OPINION ARTICLE

COVID-19: Considerations for Medical Education during a Pandemic [version 1]

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Abstract
This article was migrated. The article was marked as recommended.

Clinical placement has been the cornerstone of medical training since the early foundations of the medical profession. The COVID-19 pandemic generates unprecedented challenges for the delivery of medical education, particularly in the setting of 'flatten the curve' public health initiatives to curtail transmission. As the number of cases of COVID-19 increase, hospitals are limiting medical students' attendance at ward rounds, clinics and theatre, representing a fundamental shift in clinical education from the bedside to online formats.

We discuss the considerations behind these changes, review the strategies implemented during previous global infectious disease epidemics, and suggest strategies for maximising clinical education going forward.

Keywords
Medical education, COVID-19, medical students during COVID-19, changes to medical schools during a pandemic, pandemic management education, medical students on the frontline
Introduction
In December 2019, a novel coronavirus (SARS-CoV-2) emerged from the central-Chinese city of Wuhan and rapidly evolved into a global pandemic (Australian Government Department of Health, 2020). Initiatives designed to curtail transmission, or flatten the curve, have posed challenges for the delivery of medical education. The response of medical schools and partnering health services has been heterogenous. Recognising an important learning opportunity, some services have opted for a business-as-usual approach, while others have limited students’ attendance at ward rounds and clinics. A number have transitioned to wholly-online teaching, in line with principles of physical distancing (Kelso, Milne and Kelly, 2009). Whilst there is need to adapt the medical curriculum to facilitate timely graduation of medical students, this situation also presents an opportunity to incorporate innovative teaching and assessment methods to meet future disruptions.

Pandemic Management in Future Medical Practice
Climate change-induced extreme weather events and global warming will increase the frequency and severity of infectious disease outbreaks (Watts et al., 2018). Pandemic management, therefore, will constitute an important part of future medical practice. Assessment of medical students’ preparedness for a H5N1 pandemic demonstrated insufficient knowledge of disease pathophysiology, with over half the students obtaining their knowledge from media sources, rather than university material (Herman et al., 2007; Mortelmans et al., 2009). To better prepare future doctors for future pandemics, it is essential to include pandemic-related content in the medical curriculum. This may consist of simulated environments, which have proven to be an effective component of pandemic-management training, both for technical and nontechnical skills (Elcin et al., 2016).

Considerations for Patient Contact-Based Teaching
Continuing ward-based teaching must prioritise safety. The donning and doffing of Personal Protective Equipment (PPE) represents a risk of contact with contaminated fluids, and thus disease transmission. Incorrect PPE doffing has been implicated in a cluster of SARS cases among healthcare staff in Canada (Centers for Disease Control and Prevention (CDC), 2003). It is imperative that medical students have access to and be trained in the use of PPE regardless of duty, given the prolonged aerosol and surface stability of SARS-CoV-2 (van Doremalen et al., 2020). There are already widespread shortages in PPE, particularly N95 masks, and the presence of medical students will increase the number of PPE used per clinical encounter (Murphy, 2020). Should medical students be invited to continue clinical placement, or to participate in the COVID-19 workforce, this increase in demand ought to be accounted for.

It is recognised more broadly that medical students receive inadequate PPE training. An audit of US medical students found that 59% of participants had not received any PPE training, and during simulations only 7% exhibited correct donning and doffing technique, highlighting the need to both teach and reinforce (John et al., 2017). The emphasis on hand hygiene among medical students during the SARS outbreak resulted in a significantly higher compliance the following year (Wong and Tam, 2005). Investing in PPE training in the current climate will likely have ongoing benefits.

Considerations for Non-Patient Contact-Based Teaching
Should the need arise to cease all face-to-face teaching and clinical placements during a pandemic, online-based teaching methods must be accessible to medical students without delay. Universities globally are already transitioning to online teaching formats. Remote access to live tutorials and problem-based learning is possible through the use of video conferencing applications such as Zoom. During the SARS outbreak, universities in Singapore and Canada incorporated videotaped vignettes and mannequin simulators as patient surrogates (Lim et al., 2009; Park et al., 2016). As a substitute for anatomy laboratories, a US university is providing online labelled images of cadavers and pathology specimen pots (University of Michigan Medical School, 2020).

There has also been increasing use of Telehealth. In Australia, government subsidies have facilitated the expansion of existing services, in order to support physical distancing measures (Royal Australian College of General Practitioners, 2020). Telehealth offers an avenue for the continuation of parallel consulting by physicians and medical students. This may preserve the development of interpersonal skills, which may otherwise be difficult to attain solely through online or simulated learning.

Considerations for Conducting University Assessments
The conduct of assessments must also be adapted. The Imperial College London has successfully conducted final year exams online, representing a global first (Tapper, Batty and Savage, 2020). Deakin University has also successfully conducted online examinations for preclinical students through Practique, and The University of Queensland has announced they will be conducting examinations online via Proctortrack. This is an emerging concept as both medical school and specialty training written examinations are traditionally paper-based, and we welcome novel approaches to assessments going forward.
**Workforce Strategies**

Medical students may represent a valuable surge mechanism in times of heightened demand on the medical workforce. The British General Medical Council (GMC) has offered ultimate-year medical students the opportunity to graduate early and be absorbed into the workforce, on the proviso that they have met requirements for provisional registration (General Medical Council, 2020). An Australian health service has developed the role of ‘clinical assistant’ whereby medical students will provide clinical support roles that may be administrative in nature, or clinically supportive, such as phlebotomy (Western Health, 2020).

The organisation representing the Medical Deans of Australia and New Zealand (MDANZ) provides a good framework for the recruitment of medical students into such roles, and these principles are demonstrated in table 1. We advocate for the consideration of these principles when devising such roles (Craig, 2020).

**Ethical Considerations**

The involvement of medical students in the COVID-19 workforce must be thoroughly scrutinised from an ethical perspective. While there is valuable experience to be gained from this opportunity, the risk of harm to patients in inexperienced and possibly under-supervised hands challenges the principles of non-maleficence (Mortelmans et al., 2009). Conversely, medical student participation in the COVID-19 response will develop a cohort of pandemic-cognate practitioners, and will inform and inspire their future careers. Redirecting tasks to medical students, while reducing the burden on the existing workforce, represents improved use of resources and staff.

Tasks delegated to students ought to depend on stage of training along with confidence and willingness to participate. It must be remembered that while hospital staff have professional and contractual obligations to their workplace, medical students do not - posing medicolegal and industrial relations considerations (Lim et al., 2009). Should medical students be involved in the COVID-19 response, we encourage a formalised contract with the health service provider and remuneration.

| Table 1. Principles for the participation of medical students in the COVID-19 response |
|---|
| **1. Choice** |
| ● Participation in the COVID-19 response must be voluntary and free from coercion |
| ● While this may complement course material, it is not considered part of the curriculum, and students will not be disadvantaged with regards to course work if they decide against volunteering |
| ● Students who choose not to participate in this work are offered alternate learning pathways |
| **2. Safety** |
| ● Appropriate use access to and effective training in the use of PPE |
| ● Additional precautions for students with pre-existing health risks, e.g. immunocompromise |
| **3. Role Clarity** |
| ● Identification of the scope of practice (including limitations) to the student and the broader team |
| **4. Indemnity** |
| ● All medical students must have full indemnity insurance for the designated tasks |
| **5. Competency** |
| ● Tasks delegated to students must be at their level of competence |
| ● Where the tasks are beyond their training, additional training must be provided |
| **6. Supervision and Support** |
| ● Adequate supervision must be provided at all times, including emotional supports |
| ● Designated tasks should prioritise the education of medical students alongside service provision |
| ● Pathways for the escalation of concerns by medical students must be available, ideally independent from the health service |
| **7. Remuneration** |
| ● Service provision roles must be appropriately remunerated |
| **8. Accountability** |
| ● The university remains accountable for the learning, physical and emotional wellbeing of its medical students participating in the COVID-19 response |
Finally, all medical students must ultimately meet competencies for graduation as designated by the relevant national governance body. The participation of medical students in the pandemic effort must not influence their progress through medical school, thereby safeguarding the voluntary nature of this endeavour.

Conclusion
The COVID-19 pandemic represents a disruption to medical education, and has demonstrated an urgent need for innovation. Recognising the importance of clinical placement in the medical curriculum, the requirement for physical distancing during a pandemic has led to greater uptake of online-based teaching and telehealth services. There may be a role for medical students to voluntarily contribute to the COVID-19 response, however this must be guided by frameworks prioritising safety. Ultimately, adapting the medical curriculum to involve pandemic management training, will lead to a generation of graduates prepared to respond to future global infectious disease outbreaks.

Take Home Messages
- The COVID-19 pandemic generates unprecedented challenges for the delivery of education to medical students
- This represents a need for innovative teaching and assessment methods to prevent disruption to course progression
- If medical students were to be recruited on the frontline, or patient contact-based teaching was to continue, adequate PPE and training must be provided
- Non-patient contact-based teaching may involve video conferencing applications and telehealth
- Ultimately, COVID-19 has demonstrated the need to adapt the medical curriculum to involve pandemic management training, so as to develop a generation of graduates prepared to respond to future global infectious disease outbreaks

Notes On Contributors
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Declarations
The author has declared that there are no conflicts of interest.

Ethics Statement
This opinion piece did not require ethics approval.

External Funding
This article has not had any External Funding

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Reference Source
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Version 1

Reviewer Report 24 May 2020

https://doi.org/10.21956/mep.20074.r30879

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Leila Niemi-Murola
University of Helsinki

This review has been migrated. The reviewer awarded 4 stars out of 5

This is an interesting article focusing on the challenges brought up by the recent pandemic. Personnel working in wards and emergencies have been too involved in patient care to teach and there have been concerns for the students’ safety, too. Teachers have successfully solved many problems by constructing innovative e-learning, but the challenges related to hands-on teaching remain. As the authors point out, there will be new pandemics in the future and we should give them preparedness to face challenges related to them. As the authors point out, patient contact-based teaching will be a problem if there is a shortage of protective clothing or difficulties in maintaining proper hand hygiene. Teleconferences and simulations have been implemented successfully in many places. The pandemic has also encouraged universities to facilitate use of electronic assessment, too. As the authors emphasize, there are several ethical considerations when planning teaching and learning for and during a pandemic. The authors give a valuable summary of their principles in the Table 1.

Competing Interests: No conflicts of interest were disclosed.

Reviewer Report 04 May 2020

https://doi.org/10.21956/mep.20074.r30884

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P Ravi Shankar
American International Medical University

This review has been migrated. The reviewer awarded 4 stars out of 5

This is another in a series of manuscripts about COVID-19 and medical education. The authors briefly examine many areas and the possible impact of the pandemic on these areas. The topic for pandemic preparedness is important and can be offered in an integrated manner with other health science and broader disciplines. The major hurdle remains direct patient contact and the learning of physical examination skills. Many other skills like interviewing can be learned online. Assessment of physical examination skills will be another challenge as it will be difficult to be carried out remotely. The involvement of medical students in the health workforce and ethical considerations regarding the same have been well addressed. This is an interesting addition to the growing literature on COVID-19 and health professions education.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 03 May 2020

https://doi.org/10.21956/mep.20074.r30882

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Mohamed Hassan Taha
College of Medicine, University of Sharjah

This review has been migrated. The reviewer awarded 4 stars out of 5

An interesting paper, the authors provided a comprehensive layout of various aspects of medical education for Clinical placement During COVID-19. The authors discussed these considerations with a critical review of the strategies implemented during previous global infectious disease epidemics such as SARS. This work is a nucleus for further researches.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 03 May 2020

https://doi.org/10.21956/mep.20074.r30883

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Balakrishnan Nair  
Centre for Medical Professional Development and University of Newcastle

This review has been migrated. The reviewer awarded 3 stars out of 5

I enjoyed reading this article. In this challenging period in medical education, any suggestions will be welcome. I found the table to be very useful and keep this a checklist. There are many learning points in the current situation. We can teach the students about telehealth consultations, their limitations, management of crises in healthcare and professionalism. These are valuable skills for the future. Assessment is a major challenge now and we have to be innovative. One has to look for more reliable and valid tools and improvise as some other recent articles suggested.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 02 May 2020

https://doi.org/10.21956/mep.20074.r30881

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Trevor Gibbs  
AMEE

This review has been migrated. The reviewer awarded 4 stars out of 5

An interesting paper to read which has brought to the attention of the reader some points worthy of discussion. The paper encapsulated many of our own thoughts, specifically regarding the future, which of course is equally important as the present. I was looking to read more about the consequences of the changes that we need to make, both in the educational arena and in the effects upon student and faculty wellbeing. I do feel however that it adds enough to the discussion to recommend that it is read by all faculty and the Table 1, I recommend to all faculty and students.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 01 May 2020

https://doi.org/10.21956/mep.20074.r30878

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Daniel Xu  
Curtin Medical School

This review has been migrated. The reviewer awarded 3 stars out of 5

An comprehensive layout of various aspects of medical education, it'll be better that detailed solutions can be provided in delivering the curriculum in clinical placement. We understand the limitation in the Australian setting.

**Competing Interests:** No conflicts of interest were disclosed.

Reviewer Report 01 May 2020

https://doi.org/10.21956/mep.20074.r30880

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Dujeepa D. Samarasekera  
National University of Singapore

This review has been migrated. The reviewer awarded 3 stars out of 5

Interesting and useful discussion. The authors share a few important considerations to focus during the current crisis and also for any future epidemics or pandemics. I would have preferred if the authors have also highlighted any challenges or limitations when following these guidelines or considerations. Furthermore, areas such as student and faculty wellbeing and how best to mitigate longterm effects should be included.

**Competing Interests:** No conflicts of interest were disclosed.