rotation schedule, but I personally appreciate me structuring my own day. In a prior career I did freelance work and am used to a self-directed schedule. I had to give it up for medical school which is pretty regimented and structured and where students have minimal autonomy over their schedules. Since in person rotations have been suspended, I have been doing a variety of things including studying for Step 2, applying my medical writing skills to help out with some COVID projects with my classmates, and finishing up a research project I have been working on for 18 months. I love medical writing and am happy about the opportunity to pursue that again in the context of this rapidly developing pandemic. It’s nice to have that autonomy again. Of course, I miss seeing people and going to clinic, but the pandemic’s disruption to our medical school schedule has also re-emphasized how I like having some control over my schedule.
It's also cool to be a medical student in the middle of a pandemic because we are seeing things in real time and it's fascinating to see all the research and discoveries taking place every day. I’ve learned so much and have been enlightened around things that I didn’t know about regarding emergency and disaster situations. You have to embrace that uncertainty in some ways, which is tough because we don’t know how it will affect our residency applications which are coming up later this year. For me, there is a lot of variation in my day-to-day schedule and emotions, and I’ve learned to embrace that.

I just took my primary care elective which was instructed in an online format. In the last week, we each worked with a primary care doctor with telemedicine visits. During a debrief, the doctor I was working with told me that the patients he has been seeing are engaging in healthier behaviors because they have more time to pursue these behaviors. This is interesting, as he said some doctors worried that people would engage in unhealthy behaviors (e.g. not exercising) due to the stay at home orders. His observation made me reflect on how we as healthcare professionals and a society assume that patients are choosing to not be healthy, but maybe it’s instead that they don’t have the necessary time to learn and pursue the healthy behaviors we recommend that they practice.”

**Student 5:**

“Like many others I have been going through different waves of quarantine. When quarantine began I was two weeks into my [internal] medicine rotation, so completing the next 6 weeks was interesting. I know that the medicine coordinator and clerkship directors were really overwhelmed with what was happening in clinic, understandably. I went through a period where I really wished I had the chance to better understand clinical processes in a hands-on and in person way. When I don't feel like I’m in control, I get very anxious and there was a lot of uncertainty around what to expect these last few weeks. So the first few weeks, I was very anxious but now I appreciate it and have grown from it. I know that everyone has our best interests at heart and everything is going to be ok. We're all going to be fine. I have also found that comparing myself to others is not helpful because we all have our own journeys.

I have used a “self-journal” lately and I really recommend this even though I’m not a big “journaler.” It’s very forgiving so this has been helpful to ensure that I schedule self-care. That said, I feel like I’m not being too productive and not doing enough self-care.

I also have been thinking about how the class that I started out with will graduate and go into residency this year, and many of my friends from that class are going to COVID hot spots in New York, and my boyfriend is one of them. In talking to them, everyone feels nervous and scared because many of their recent clinical experiences were virtual and not what they are used to. I hear that they are feeling apprehensive about being doctors and practicing but not feeling super prepared. I know they are going to be great, but I also worry about them. I also feel guilty that I’m happy I’m not in that year anymore, since I took a year off - which is hard to say out loud - because there are a lot people who I love in that class, but that could have been me, and now I have more time to work on myself before being handed that degree of responsibility.”

**Student 6:**
“I’ve been quite productive writing and working on projects. I’ve been doing drive-thru COVID-19 testing at two hospitals 6 days a week which has been good for seeing people and getting out of the house. The testing has been weird; it’s fun and enjoyable in many ways, and it feels good to be there because you feel that you are doing something to help - which is nice. And it solidified my intentions to go into emergency medicine because I just wanted to get out and do “something,” which may be a strange reaction to have in the middle of a pandemic. Obviously, there are those moments as you’re testing that you realize “this person just coughed virus all over me,” and that’s a little scary, but it is what it is.”

**Student 7:**

“At first, I went through the same stages of quarantine that Student 1 described: guilt because it felt like I was not doing enough, guilt that I was not spending enough time with my family, and guilt for worrying about school while a global pandemic is happening. My worries felt so large and yet so insignificant in comparison to the difficulties others were facing around the globe.

One day I went for a walk outside and my anxiety about schoolwork suddenly left me when I found myself enjoying some flowers with my partner. I realized I had not had time to enjoy myself in so long. My world revolved around school before this pandemic. This global crisis forced me to identify what is really important to me. I asked myself, “If everything ended today, would I be able to say I spent my life in a way that was meaningful for me?” I understood then that making time for myself and my family and connecting with others mattered much more to me than school and work in general.

I also realized that I missed talking to and connecting with my patients. To make-up for it, I have been calling seniors, isolated in their homes due to the pandemic, to talk and give them company. It has been a very rewarding experience to listen to their stories. Although I volunteered to provide comfort to them during this time of physical distancing, I found myself being comforted by them because they frequently told me, ‘I am much older than you and have been through a lot worse, so I know you will get through this, too.’

I was surprised by how much I enjoyed connecting with patients and seniors over the phone because I am naturally introverted. Having a better understanding of what fulfills me changed the medical career I want to pursue. Before, I was considering a career in which I could practice in-patient pediatrics, or even pursue a sub-speciality in pediatrics. But now I am considering a career in primary care pediatrics because I enjoy having longitudinal relationships with my patients, and I want a lifestyle that allows me more time with my family. Regardless of what I ultimately decide to go into, the pandemic has definitely made me more carefully consider my career trajectory and what is meaningful for me.”

**Discussion:**

As we prepare future physicians to care for patients amidst a pandemic or otherwise, the personal experiences of medical students as well as their thoughts on medical curricula are vital for guiding the future direction of medical education and largely unexplored. The participants of this focus group are
uniquely equipped to provide useful perspectives on this topic given that as third year medical students, they experienced a traditional in-person pre-COVID-19 clinical curriculum, are currently experiencing a clinical curriculum based on distance learning in the midst of COVID-19, and will likely experience clinical training post-COVID-19. The group candidly expounded upon five self-initiated themes: guilt, anxiety, self-awareness, volunteerism, and autonomy. Analysis of these themes from the context of how they may guide the future direction of medical education, is discussed below.

**Guilt**

Five of the 7 participants explicitly expressed feelings of guilt as related to feeling useless, feeling unproductive in terms of workload, and feeling that their anxiety and stress levels were less valid than others dealing with more severe circumstances during the pandemic. The feelings of uselessness ranged from wishing they were able to play a greater role in front line care of patients, to being frustrated by not being equipped with the knowledge base needed to address questions and concerns about the pandemic posed to them by family and friends who assumed they would know the answers. These students also struggled with not feeling productive in terms of their study life and dedicated study time to medical education. They suddenly found themselves with far less structure and direction relative to their educational instruction and felt guilty about not filling those gaps of time. The students felt guilty about lamenting over their pandemic-related concerns when others seemed to be in more precarious situations, such as recently graduated classmates - many of whom voiced feeling ill-prepared and apprehensive - who had no choice but to work clinically under suboptimal circumstances, sometimes in locations hit heavily by COVID-19 cases.

*Tips and Tools:* While it is important to own and feel validated in feelings of guilt, medical students should also be encouraged to channel such feelings into ones of appreciation for others’ journeys and gratitude for their own paths. This approach acknowledges that there is discomfort related to the various aspects of the pandemic, but also recognizes one’s own limitations and fosters the skill of focusing on optimizing that which one can control. Future medical education should acknowledge that appropriately placed guilt is a normal feeling and should teach students coping strategies to ensure that those feelings don’t result in overwhelming negative energy and incapacitation (Dobie, 2007; Gunn, 2011; Wen, 2013).

**Anxiety**

Five of the 7 students explicitly referred to anxiety as being a predominant feature of their experience during the pandemic. They expressed feeling anxious about the future of their medical education, their degree of preparation as rising fourth year medical students and soon-to-be physicians, and frustration about how the pandemic was being managed by the government. The uncertainty associated with not knowing how their futures would be affected by this pandemic, particularly relative to their medical education, and lacking the educational guidance and structure that they had in many ways come to rely upon, seemed to trigger a sense of helplessness and loss of control. After having invested many years of dedicated study and having spent numerous dollars in tuition in order to join the coveted ranks of medical school, not knowing if they would ever realize what they had originally imagined their student
and professional life to be, provoked anxiety. The students shared that once they recognized their heightened levels of anxiety, they adjusted their daily operations and priorities in order to practice self-care and ease their stress levels.

**Tips and Tools:** Intentional avoidance of triggering events and attention to self-care rituals are examples of coping mechanisms that were employed to manage anxiety in a healthy way. Owning one's feelings is important in order to avoid developing resentment, employ measured perspective, and seek meaningful resolution (Finkelstein, 2007; Värlander, 2008; Wild, 2014). Having a positive outlook is vital.

**Communication and transparency between school.**

**Self-awareness**

All 7 of the students spoke to the importance and development of their self-awareness. The students shared that in many ways - whether consciously or subconsciously - the pandemic forced them to reflect on their purpose and that which is most meaningful to them. Reflection fosters self-awareness through introspective thought relative to a particular circumstance or situation (Ardelt, 2018; Saunders, 2007). Well-developed self-awareness provides the tools needed to thoughtfully manage challenging and complex predicaments, such as the unprecedented COVID-19 pandemic (Ardelt, 2018; Epstein, 2013). Many of the students shared that their self-awareness and understanding of self has grown over the course of the pandemic. Some experienced awakenings around what is most important to them and how that has fostered a re-prioritization of career goals. For example, one student realized the type of lifestyle that would afford them the degree of control needed to be most effective as a physician, family member, and friend. Another student received confirmation of their prior decisions around purpose and medical specialty choice. None of the students voiced any regret around choosing to pursue a career in medicine.

**Tips and Tools:** Self-awareness is a vital aspect of professional development; the skills of being open, reflective, authentic, and trusting in one's own judgement are key to becoming an empathetic physician and providing successful health care (Matiti, 2007).

**Volunteerism**

Four of the 7 students shared that they have been participating in volunteer activities since being at home for distance learning. While some argue that the popularity of volunteerism has plummeted over the past decade in the United States, perhaps the COVID-19 crisis has resulted in a renewed desire to give of one's time and skillset freely (Dietz, 2018). In response to the coronavirus pandemic, the United Kingdom's National Health Service (NHS) called for its citizens to volunteer to complete tasks such as medication delivery for pharmacies, driving patients to appointments, and making phone calls to the isolated. The response was swift and robust such that within 24 hours, 500,000 volunteers had signed up (Addington-Hall, 2005). In the United States, countless health care providers have poured into hard hit cities like New York to provide volunteer care of COVID-19 patients. Similarly, the majority of the medical students in this study have embraced volunteerism in their time away from campus and in-person instruction. Some of their reported volunteer activities were directly COVID-19-related such as drive through viral testing and calling socially isolated senior populations. Other activities included babysitting a child with special
needs and helping with homework. Volunteer work has been shown to improve morale and serve communities well.

*Tips and Tools:* Adding volunteer community work to medical school curriculum might enhance physicians’ sense of altruism while affording students access to direct practical experiences to about community, the social determinants of health, and public health systems (Butler, 2020; Hunt, 2011; Mitka, 2011).

**Autonomy**

Autonomy was another slightly less common, but nonetheless pervasive theme that emerged from this focus group discussion. Distance learning suddenly availed these medical students to a relative abundance of time and personal control of how that time was spent. While this was an abrupt departure from the typical, very regimented and organized schedule of medical school, many of these medical students embraced this new found freedom. They shared their appreciation for being able to dictate their learning and leisurely time based on their individual priorities and skillset. One student, for example, expounded upon how distance learning has allowed them to do more medical writing, an area of expertise and source of joy that they had not been able to enjoy since starting medical school due to lacking adequate time to devote to it. Other students shared that they were proud of how they efficiently and productively used their time to do medical research and projects, to practice self-care such as journaling, and to volunteer. In this process, many voiced that they became more confident in their career and medical specialty choices. They reported feeling more effective when allowed to self-direct their activities.

*Tips and Tools:* More autonomy might provide medical students more opportunity to explore and identify careers and skillsets that are fulfilling and meaningful to them (Kusurkar, 2015; Mamary, 2003; Murad, 2010; Williams, 1998).

**Potential Consequences of Distance Learning**

All of the students in this focus group transitioned from a clinical setting to a virtual setting during one of their core clerkships. Many students commented on how this transition impacted their learning in various ways. These experiences could result in their decreased confidence or knowledge, and/or increased anxiety when they encounter patients in-person again. The decrease in in-person patient encounters may also impact the field of choice these students choose, as they may feel more comfortable entering a field for which they received in-person training prior to the pandemic.

Some students also commented on how this experience has either solidified their career choice or helped them choose a field that aligned more with their preferences after self-reflection. This may lead to physicians from the Class of 2021 being happier with their specialty choice, since this cohort of students have had more time to reflect on their personal and career goals.

**Limitations**
There are several limitations to this study. First, all 7 students and the 2 faculty facilitators knew each other and had worked together academically prior to the focus group. Therefore, some answers could have been influenced by prior knowledge of each other's various perspectives and philosophies. Second, the focus group participants’ responses may have also been affected by feeling less comfortable sharing via video versus in person. Third, the perspectives shared are partly limited to that influenced by experiences had at a single medical school located in a specific geographic location, which limits the generalizability of the results. Additionally, the shared experiences from the participants is only based on what has occurred to date relative to the pandemic. It is estimated that the pandemic will last for several more months such that perspectives could change over that time period. A follow up focus group with these students at the end of their medical education to discuss their insights one year from now would address this limitation by providing a more complete perspective. A future large retrospective cohort study might also improve generalizability of this data. Another limitation is that the students in the focus group have limited experience with front line medical care such as emergency and intensivist medicine (traditionally scheduled and experienced during 4th year clerkships) which limits their perspective. Finally, the small sample size of participants predominantly made up of females, with no African Americans/Blacks, and all of whom are third year medical students limits the generalizability of this data.

Conclusions:

Several insights relative to transforming medical education can be gained from the COVID-19 pandemic. The insights shared by this unique group of medical students is invaluable and can inform these changes. These students have the benefit of having experienced clinical education pre-COVID and during COVID - the latter which has been delivered virtually and has required that they implement significant self-directed learning. These students report successful adaption to distance learning in a short amount of time, suggesting that perhaps medical education is more malleable than one might think. Fear of medical education transformation being infeasible due to poor learner adaptability should not be a barrier. The themes shared combine to suggest the need to emphasize three priority areas - reflection, healthcare delivery innovation through technology, and built-in opportunity for student autonomy as ideal aspects of a transformed medical education curriculum.

First, training in delivery of healthcare virtually with the use of innovative technology such as augmented intelligence and machine learning must be prioritized in medical education. COVID-19 has forced medical professionals to deliver care via telemedicine, which will likely become a routine route of healthcare delivery for the foreseeable future. Some medical school learning objectives have already been altered to include the demonstration of ability to perform a physical examination on a patient via telemedicine. Medical students should therefore receive required training in telemedicine and medical technology during their preclinical and clinical years of education. Given the trajectory of medical practice in the era of COVID-19 and beyond, these will be important skills to master and proficiently perform.

Second, medical education leaders should place greater curricular emphasis on reflection training and sharing to improve self-awareness and professional development. Reflection sessions with students
might best take place via small group in-person meetings or virtually. If done virtually, faculty would likely need to receive specific training in effective moderation of virtual reflecting rounds. By providing students with safe space to speak openly and honestly about their experiences, medical schools can equip future physicians with tools that will help them cope effectively and mitigate risk of future burnout. Self-reflection will also promote the development of physicians who will better empathize and connect with their patients. Additionally, time to specifically reflect on professional goal development should be prioritized.

Finally, designing medical curricula to include less prescriptive blocks of time which encourage increased student autonomy around self-directed experiential and didactic-based learning would be transformative. Shortening the length of preclinical education and delivering preclinical content online might allow for more undedicated blocks of time in the schedule. Studies have already shown the benefit of online lectures. These undedicated blocks of time would not have a predetermined agenda but would include a student-inspired set of objectives and goals. This would provide the opportunity to personalize areas to be focused upon for each individual student. Students would have the flexibility to spend more time mastering knowledge in areas of weakness and honing skill in areas of expertise. Students would be able to learn at their own pace and incorporate endeavors not directly related to medical education such as self-care, non-clinical approaches to health, and community volunteer opportunities.

This pandemic has exposed a profound opportunity to transform medical education. The medical student participants of this focus group used reflection to expound upon their COVID-19 experiences. Their insights were authentic, introspective, and demonstrated adaptability. Their perspectives and experiences related to the pandemic must be acknowledged and utilized to inform the future of medical education and medical practice.

Declarations:

Competing interests:

The authors declare no competing interests.

List Of References:

AAMC. 2020 FACTS: Enrollment, Graduates, and MD-PhD Data. Accessed March 13, 2021. https://www.aamc.org/data-reports/students-residents/interactive-data/2020-facts-enrollment-graduates-and-md-phd-data

Addington-Hall, J. M., & Karlsen, S. (2005). A national survey of health professionals and volunteers working in voluntary hospices in the UK. II. Staff and volunteers' experiences of working in hospices. Palliative Medicine, 19(1), 49-57.
Ardelt, M., & Grunwald, S. (2018). The importance of self-reflection and awareness for human development in hard times. Research in Human Development, 15(3-4), 187-199.

Bhagavathula, A. S., Aldhaleei, W. A., Rahmani, J., Mahabadi, M. A., & Bandari, D. K. (2020). Knowledge and perceptions of COVID-19 among health care workers: cross-sectional study. JMIR public health and surveillance, 6(2), e19160.

Butler P. A million volunteer to help NHS and others during Covid-19 outbreak. The Guardian. https://www.theguardian.com/society/2020/apr/13/a-million-volunteer-to-help-nhs-and-others-during-covid-19-lockdown. Published April 13, 2020. Accessed March 13, 2021.

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.

Dietz, N., & Grimm Jr, R. T. (2018). Where Are America's Volunteers?.

Dobie, S. (2007). Reflections on a well-traveled path: Self-awareness, mindful practice, and relationship-centered care as foundations for medical education. Academic Medicine, 82(4), 422-427.

Emanuel, E. J. (2020). The inevitable reimagining of medical education. Jama, 323(12), 1127-1128.

Epstein, R. M., & Krasner, M. S. (2013). Physician resilience: what it means, why it matters, and how to promote it. Academic Medicine, 88(3), 301-303.

Finkelstein, C., Brownstein, A., Scott, C., & Lan, Y. L. (2007). Anxiety and stress reduction in medical education: an intervention. Medical education, 41(3), 258-264.

Gunn, G. R., & Wilson, A. E. (2011). Acknowledging the skeletons in our closet: The effect of group affirmation on collective guilt, collective shame, and reparatory attitudes. Personality and Social Psychology Bulletin, 37(11), 1474-1487.

Hunt, J. B., Bonham, C., & Jones, L. (2011). Understanding the goals of service learning and community-based medical education: a systematic review. Academic Medicine, 86(2), 246-251.

Kusurkar, R. A., & Croiset, G. (2015). Autonomy support for autonomous motivation in medical education. Medical education online, 20(1), 27951.

Mamary, E., & Charles, P. (2003). Promoting self-directed learning for continuing medical education. Medical teacher, 25(2), 188-190.

Matiti, M., Cotrel-Gibbons, E., & Teasdale, K. (2007). Promoting patient dignity in healthcare settings. Nursing Standard (through 2013), 21(45), 46.

Mitka, M. (2005). Volunteering overseas gives physicians a measure of adventure and altruism. JAMA, 294(6), 671-672.
Mowery, Y. M. (2015). A primer on medical education in the United States through the lens of a current resident physician. *Annals of translational medicine, 3*(18).

Murad, M. H., Coto-Yglesias, F., Varkey, P., Prokop, L. J., & Murad, A. L. (2010). The effectiveness of self-directed learning in health professions education: a systematic review. *Medical education, 44*(11), 1057-1068.

Saunders, P. A., Tractenberg, R. E., Chaterji, R., Amri, H., Harazduk, N., Gordon, J. S., ... & Haramati, A. (2007). Promoting self-awareness and reflection through an experiential mind-body skills course for first year medical students. *Medical teacher, 29*(8), 778-784.

Simpson, S. A., & Long, J. A. (2007). Medical student-run health clinics: important contributors to patient care and medical education. *Journal of general internal medicine, 22*(3), 352-356.

Värlander, S. (2008). The role of students’ emotions in formal feedback situations. *Teaching in higher education, 13*(2), 145-156.

Wen, L. S., Baca, J. T., O’Malley, P., Bhatia, K., Peak, D., & Takayesu, J. K. (2013). Implementation of small-group reflection rounds at an emergency medicine residency program. *Canadian Journal of Emergency Medicine, 15*(3), 175-178.

Wild, K., Scholz, M., Ropohl, A., Bräuer, L., Paulsen, F., & Burger, P. H. (2014). Strategies against burnout and anxiety in medical education–implementation and evaluation of a new course on relaxation techniques (Relacs) for medical students. *PloS one, 9*(12), e114967.

Williams, G. C., & Deci, E. L. (1998). The importance of supporting autonomy in medical education. *Annals of internal medicine, 129*(4), 303-308.