COVID-19 essay competition: What can medical students do to help?

Want to help? Focus on the next pandemic – it may be worse.

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In 2011, a virus with a case fatality rate 50 times that of the COVID-19 virus was heavily mutated in a secure laboratory (Herfst et al., 2012). This virus was the lethal H5N1 avian influenza. Before this, although humans could become infected if they worked with birds, the virus had fortunately never achieved human-to-human transmission. In the experiment, however, the researchers mutated the virus in such a way that it could achieve aerosolised mammalian transmission (Herfst et al., 2012). If this new mutated strain of H5N1 had accidentally or non-accidentally escaped from the laboratory, it would be hard to conceive how devastating the impact could have been.

The current COVID-19 pandemic has elucidated key weaknesses in our capacity as a global civilisation to handle the stressor of what is a rather benign virus. It is tempting to think that SARS-CoV-2 is as virulent as viruses get but there are far more pathogenic viruses with pandemic potential that exist both in laboratories and in nature.

If the question is 'how can medical students help?', then I argue the case for long-termism. This is the case where we should not purely focus our efforts on this pandemic. Rather, we should be using our learnings from this pandemic and consider contributing part of our careers to reducing Global Catastrophic Biological Risks (GCBRs). Many definitions exist for GCBRs, but they all essentially define them as events caused by biological agents that could result in widespread disaster or extinction (Lewis, 2020; Schoch-Spana et al., 2017). This includes pandemics, both natural and engineered. In this essay I aim to demonstrate that reducing GCBRs is an important problem to work on. I will explore why medical students are well positioned to be valuable in this field. Finally, I will discuss the significant positive impact that an individual can have when working in this field.

The COVID-19 crisis may tragically result in the death of millions, yet it is unlikely that it will cause an extinction event or stress humanity to a point where its long-term potential is permanently compromised. Public health doctors and philosophers have agreed that the probability of a GCBR occurring this century and causing extinction is approximately 1% (Lewis, 2020; Ord, 2020). Although improbable, the consequences would be disastrous.

It is less likely that a virus from nature would cause a GCBR, but rather, one that is bio-engineered (Inglesby & Relman, 2016; Ord, 2020). Although historically we have not had a GCBR caused by an engineered pathogen, this is an unreliable predictor of its potential to occur.

Further, I would argue that the probability of a GCBR is increasing. The democratisation of scientific information and the near exponential cost-reduction in bio-engineering techniques means that 'Bad Actors' (such as terrorist organisations or omnicidal cults) can engineer pathogens at affordable prices (Millett & Snyder-Beattie, 2017). This is an attractive prospect for Bad Actors as the cost of causing one civilian casualty per square kilometre is US$2000 with conventional weapons, US$800 with nuclear weapons, but only US$1 with biological weapons (Koblentz, 2004). Further, nuclear material is easier for the international community to track due to the radiation, whereas pathogens are much more difficult to trace. It is no surprise that engineered pathogens are often referred to in the Biosecurity community as the 'Poor Man's atomic bomb' (Carus, 1991; Horowitz & Narang, 2014).

Hopefully, by now, you are sufficiently worried. Fear not, medical students are well positioned to be valuable assets in this field. Dr Gregory Lewis, a public health physician for the Future of Humanity Institute at Oxford university, has recently written about the key

characteristics required for people who want to work in the field of GCBRs (Lewis, 2020). These characteristics align very well with the graduate capabilities that medical students develop. For example, due to the nature of biosecurity work, one key characteristic is discretion. As medical students, we are trained in patient-doctor confidentiality and maintain excellent levels of professionalism from early on in our careers. Additionally, the medical degree prepares us with relevant domain knowledge. For example, medical students will understand basic science processes (i.e. how a viral polymerase chain reaction works) as well as higher level public health processes (i.e. the Donabedian model of examining health care systems). Further, there are opportunities for medical students to complete a PhD or a Masters degree if they wish to upskill (i.e. Masters of Infectious Diseases Intelligence, UNSW Sydney). Once in the clinical workforce, most specialty colleges support part-time training (which could allow for one to work part-time in GCBRs) and once a specialist it is possible to work part-time in non-clinical fields.

The impact that a medical student could make is potentially restricted if she or he were only to work clinically. One way to measure the impact of a clinical doctor is by measuring the number of Quality-Adjusted Life Years (QALYs) that an average doctor adds to society. Over the course of one's career it works out to be approximately 760 QALYs (Lewis, 2012). To decipher this, it would be like saving the life of 22 forty-five-year-old people[1]. This is not insignificant by any means but comes at a significant financial cost to society. However, helping to prevent or control one GCBR would not only save the lives of all the people it would have affected, but additionally, all future generations. This is likely to be orders of magnitude larger than 760 QALYs.

[1] Assuming life expectancy of a 45-year-old is, on average, 80 years of age. Saving one 45-year-old's life adds 35 QALYs. Thus, if one doctor adds 760 QALYs in their career then that is approximately 22 sets of 35 QALYs. i.e. saving the life of 22 45-year-olds.

Career opportunities in the fields relating to GCBR reduction are abundant. There are government opportunities, for example with the Department of Health establishing National Laboratory Security Protocols or for the Department of Defence working on Biosecurity. There are also academic opportunities for examples working with universities working in research. Most of these opportunities focus on preparation as this is the key to performing well in crises, such as COVID-19.

Australia, in my opinion, was lucky rather than prepared when it came to the COVID-19 response. We had no pandemic response fund (and still do not). We lacked a general pandemic plan (and still do). We ended up adapting an influenza pandemic plan and were lucky it was sufficient (Department of Health, 2020). The next pandemic may behave very differently. We also had personal protective equipment and supply chain issues and we are dependent on international suppliers (Woodley, 2020). However, at the time of writing, we have been incredibly successful in controlling this pandemic. We are fortunate that we are an island nation with relatively impermeable borders. We are lucky to have a healthcare system which operates at commonwealth, state and territory levels with mechanisms for good co-operation, decision making and efficient resource allocation. We are lucky to have a political leadership who followed the advice of our Australian Health Protection Principle Committee. Other countries have not been so lucky. Next time, we may not be so lucky, and it is preparation that will save us.

In conclusion, the importance of working on the COVID-19 pandemic should not be minimised. It is an opportunity to identify the systemic weaknesses of our global community. However, the next pandemic could be far worse and working to reduce to risk of GCBRs is

one of the ways that medical students can do the most good. They would addressing a problem that is both tractable and growing, thereby having a great positive impact. The risk of a GCBR occurring in this century is low but the consequences would be disastrous. The skill sets of medical students and graduates are well aligned to the desired characteristics of people working in this field. Working on reducing GCBRs would be an excellent path for any medical student who wishes to make a significant societal impact.

The opinions articulated above represent the views of the author and do not necessarily reflect the views of the University of New South Wales, Sydney.

References

Carus, W. S. (1991). *" The Poor Man's Atomic Bomb?": Biological Weapons in the Middle East*: Washington, DC: Washington Institute for Near East Policy.

Department of Health, C. (2020). *The Australian Health Sector Emergency Response Plan for Novel Coronavirus*. https://www.health.gov.au/resources/publications/australian-health-sector-emergency-response-plan-for-novel-coronavirus-covid-19-short-form.

Herfst, S., Schrauwen, E. J. A., Linster, M., Chutinimitkul, S., de Wit, E., Munster, V. J., . . . Fouchier, R. A. M. (2012). Airborne Transmission of Influenza A/H5N1 Virus Between Ferrets. *Science, 336*(6088), 1534-1541. doi:10.1126/science.1213362

Horowitz, M. C., & Narang, N. (2014). Poor Man's atomic bomb? exploring the relationship between "weapons of mass destruction". *Journal of Conflict Resolution, 58*(3), 509-535.

Inglesby, T. V., & Relman, D. A. (2016). How likely is it that biological agents will be used deliberately to cause widespread harm? *EMBO reports, 17*(2), 127-130.

Koblentz, G. (2004). Pathogens as weapons: the international security implications of biological warfare. *International security, 28*(3), 84-122.

Lewis, G. (2012). How many lives does a doctor save? – Part 3 – Replacement. Retrieved from https://80000hours.org/2012/09/how-many-lives-does-a-doctor-save-part-3-replacement-84/

Lewis, G. (2020). Reducing Global Catastrophic Biological Risks. Retrieved from https://80000hours.org/problem-profiles/global-catastrophic-biological-risks/#what-are-global-catastrophic-biological-risks

Millett, P., & Snyder-Beattie, A. (2017). Existential risk and cost-effective biosecurity. *Health security, 15*(4), 373-383.

Ord, T. (2020). The precipice: existential risk and the future of humanity. In: London: Bloomsbury.

Schoch-Spana, M., Cicero, A., Adalja, A., Gronvall, G., Kirk Sell, T., Meyer, D., . . . Toner, E. (2017). Global catastrophic biological risks: toward a working definition. *Health security*, *15*(4), 323-328.

Woodley, M. (2020). Concerns grow over global PPE supply chains. Retrieved from https://www1.racgp.org.au/newsgp/clinical/concerns-grow-over-global-ppe-supply-chains