Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.JournalofSurgicalResearch.com

Perspectives During the COVID-19 Pandemic

The Impact of COVID-19 Pandemic on Medical School Admissions: Challenges and Solutions

Background

The coronavirus disease 2019 (COVID-19) pandemic has brought hardship. With the pandemic, there is a need for more health care professionals; yet, premedical students face additional hurdles in applying to medical school. The process of applying to US medical schools before the COVID-19 pandemic was competitive, with an average acceptance rate of 6.7% in 2019.[1] Now with many unforeseen challenges, premedical students applying during 2020, 2021, and subsequent application cycles should be prepared for the changes that the pandemic has necessitated.

The COVID-19 pandemic has resulted in a lack of in-person science courses and laboratories, reduced ability for face-to-face experiences in shadowing or volunteering, sudden changes to the Medical College Admission Test (MCAT), and changes to deadlines. These changes may impact the next generation of medical students, who will become the next generation of residents, surgeons, and surgeon educators. This perspective will highlight the challenges of applying to medical school during the COVID-19 pandemic and propose evidence-based recommendations to ease the additional burden on the medical school admissions process.

In-person challenges

The comprehension and performance in core science courses, such as chemistry, biology, and biochemistry, can be greatly impaired by changes to the teaching style. With social distancing requirements set by the Centers for Disease Control and Prevention, most colleges and universities have moved classes to an online lecture format.[2,3] Bawa found that perceptions of students and teachers about online courses are dramatically different, resulting in confusion and dissatisfaction for students.[4] This confusion could be detrimental for premedical students who need the knowledge from core courses for the MCAT and their educational foundation. In addition, Kayser determined that a service-learning pedagogy using experiential-based learning is important for premedical students to stimulate compassion, cultural competence, and community-responsive skills.[5] Vincent-Ruz *et al.*[6] found that early experiences in undergraduate research correlated to student attainment, MCAT performance, and medical school acceptance. With this reduced ability to partake in early laboratory research, students may face a disadvantage on multiple levels.

Many shadowing and volunteering experiences were canceled for premedical students because of the pandemic. Volunteering and shadowing are crucial for premedical students to determine their fit and desire for a career in medicine and demonstrate commitment as a prospective doctor. With social distancing requirements and limited personal protection equipment, premedical students are largely excluded from in-person medical experiences. The American Medical Association has said that it is unknown how long these limits will last.[7] This reduced ability for premedical students to experience the day-to-day interactions of a physician may lead to applicants with unrealistic expectations and contribute to the already high rate of physician burnout.[8]

MCAT challenges

The MCAT is one of the most important knowledge metrics used to evaluate the ability to succeed as a medical student and doctor. Most students prepare for the MCAT over several months, with peak testing periods during the spring. The spread of COVID-19 brought about the closure of all testing centers across the country during this peak time.[9,10]

In response to COVID-19, social distancing requirements, and the cancelations of examinations, the Association of American Medical Colleges (AAMC) decided to reformat the examination by shortening the MCAT from 7.5 h to 5.75 h for the rest of this testing season.[10] The shortened MCAT will still cover all four sections of the longer version and will test the same knowledge and skills at the same level of difficulty as the full-length examination according to the AAMC.[10] In addition, the scoring will remain the same as the full-length examination. The AAMC also decided to expedite score releases.[10] The MCAT scores were previously released in 4 wk, but this period was changed to 2 wk to allow students a competitive advantage in applying early in the application cycle.

Deadline challenges

With the cancelation of many MCAT examinations and the additional stress caused by the COVID-19 pandemic, the AAMC recognized that premedical students applying during the 2021 cycle would need additional time to fill out their medical school application.[11] Consequently, the AAMC has delayed the transmission of applicant data to medical schools by 2 wk to give students additional time to complete their application.[12] This means that applicants will have more time to enter their coursework, clinical and volunteering experiences, and personal statement before the system begins transmitting applications to medical schools. Nevertheless, the application for 2021 opened on May 4 and could be submitted starting May 28, as previously planned.[12]

The AAMC has left it up to individual medical schools to determine whether to push back the deadlines for the primary application and have encouraged students to use the Medical School Admission Requirements online database to monitor individual school policies and requirements.[12] One of the biggest challenges for 2020 applicants is attending interviews, which are difficult to get to with the stay-at-home orders and travel restrictions. Many medical schools have adopted a virtual interview format to accommodate applicants who are unable to travel and to protect the health and safety of the interviewers and interviewees. The question remains, Will these changes persist after the pandemic has subsided?

Overcoming the challenges

One of the marvels of the medical field is its ability to overcome challenges (diseases) and push boundaries (cures) beyond what has been done before. This COVID-19 pandemic will be no different. Medicine will prevail, and so will the medical school admissions process. Overcoming the additional challenges caused by the COVID-19 pandemic is achievable. For instance, Carpenter designed an online undergraduate chemistry course where information is conveyed using digital pen and paper in combined audiovisual lectures that are fully controlled by the students to adjust information flow and repetition.[13] Course designs such as this could be used in medical school and residency to ensure that students are not affected by the in-person restrictions. Furthermore, this could be used in continuing medical education courses for current physicians.

Beyond this, many premedical students have determined alternative ways to give back and support their communities despite the in-person restrictions. The American Medical Association has suggested volunteering with phone triage to assist health systems and public health entities in reducing the number of patients in the emergency room.[14] Surgeons and surgeon educators can help premedical students remain involved by offering virtual volunteer positions, such as remote research opportunities in assembling literature reviews or conducting statistical analyses. These are tasks that undergraduate students would thrive at and would help surgical research teams. Volunteering and contributing while social distancing will require imagination and diligence. The clerkship director local medical school is using remote simulation with avatars to carry out in-person techniques (G. Miller, personal communication, August 22, 2020). The technical skill is not gained, but decision-making improves. Furthermore, some trauma centers are using virtual reality medical simulations to train medical students and early-career doctors.[15] Virtual learning platforms have been helpful in providing online courses and a method to practice technical skills during COVID-19.[16] Such virtual learning, used for surgical residents, can be useful for all levels of medical training to prevent burnout and allow time to focus on technical skills. Premedical students can be included in these types of experiences to provide further exposure to the field of medicine. During a peak in COVID-19 cases, a general surgery training program used remote technology to do bedside rounds.[17] Another center used telemedicine meetings for subjects such as trauma surgery and patient safety, which was found to increase students' interest.[18] Premedical students could also be included in these telehealth meetings to increase medical exposure. These methods to avoid pandemic exposure could allow premedical student volunteer experience. Surgeons can also offer support by speaking with premedical students about their experience in surgery to compensate for the lack of shadowing abilities. This would ensure that students are provided with a realistic perspective and are inspired to pursue surgical specialties. Surgeons can further provide premedical students with expedited letters of recommendation and additional guidance during the changes caused by COVID-19. This would help ease the burden of deadline changes and give premedical students the support and experience needed to get accepted into medical school at this time.

The COVID-19 pandemic has presented an opportunity to refine the medical school application process. Premedical students must be kept informed of the alterations and challenges occurring during this rapidly changing situation.

Conclusion

The COVID-19 pandemic has resulted in global hardships for everyone; yet in the premedical community, there is still an unwavering desire to enter the field of medicine. In a time when there is a desperate need for health care professionals, this is great news. Nevertheless, the pandemic has presented additional challenges for premedical students applying to medical school, which are currently being fought.

Acknowledgment

Funding: none.

Authors' contributions: B.D. and A.E. contributed to study design; conception; data collection, interpretation, and analysis; and article. All authors critically revised the article and read and approved the final article.

Disclosure

The authors reported no proprietary or commercial interest in any product mentioned or concept discussed in this article

REFERENCES

1. Moody J. *10 Med Schools With the Lowest Acceptance Rates*; 2020. U.S. News & World Report; 2020. Available at: https://www.usnews.com/education/best-graduate-schools/the-short-list-grad-school/articles/medical-schools-with-the-lowest-acceptance-rates. Accessed June 1, 2020.
2. Social Distancing, Quarantine, and Isolation. *Centers for Disease Control and Prevention*; 2020. Centers for Disease Control and Prevention; 2020. Available at: www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/social-distancing.html. Accessed June 2, 2020.
3. Hess A. *How Coronavirus Dramatically Changed College for Over 14 Million Students*; 2020. CNBC; 2020. Available at: https://www.cnbc.com/2020/03/26/how-coronavirus-changed-college-for-over-14-million-students.html. Accessed June 2, 2020.
4. Bawa P. Retention in online courses: exploring issues and solutions – a literature review. *Sage Open*. 2016;6, 2158244015621777.
5. Kayser C. Cultivating community-responsive future healthcare professionals: using service-learning in pre-health humanities education. *J Med Humanit*. 2017;38:385–395.
6. Vincent-Ruz P, Grabowski J, Schunn CD. The impact of early participation in undergraduate research experiences on multiple measures of premed path success. *Scholarship Pract Undergraduate Res*. 2018;1:13–18.
7. Murphy B. *How COVID-19 is affecting medical school admissions*; 2020. American Medical Association; 2020. Available at: https://www.ama-assn.org/residents-students/preparing-medical-school/how-covid-19-affecting-medical-school-admissions. Accessed June 2, 2020.
8. Rothenberger DA. Physician burnout and well-being: a systematic review and framework for action. *Dis Colon Rectum*. 2017;60:567–576.
9. Maloney A. Pearson VUE testing center closures. The American Board of Surgery. 2020. Available at: http://www.absurgery.org/default.jsp?news_covid19_pearsonvueclosures. Accessed June 3, 2020.
10. Coronavirus (COVID-19) and the MCAT exam. Association of American Medical Colleges. 2020. Available at: https://students-residents.aamc.org/applying-medical-school/article/coronavirus-covid-19-and-mcat-exam/. Accessed June 3, 2020.
11. Campbell G. AAMC Press Teleconference. Association of American Medical Colleges. 2020. Available at: https://www.aamc.org/system/files/2020-05/ocomm-Teleconference-Transcript-2020.05.08.pdf. Accessed June 3, 2020.
12. Coronavirus (COVID-19) and AMCAS. Association of American Medical Colleges. 2020. Available at: https://students-residents.aamc.org/applying-medical-school/article/coronavirus-covid-19-and-amcas/. Accessed June 3, 2020.
13. Carpenter S. 3-in-1: design and gamified delivery of an online pre-med organic chemistry/biochemistry course. In: *Interdisciplinary STEM Teaching & Learning Conference*; 2019:47. Available at: https://digitalcommons.georgiasouthern.edu/stem/2019/2019/47. Accessed June 30, 2020.
14. Murphy B. 5 ways medical students can assist during the COVID-19 pandemic. American Medical Association. Available at: https://www.ama-assn.org/delivering-care/public-health/5-ways-medical-students-can-assist-during-covid-19-pandemic. Accessed July 30, 2020.
15. Couperus K, Young S, Walsh R, et al. Immersive virtual reality medical simulation: autonomous trauma training simulator. *Cureus*. 2020;12:e8062.
16. Ehrlich H, McKenney M, Elkbuli A. We asked the experts: virtual learning in surgical education during the COVID-19 pandemic-shaping the future of surgical education and training. *World J Surg*. 2020;44:2053–2055.
17. Meneses E, McKenney M, Elkbuli A. Reforming our general surgery residency program at an urban level 1 trauma center during the COVID-19 pandemic. Toward maintaining resident safety wellbeing. *Am J Surg*. 2020;220:847–849.
18. Pereira BM, Calderan TR, Silva MT, Silva AC, Marttos Jr AC, Fraga GP. Initial experience at a university teaching hospital from using telemedicine to promote education through video conferencing. *Sao Paulo Med J*. 2012;130:32–36.

Brianna Dowd
Division of Trauma and Surgical Critical Care
Department of Surgery
Kendall Regional Medical Center
Miami, Florida

Mark McKenney, MD, MBA, FACS
Division of Trauma and Surgical Critical Care
Department of Surgery
Kendall Regional Medical Center
Miami, Florida
Department of Surgery
University of South Florida
Tampa, Florida

Adel Elkbuli, MD, MPH*
Division of Trauma and Surgical Critical Care
Department of Surgery
Kendall Regional Medical Center
Miami, Florida

*Corresponding author. Division of Trauma and Surgical Critical Care, Department of Surgery, Kendall Regional Medical Center, 11750 Bird Road, Miami, FL 33175. Tel.: +1 786 637 5287; fax: +1 305 480 6625.
E-mail address: Adel.Elkbuli@hcahealthcare.com

0022-4804/$ – see front matter

https://doi.org/10.1016/j.jss.2020.08.072