MEDICAL STUDENTS AT A CROSSROAD:
HOW MEDICAL SCHOOLS EDUCATE STUDENTS
DURING A COVID-19 GLOBAL PANDEMIC

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ABSTRACT

The COVID-19 pandemic has disrupted all sectors of society including medical education. Medical schools are faced with an ethical dilemma pitting quality of medical education against student safety and delivering quality patient care. This paper identifies the different participants affected by a medical school's decision on how to educate their students, discusses the current context of the pandemic, and analyzes the different options medical schools have. This paper defines two phases of the pandemic whereby phase two is defined as the time period the scientific community has an adequate understanding of the risks associated with COVID-19 and hospitals have adequate personal protective equipment. Phase one is simply the time before both of those criteria are met, and is the time when medical students should not be allowed on in-person clinical rotations. During phase two, students should be granted agency to make the decision for themselves. Using the analysis of the current pandemic, the paper outlines how medical schools' decisions should change for future hypothetical pandemics.

TABLE OF CONTENTS

Page

CHAPTER 1: PROLOGUE

With one rotation remaining before finishing my third year of medical school, I received an email on March 13, 2020 from my dean announcing, "We have decided to temporarily suspend all 3rd and 4th year medical student clinical rotations effective immediately through Sunday, March 22nd 2020." What began as a 10-day postponement of clinical rotations turned into an indefinite postponement and ultimately a months-long sabbatical from in-person clinical education. As the announcement sank in, and I had more time to think about the different reasons for their decision, I became frustrated.

I was frustrated for many reasons—the inability to do that which I wanted to do for the rest of my life, the uncertainty of my future, and a medical school administration informing me that they knew what was best for me without my input. The main reason, though, was that each morning after reading the news listing the number of cases of COVID-19 and the number of people who had died from COVID-19, I was unable to help in either the hospital or clinics. Medical school administrations sent emails explaining their decision processes citing a combination of legitimate reasons and some unsupported claims, but I felt coddled. My medical school had removed the monkey bars fearing fractured collar bones and liability, but failed to acknowledge the importance of challenges and benefits that can only come with hardship.

In response to the one-liner explanations given by the medical school administrations, I considered each of the claims and did my best to find the evidence that either supported or contradicted their arguments. I also examined the benefits of keeping students in clinical rotations, which were almost never mentioned by medical school administrations. What was originally intended to be a short retort to the emails from my medical school's leadership morphed into a

much more substantial body of work ultimately becoming my Masters in Urban Bioethics Thesis.

In writing about this topic, I learned two important lessons. The first is that writing about a new pandemic is a difficult task because it is a moving target. Every day we know more and more about Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus causing COVID-19. Never before has a vaccine accelerated through research trials as quickly as Moderna's and Pfizer's have, and our current knowledge may become obsolete in several months. Furthermore, the societal and governmental responses to the pandemic change equally as fast. Because there have been few national restrictions individual states have been in charge of pandemic restrictions, which means that almost every week there is a new restriction or "advancement to a new phase" issued by a governor or mayor. The States' different approaches are as varied as the States themselves are and add even another layer of complexity to the study.

The second lesson is the importance of including ethicists and students at the decision-making table. Medicine is full of complex and complicated ethical questions and to parse through the laundry list of pros and cons takes a combination of dialogue with the stakeholders, researched understanding of the possible solutions, and trained analysis. Many physicians are trained to make quick decisions— whether to start compressions, add another anti diabetic agent, or obtain imaging. Moreover, the healthcare industry values the metrics and efficiency of a physician to see as many patients as possible causing physicians to continue making more split-second decisions.

Ergo, when the pandemic started spreading throughout the United States, it was not surprising that the decision to remove students from the hospital was made quickly like the decision to start compressions and intubate the patient. Certainly it was the correct decision. However,

when it became evident that the pandemic would last longer than a few months, the decision of when and how to reintroduce students into the hospital was one that required more consideration. Like the intensive care physician who consults the palliative care team to facilitate a goals of care discussion after a patient coded and was intubated, medical school administrations could benefit from consulting ethicists and students.

Personal Timeline:

December 2019—An outbreak of cryptogenic pneumonia occurs in Wuhan, China.

March 11, 2020—World Health Organization declares that COVID-19 is a pandemic.

March 12, 2020—"As of today, all students on clinical rotations will remain on the rotation as long as their involvement does not negatively impact resources, including personal protective equipment (PPE), related to patient care. Students will not participate in the care of patients who are suspected of having or who have been diagnosed with COVID-19… All volunteer… activities are cancelled for the remainder of the semester."

March 13, 2020—"After discussion with the Dean, education leadership in Philadelphia, and our St. Luke's campus, we have decided to temporarily suspend all 3rd and 4th year medical student clinical rotations effective immediately through Sunday March 22nd 2020."

March 17, 2020—"For now, no students will return to the clinical setting before Monday March 30th, with no 3rd years returning to clinical rotations before Monday April 13th."

March 27, 2020—"After recent discussions, we have decided that students cannot return to clinical rotations on Monday April 13th. As of now, all clinical rotations will be suspended until Monday May 11th."

March 30-April 10, 2020—I attend online obstetric and gynecology lectures.

April 28, 2020—Over a zoom meeting, students are told they will return in a phased approach from May 11-May 26. Students will not be able to go into the operating room or to labor and delivery as the hospital does not have enough gowns, gloves, and other surgical equipment.

May 4, 2020—Students are surveyed when they would like to return between May 11, May 18, and May 26.

June 1, 2020—I start my first 4th year rotation, Transplant Infectious Disease.

June 22, 2020—I start last 3rd year rotation, Obstetrics and Gynecology.

January 22, 2021—I receive the first dose of Pfizer's vaccine.

February 10, 2021—I receive the second dose of Pfizer's vaccine.

CHAPTER 2: INTRODUCTION

The saying goes, "history repeats itself." Just over 100 years ago the 1918 Flu Pandemic spread across continents wreaking havoc for people, communities and economies. The death total from the infection was estimated to be 50 million; unfortunately many of the fatalities were patients younger than 5 and in the 20-40 year old category.[1] At the time, the medical industry was just getting off the ground. Some medical schools still only required a high school degree for admission.[2] While Oseltamivir had not been invented and penicillin would not be discovered for another ten years,[3,4] many of the ethical dilemmas facing the early 20th century medical community are reappearing in today's 21st century COVID-19 pandemic.

On March 11, 2020 the World Health Organization (WHO) declared that COVID-19 was a pandemic. Starting as a localized outbreak in Wuhan, China, the virus spread across the globe to include 118,000 cases in 114 countries with 4,291 deaths according to the WHO on that date.[5] The numbers continued to rise exponentially even amidst the social distancing campaigns, executive orders to stay-at-home,[6] cancellations of all major gatherings ranging from National Basketball Association games to film festivals to religious services, and other attempts to "flatten the curve." Numbers are not the only the way to paint this dystopian picture. Stories from Italy warned of family members being stuck at home with the dead body of a loved one for days on end without any assistance to remove the body, let alone anyone to come and help process the loss.[7] Stories from the United States portrayed the complexities caring for a patient with COVID-19 who coded in the hospital.[8] As harrowing as these pandemics are, physicians, healthcare workers, and other hospital staff have courageously stepped up to treat those infected with SARS-Cov-2. For those training to become physicians, the story is ethically complex.

What should medical students on clinical rotations do? Do medical students study from afar and read the stories from the confines of their homes or do they make stories and risk living to tell the tale? Over 100 years ago during the 1918 Flu Pandemic the answer was to send students to makeshift hospitals to treat those suffering from influenza. In an article from the Annals of Internal Medicine, Dr. Isaac Starr chronicled his transition from one lecture about influenza at the University of Pennsylvania's medical school to becoming "head nurse" of an entire floor solely for those with the flu. With little supervision and that coming from retired specialists or medical students in the year above, he was mostly free to care for his patients as he saw fit.[9] Although the extreme measures taken back then might not be as acceptable today, fourth year medical students in New York and Massachusetts graduated early with an invitation to serve in hospitals facing a shortage of medical workers.[10] Fortunately, they did have more supervision than Dr. Starr, and their service was optional, not required.

First, before any specific decision of how medical schools should educate their students during the COVID-19 pandemic, Chapter three will identify the stakeholders, i.e. those who may be affected by any medical school decision, and define their duties and rights. Chapter four will outline the current "bio-socio-pedagogical" situation. Chapter five will define phase one of the pandemic, argue for suspending clinical rotations during this phase, and analyze possible ethical educational alternatives. Chapter six will define phase two and argue for medical students determining a timeline for their individual return to clinical rotations. Chapter seven will explore how educational decisions should change during future hypothetical pandemics modifying several variables from the current one. Lastly, Chapter eight will suggest specific ways the medical com-

munity can be more prepared and ethical in training medical students along with proposing a retrospective trial to inform future medical school administrations' decisions about how to continue educating medical students during another pandemic.

CHAPTER 3: STAKEHOLDERS

Before discussing how medical schools should educate their medical students during a pandemic, it is vitally important to understand who the stakeholders, or those affected by any educational solution, are. This chapter will list each of the stakeholders and define their rights and responsibilities. The first stakeholders in this discussion are the physicians. Almost all physicians have recited some version of the Hippocratic Oath during their career. One line from a version used by Temple University's Lewis Katz School of Medicine graduates in 2009 reads, "That into whatsoever house I shall enter, it shall be for the good of the sick to the utmost of my power."[11] Physicians signed up to take care of sick people. They have a duty to treat their patients if they are coming in with the common cold, cholecystitis or COVID-19. Their primary obligation is to care for their patients.

Many physicians also have a secondary obligation. For attending physicians working with residents or medical students, they were hired to teach future physicians and to supervise the work of their trainees. Of note, this obligation is secondary to the first one. Namely, if there is a conflict of these two roles, care of the patient trumps teaching the learner. For example, a surgical attending may spend much of their time taking a backseat during an operation to the residents educating students and residents alike on the procedure, the anatomy observed, or management of the patient. As soon as a mistake occurs, active education ends, and the attending will jump into action to amend any error that has been made. That being said, often students and residents soak up vast amounts of information by witnessing a physician, i.e. passive education. Physicians first have a duty to care for their patients and then to teach residents and students.

The second stakeholder to discuss is the general public, which for the sake of simplicity includes patients. Many of the public's healthcare rights have descended from the Emergency Medical Treatment and Active Labor Act (EMTALA) of 1986. Essentially anyone in the United States presenting to the emergency room either with or without insurance must be evaluated by emergency room personnel, and if they are determined to have an emergent medical condition, they must be treated.[12] Therefore, any person presenting with fever, cough, and respiratory distress, i.e. a patient with COVID-19-like symptoms, has the right to seek and receive hospital care if needed, effectively granting all symptomatic COVID-19 patients the right to healthcare.

With the right to healthcare, the general public also has responsibilities, which have disseminated from the Centers for Disease Control and Prevention (CDC) and local state governments. The CDC escalated its directives in March of 2020 from recommendations for washing hands at least twenty seconds, to avoid mass gatherings and stay 6 feet apart, to advising everyone to wear a mask when unable to socially distance.[13-15] While there has not been a federal executive order to shelter-in-place, as of April 3, 2020 41 states had issued orders telling people to stay at home except for essential business or travel.[16] People are the vectors transmitting the disease, and therefore the States and CDC have made people responsible for decreasing its spread.

The next group of stakeholders is the medical students. The essential responsibility of medical students is to prepare for residency. In order to demonstrate their preparedness, students will need to pass a few national board exams such as Step 1, or the osteopathic equivalent COMLEX, and meet all requirements set by their medical schools. These requirements can be seen when examining the accreditation process of medical schools. The Liaison Committee on Medical Education (LCME) listed 12 standards for the 2019-2020 academic year. Two important standards are as follows: "Standard 5.5: A medical school has, or is assured the use of,

appropriate resources for the clinical instruction of its medical students in ambulatory and inpatient settings and has adequate numbers and types of patients (e.g., acuity, case mix, age, gender). Standard 6.4: The faculty of a medical school ensure that the medical curriculum includes clinical experiences in both outpatient and inpatient settings."[17] An indispensable part of the medical school curriculum therefore is to give students hands-on experience seeing patients. Each medical school may have different clinical rotations, but students must pass them before a medical student will be able to matriculate. Ultimately this is to ensure that all students can fulfill their obligation to be fully-fledged, competent residents by the time they graduate medical school.

In terms of medical student rights, medical schools must ensure their students are safe. The LCME notes, "Standard 5.7: A medical school ensures that adequate security systems are in place at all locations and publishes policies and procedures to ensure student safety and to address emergency and disaster preparedness."[17] The specifics of how or to what degree of safety is ensured by medical schools is not specified, but it would be within a student's right to demand access to all protective equipment deemed necessary before seeing any contagious patients. Thus, if students are caring for COVID-19 patients, they should expect all of the necessary personal protective equipment that physicians and other healthcare workers expect to decrease the risk as much as possible of contracting the disease.

The next stakeholders are the medical schools. As noted previously for the medical students, these educational institutions are responsible for balancing student safety and a robust medical education that includes clinical rotations. The key question for this discussion is how safe do students have to be because entering a hospital is inherently risky. The risks include, but

are not limited to coming into contact with patients suffering from contagious infectious diseases, patients admitted to psychiatric wards who pose a danger to themselves or others, and needle-stick or scalpel injuries from assisting in surgical operations. Although medical schools are not expected to entirely eliminate these risks as that would be impossible, they are expected to mitigate them, for example by providing students personal protective equipment like surgical masks, gloves, hand sanitizer, and training on how to safely assist in surgical cases.

In terms of medical school rights, the educational institution has the right to determine how they will educate their students. They have the power to send students to different hospitals for clinical rotations and to pull students out of clinical rotations if they are deemed unsafe or a poor educational experience. Although they have to meet educational standards set by the LCME, they have a certain amount of freedom in how they adhere to those standards. As the Association of American Medical Colleges notes in regards to inpatient contact activities, "The medical school dean has the authority and responsibility to make such decision regarding medical students."[18]

Although not a stakeholder, the resources that hospitals and medical schools have is vitally important to discuss. Unfortunately, the United States of America was woefully unprepared for this pandemic, and many hospitals were without adequate essential equipment for many months. An article in the New England Journal of Medicine noted, "Equally worrisome is the lack of adequate PPE [personal protective equipment] for frontline health care workers, including respirators, gloves, face shields, gowns, and hand sanitizer."[19] To illustrate this point, Thomas Jefferson University Hospital in Philadelphia accepted a donation in March of 2020 from Moore College Art and Design in the form of 200 N95 masks and 200 gowns. If that was

not desperate enough, Nasheli Ortiz-González, a professor at the art school, created an online tutorial on how to sew masks and with the help of others made 20 in the span of a couple hours to add to the donation.[20] These resources were insufficient even while hospitals were being as conservative with protective equipment as they could safely be and limiting the number of physicians, nurses, and visitors seeing each patient, not to mention that Philadelphia medical students had been absent from rotating in the hospital for at least two weeks when these stories were published.

Although the supply of PPE has improved, on June 10, 2020 the Governor of Washington, Jay Inslee, sent Vice President Mike Pence a letter calling for more PPE.[21] NPR reporter Steve Inskeep introduced an interview on November 26, 2020 by noting, "We've had nearly nine months of the pandemic to get this right, and still, many health care workers do not have the personal protective equipment that they need."[22] At various times and in various places across the United States, the healthcare system has not always had an adequate supply of PPE.

CHAPTER 4: CURRENT SITUATION

Now that the stakeholders' rights and responsibilities have been defined, it is important to understand what is happening currently. On March 17, 2020 the Association of American Medical Colleges (AAMC) advised all medical schools to suspend clinical rotations for the next two weeks. That statement was revised on March 30, 2020 to extend the suspension till at least April 14, 2020 citing concerns for students' safety, to flatten the curve and to preserve the supply of personal protective equipment.[23] To put this in perspective, barring students from the hospital was the same approach employed in previous severe acute respiratory syndrome (SARS) outbreaks. Medical students in both Toronto and Hong Kong were barred from rotating in hospitals when their cities faced outbreaks in 2003.[24,25] The AAMC then updated its policy again on April 14, 2020 stating, "For medical schools in locales in which there is significant, active current or anticipated COVID-19 community spread, and/or limited availability of PPE and/or limited availability of COVID-19 testing the AAMC guidance remains that, unless there is a critical health care workforce (HCW) need locally, we strongly suggest that medical students not be involved in any direct patient care activities."[18]

For medical schools nationwide this meant clinical rotations were initially postponed, then were modified through a combination of shortening rotations, transitioning aspects of the rotation online whether that be didactics or actual patient encounters, and offering other online electives while clinical rotations were on pause. The Lewis Katz School of Medicine at Temple University (LKSOM) employed all of these solutions. Medical students were barred from in-person clinical rotations until May 11, 2020. Rotations were decreased in length and supplemented

with a week or two of dedicated virtual didactics. While students were not in the hospitals, they were offered online electives such as Literature in Medicine and Radiology.

LKSOM reintroduced students into the fold earlier than many other schools, as an article from the AAMC published on August 11, 2020 details, "An AAMC survey of 155 member medical schools showed that more than 80% of respondents plan to return third- and fourth- year students to required clinical clerkships by the end of August."[26] After students started to return to clinical rotations, the AAMC then updated their recommendations for medical schools again on August 14, 2020 now saying that students could return to clinical rotations if there were adequate PPE and if medical schools could "ensure: (1) reasonable safeguards are in place to minimize medical students' risk of contracting COVID-19, and (2) medical student participation in the required clinical experiences and assessments aligns with the school's educational program objectives."[27] Unfortunately, just because many students have returned to clinical rotations does not mean that they will stay in their clinical rotations. On November 12, 2020, an LKSOM deans' meeting outlined if the Temple COVID-19 hospitalizations reached a critical point, clinical rotations would again be suspended.

CHAPTER 5: PHASE ONE ARGUMENTS

Now that the stakeholders have been identified and the current situation has been depicted, arguments for and against keeping students in clinical rotations can be examined. To further simplify the discussion, the pandemic will be split into two phases. Phase one is defined as the time from the start of the pandemic up until the time when the scientific community understands how the virus is contracted and the risks of infection *and* also each hospital has adequate amounts of personal protective equipment to supply students. It is worth noting that this time frame will vary city-by-city and hospital-by-hospital, and the reason that is beneficial is because each medical school administration should actually have their own timeline for students returning to clinical rotations. Phase two begins after there is both an adequate supply of personal protective equipment and information surrounding the infectious disease.

During phase one, students should not be allowed to have patient contact for two major reasons. The first is the dearth of PPE. Sending students into the hospital would exacerbate the already existing shortage of personal protective equipment. Without PPE, physicians and other health care workers are at risk of becoming infected leading to fewer medical personnel available to care for the rising number of patients needed to be seen. Medical school administrations can only reintroduce medical students once they have enough PPE for students in addition to the frontline workers. The Accreditation Council for Graduate Medical Education published a statement for guidance on what residents and fellows need before being asked to treat COVID-19 patients saying the hospitals must, "provide residents… with adequate resources, facilities, and training to properly recognize and care for these patients… any resident or fellow who provides care to patients will do so under the appropriate supervision for the clinical circumstance and the

level of training of the resident/fellow."[28] This guidance from the ACGME should also be the standard for medical students. Thus while hospitals are still requesting donations from their local community for PPE, students should not be seeing any patient in a capacity requiring PPE.

The second reason students should not be seeing patients during phase one is students do not understand the risks associated with the infectious disease. To use informed consent as an analogous example, patients cannot proceed to surgery without understanding the risks and benefits associated with the procedure. These patients are similar to medical students who would be entering the hospital without knowing what could happen to them and therefore would not have informed consent. Informed consent is widely accepted as the standard of care among the bioethical community for procedures and experiments to protect vulnerable populations from the inherently risky operations and unknowns associated with experiments. Likewise, it would be unreasonable to send unpaid, unknowing, and vulnerable students into an inherently risky environment. Therefore, medical students should not be sent into hospitals during phase one as phase one is defined by the time period in which the scientific community does not fully understand how COVID-19 is contracted nor the outcomes associated with the disease.

Therefore, during phase one, due to a lack of PPE and inadequate information, students should not be allowed into clinics and hospitals. This does not necessarily mean that clinical rotations have to be cancelled, but it necessitates their modification. As noted previously medical schools are already mitigating the deleterious educational effects of keeping students out of hospitals. Online didactics, virtual electives, and research have provided students an opportunity to continue learning even while staying at home. These pedagogical substitutes are valuable, but they will never replace learning how to scrub or discussing a patient's goals of care after receiv-

ing a terminal diagnosis, or even the simple act of obtaining a history and physical from a patient. Like everything done well, patient care requires hours and hours of practice. Although less than ideal, if students are barred from entering the hospital or clinic they should be immediately offered these digital and distanced alternatives.

Another way to be involved in patient care during phase one without endangering students would be to incorporate them into the growing telehealth market. Since the start of the pandemic many hospitals have switched both outpatient visits and inpatient consults to virtual visits to protect both patients and providers from spreading coronavirus. With relaxed governmental regulations on these visits, more and more of our outpatient and consult services will be turned into telehealth visits.[29] Currently the training model is as follows—medical students go into the exam room with the patient, take a history, do a physical exam, leave the room and present their findings to an attending physician. Then both return to speak with the patient and address all issues brought up with the student. Besides the physical exam, this entire model could be transported online with physician and student in the same building or even physician, patient, and student all at home. This would not endanger students and it would not require any extra PPE.

Furthermore, as this model of patient care is likely to continue even after the pandemic, it is vitally important for students to have experience working with patients in this manner and receive instruction on how to perform some exam maneuvers, build rapport with patients, and other doctoring skills through this entirely new medium. For students, there is no better time to start telehealth education than during a global pandemic. Therefore, during phase one students should be offered clinical telehealth rotations along with the other online rotations and research while barred from clinical rotations.

CHAPTER 6: PHASE TWO ARGUMENTS

Now that phase one has been covered, this paper will move onto phase two with the assumption that there is both adequate amounts of PPE and information regarding COVID-19 for students to make informed decisions of their risk when starting clinical rotations. The first argument proffered by medical schools to postpone clinical rotations for students is their safety. Staying away from hospitals where patients with COVID-19 are being treated would theoretically reduce their risk of exposure. If medical students could self-isolate and stay at home for the duration of the pandemic, their risk undoubtedly would be less than if they were going to the hospital everyday seeing patients. Moreover, there have been reports that the healthcare workers who contract the disease become sicker than the average infected person their age, possibly due to the "exposure dose" healthcare workers face when treating COVID-19 patients.[30]

Sadly what is true in theory is not always the case in practice. Medical students, like all people, live with others, go to the grocery store, exercise, take care of sick family members, and practically would not be able to self-isolate to the point where they can eliminate the risk of contracting SARS-CoV-2. Case in point, a 25-year-old medical student's rotations were cancelled and she moved back home to live with her family. There she contracted COVID-19 along with the rest of her family after her father, a cardiologist first presented with symptoms. She ended up in the Intensive Care Unit for several days on extracorporeal membrane oxygenation (ECMO), and was placed on a heart transplant list before having a full recovery.[31]

Moreover, a study from the CDC published in late October examining those hospitalized with COVID-19 from March 1-May 31, 2020 found that 6% of patients were health care personnel (HCP), but notes in the limitations of the study, "It is unknown whether HCP were exposed

to SARS-CoV-2 in the workplace or community."[32] Even as of October of 2020 it was incredibly difficult to know exactly where a person became infected, but earlier reports demonstrated that it was possible to have no hospital spread. A study from Hong Kong published on March 5, 2020 has demonstrated absolute lack of nosocomial spread in the 413 health care workers caring for COVID-19 patients suggesting that health care workers can care for patients with COVID-19 with minimal risk of infection.[33] Likewise as of March 21, 2020 Singapore had not recorded a single health-care-related transmission of the coronavirus even though they had treated hundreds of cases. Furthermore, Atul Gawande, a public health researcher and writer, reported that, "Deborah Yokoe, the medical director of hospital epidemiology and infection prevention at U.C.S.F. Medical Center, told me that, given the safety practices in the hospital, she is seeing a greater likelihood of staff picking up infections at home than at work" in his article "Keeping the coronavirus from infecting health-care workers."[34]

The counter to these data may claim that medical students would not be as adept at avoiding infection as the much more experienced physicians who were working at UCSF or the hospitals in Hong Kong and Singapore. There would be evidence to support that claim. Namely a study published in 2017 demonstrated that when 27 students participated in a simulated contaminated glove removal, 44% became contaminated, and 59% of the students did not recall prior training in the use of PPE.[35] On the other hand, in the same study attending physicians and fellows were quizzed on the CDC recommended donning and doffing sequence, of which 45% answered incorrectly. Another study looking at a geographically similar population in Northeast Ohio had 200 health care personnel simulate contaminated glove removal and found that 52.9% became contaminated, and when zooming in on just physicians the percentage contaminated was over 80. Again, the theoretical argument physicians are more adept at avoiding exposure does

not hold up when examining the evidence as physicians contaminated themselves even more than medical students with over 80% compared to 44%.[36]

The discussion does not end there though, as this study, unsatisfied with the results, implemented an educational intervention in hopes of reducing how often health care personnel are contaminating themselves. They provided thirty-minute sessions subdivided into ten minutes of a video and twenty minutes of demonstration and practice donning and doffing PPE. After this intervention, the percentage of physicians contaminating themselves sharply decreased from over 80% down to 20%. Thus, while it is still alarming how little training medical students in 2017 received in correct PPE usage, the argument that physicians are "better" equipped at protecting themselves has been debunked. This study did however demonstrate how vital it is to have a competency based educational session prior to reintroducing medical students to the hospitals and clinics.

To make the claim that students would be less safe rotating in hospitals is unfortunately not based on evidence, but is purely theoretical in nature. To use the medical student previously mentioned as an example, if she continued on rotations, did not move back home and spend time with her contagious family members, would she have contracted COVID-19? One can only speculate. When the scientific community cannot definitively determine the risk of becoming infected either in the hospital or at home, medical schools cannot claim that they need to keep students out of the hospital in order to keep them safe.

I want to be clear on this last point. I am not arguing that students would have been safer in the hospital as definitive data do not exist to support that claim. I am only stating that the truth of where students would be safest is unknown, and as such to make an unsupported claim of where students would be safest can be dangerous to the health of students.

If we assume that the practice aligns with the theory, and clinical rotations increase students' risk of getting COVID-19, we then need to determine the actual risk medical students face contracting the disease and the consequences of that illness for medical students. Although every individual's risk of disease is different, a few patterns exist. The great majority of medical students are in their twenties having recently graduated from college with a few in their thirties and the rare medical student over the age of forty. With that in mind, looking at data from United States, the risk for medical students can be estimated. An article published in the Lancet that examined cases of COVID-19 from March 1 - June 6, 2020 in New York City found the case-fatality rate to be 0.116% for those aged 25-44 years old.[37] This was strikingly similar to the Italian data from the onset of the pandemic to April 16, 2020 as it tabulated a case fatality rate of 0.09 for those aged 20-29.[38] Furthermore, if the trends hold true, it is likely that the majority of these deaths occurred in those at the upper end of this age range, which the majority of medical students are younger than.

Three objections to these data exist. First, the New York and Italian populations are not generalizable to the United States population. Albeit true, the trends in New York are similar around the country with the elderly being the most affected by COVID-19. Furthermore, as noted in a study in the European Respiratory Journal, those with medical comorbidities generally fare worse than those without.[39] As most twenty-year-olds do not have chronic obstructive pulmonary disease, or a malignancy or other medical comorbidity it is reasonable to believe that only the rare medical student would have a severe COVID-19 infection. Second, although the majority of medical students are young and at low risk of developing a severe infection from COVID-19, what about the student who is at high risk? For any student who feels unsafe, especially during a pandemic, medical schools should allow any student to postpone clinical rotations until the risk

is at a level they consider safe. The third objection is that case fatality does not paint the entire picture. Many of these infected young adults could have been admitted to the hospital or even put on ventilators, an outcome highly undesirable for any medical student, and the data do not account for that outcome.

However, using cumulative data reported up until December 2, 2020 from Washington State, 40% of their 172,437 confirmed cases of COVID-19, and 14% of their 11,195 hospitalizations occurred in those aged 20-39.[40] This adds up to a 2.2 percent chance of becoming hospitalized for this age group if they contract COVID-19, but is likely an overestimate considering the number of people who are asymptomatic and never get tested. Therefore, for any medical student contracting COVID-19 they would have roughly a 0.116% chance of dying and a less than 2.2% chance of becoming hospitalized.

Yet, attending medical school already comes with considerable risks. Pediatrics rotations are notorious for medical students becoming sick with whatever common respiratory or gastrointestinal bug that is going around at that time. Medical students are responsible for treating patients with tuberculosis, influenza, and many other infectious diseases. Medical students are even required to purchase needle stick insurance in case the student suffers a needle stick or scalpel cut. These and other health risks students put themselves through in order to become someone who can treat patients. Medical students are clearly at risk for both infections and physical injuries during medical school; COVID-19 may minimally increase that risk.

In addition to the physical health of medical students, medical schools are also concerned with their students' mental health. "Wellness" is the new buzzword in the medical field due to how mentally taxing the profession is. While physician burnout and mental health issues are regularly in the news, many of those issues start in medical school. American Medical Association

data show that medical students are three times more likely to die of suicide than their counterparts in the general population.[41] Exacerbating the medical field's mental health crisis is the pandemic. Highlighting this problem was the tragic suicide of Dr. Lorna Breen, an emergency physician in New York in April, 2020 when the city was a hotbed for COVID-19.[42] Many experts are worried that this pandemic may lead to increased burnout, moral injury, and post-traumatic stress disorder for physicians.[43] A JAMA article published in April 2020 outlined many of the reasons the pandemic could cause such negative mental health outcomes including, but not limited to economic stress, social isolation, barriers to community and religious supports, decreased access to mental health treatment, national media, and poor physical health.[44] While all of these risk factors make sense, it is surprising that none of the factors listed in the paper are specific to working in a hospital.

One study published in March of 2020 did actually attempt to elucidate which health care workers in China were at more risk psychologically. They found "participants reported experiencing psychological burden, especially nurses, women, those in Wuhan, and frontline health care workers directly engaged in the diagnosis, treatment, and care for patients with COVID-19." Though unknown, the predicted reason nurses were experiencing higher levels of "psychological burden" was their proximity to patients infected with COVID-19, which is also in line with the other risk factors being working in Wuhan (where the outbreak originated), and directly caring for patients with COVID-19.[45] All of this suggests that medical schools should be concerned and potentially consider barring students from clinical rotations as long as patients with COVID-19 are being treated in the hospital for mental health concerns.

That viewpoint is debatable for several reasons. First, whether or not medical students are sent into clinical rotations, they are psychologically taxed during the pandemic. Studies around

the globe have examined the mental health of their medical students during this time. A study surveyed Turkey medical students from April 30-May 5, 2020, a time during which clinical rotations had stopped, and found them to have worse sleep and appetite during the pandemic.[46] Likewise, a study from India found students to have significantly increased anxiety and stress when surveyed in June 2020 compared to the initial survey in December 2019, a time when no outbreak had occurred in India.[47] It is normal that pandemics would be stressing people's mental health and medical students are no different in this regard.

Thus, the question for medical schools again is which is the worse evil for medical students' mental health, sending students into clinical rotations where they will possibly experience anxiety about exposure and trauma from witnessing the pandemic's toll first hand or keeping them at home isolated, unsure of their future, and powerless to help? Now with this revised question, two answers come to mind. First, recalling the argument for physical safety, it is similarly dangerous to state that which is not supported by evidence. Evidence of this danger was supplied by an article from the New York Times examining the psychological impact on young people describing the situation in France where "professionals have urged authorities to consider reopening schools to fight loneliness."[48] Second, while the question of risk of contracting COVID-19 for an individual student can be estimated, the question of what is safer for an individual's mental health is difficult to assess, and the one most able to assess this question is more likely the individual in question. Namely for some individuals, they may feel less anxious by continuing rotations, seeing patients, etc., and for others they may feel better staying at home while COVID-19 is surging. The point is students would be the best judges of making that decision for themselves.

The second point of contention with this viewpoint is how it fails to account for the temporary nature of medical students. Every year fourth year medical students graduate to become residents. Residents at countless programs across the country are taking care of patients infected with COVID-19 whether it be in the emergency room, the hospital ward, or the intensive care unit. Regardless though of whether residents take care of COVID-19 patients or not, residents are expected to be in the hospital taking care of patients. Medical students need to be ready for this next step because more than just their mental health depend on it. Dr. Amanda Kingston notes in her article, "Physician suicide has a double peak with the highest incidence occurring in late-middle age and the second peak during the training years of residency and fellowship", attributing the long work hours and risk of medical errors as possible causes.[49] If residents are not as prepared for their training years, this peak of suicide during residency may spike even further. Therefore, if the medical school mission is to prepare students for residency and beyond, they must not only pay attention to their students' mental health during school, but also prepare them to remain mentally healthy during residency and beyond.

The third problem with this viewpoint is that many of the risk factors associated with worsened mental health found in the original study from China would not be a part of the medical students' experience. The proposed risk factor of proximity to COVID-19 patients does not apply to the medical student experience for the simple fact that medical students were forbidden from caring for confirmed or suspected COVID-19 patients. Other stressors that are hypothetically proposed such as lack of PPE, working increased hours, feeling powerless in the face of an incurable disease would also not factor into the medical student experience. By nature of returning during phase two, there should be an adequate supply of PPE, there would be no reason for students having longer hours, and because they would not be caring for COVID-19 patients, they

would not feel powerless. The concerns for medical students' mental health is valid, but for the three reasons listed above the concerns should not outweigh the benefits of giving students the choice of when to return to clinical rotations.

Medical students' introduction to medical ethics often starts with learning the core principles of beneficence, non-maleficence, justice, and autonomy. Urban bioethics takes autonomy one step further using agency in its stead. Agency takes into consideration which options are presented to the patient in the first place, while autonomy only ensures the patient understands and agrees to the option presented. An example of the difference may be the person who is experiencing homelessness with type II diabetes and does not have the option to refrigerate medications. To be autonomous means giving the patient guidance on healthy diets and prescribing medications that do not require refrigeration. To grant this patient agency means empowering them to find a shelter or means of storing their medicine in order to expand their options to control their diabetes. In this example, it is easy to see that granting agency leads to improved outcomes more than granting autonomy.

When medical schools make an argument about keeping students out of clinics for their own safety without their input, they are arguing paternalistically without respect for students' agency. While bioethics only applies the principle of agency to patients, it is important to extend it to medical students for two reasons. The first is that the nature of a pandemic blurs the line between student and patient. One 15 minute interaction can easily turn a student into an admitted patient. Therefore, because patient agency is emphasized, and students are one exposure away from becoming patients, student agency should also be emphasized. Furthermore, during phase two the main argument from medical schools for keeping students out of clinical rotations is related to their health. In essence, their argument is about the student-patient, not about the student-

learner. Because students can also practically be patients with COVID-19, the case for granting patients agency should extend to students.

The second reason stems from the basis for applying agency to patients. Simply insofar as agency is an extension of autonomy, the reason bioethics values agency is for all of the reasons it values autonomy. Autonomy was a concept highlighted in the Nuremberg Code of 1947, a code of ethics created in response to the atrocities committed by Nazi scientists experimenting on people without their consent.[50] Autonomy and thus agency were important principles aimed at empowering patients to make decisions for themselves because the relation of patient and provider has an inherent power imbalance. In a similar vein, students and medical school administrations have a similar power imbalance. Medical schools dictate almost all of students' curricula in the first and second years, where they can or cannot do clinical rotations, and which electives they are able to choose. A couple differences exist; namely a medical education is not life-saving therapy, but that being said, by the time a medical student is in their third or fourth year, due to the massive amounts of debt they have, there is immense pressure to finish. Moreover, unlike a patient, who can get a second opinion, it is very difficult to transfer to another medical school. All of this adds to the premise that medical school administrations and students have a similar power imbalance, and by granting students agency in regards to concerns about their health and safety is useful.

Now that we understand why agency should be granted to students, let us return to addressing their agency in regards to students' safety. Although students have autonomy to make decisions about what to do when not in clinical rotations, their agency is being limited because the option of returning to rotations is not available. Again, now that the discussion is focused on phase two, medical students know their personal risks of returning to clinical rotations and they

know the possible benefits. If student safety were the only issue keeping medical students from returning to hospitals, medical students should be given agency to make their own informed decisions.

Student safety is not the only issue preventing students from returning to hospitals. Another issue raised by medical schools is that physicians are too busy taking care of COVID-19 patients to oversee medical students. The idea is that without the distraction of educating students, they can devote more time to delivering high-quality care to a larger number of patients during this pandemic. To substantiate this claim, a study of Northwestern emergency room attending physicians found that these doctors spend nine minutes educating residents and students for every hour they are working.[51] Certainly attending physicians will need to spend more time taking care of patients during a global pandemic and if medical students are in the hospital they will have to spend some amount of time on education.

On second glance though, that argument does not take into account all that students provide. Orly Nadell Farber, a fourth-year medical student at Stanford, eloquently defends the value of the medical student role saying, "students can contribute to patient care by coordinating medications and procedures, consulting with nurses and specialists, and updating patients and their families on the care plan."[52] At Temple Hospital, medical students have done all of these things. They are also tasked with checking in on patients so residents can continue writing their notes, transporting patients to radiology, delivering blood samples to the laboratory, talking to family and friends to obtain collateral information about patients in psychiatry wards, speaking with ancillary staff regarding discharge concerns, answering questions patients have, and explaining disease processes patients are experiencing. All of these tasks save the team time and lead to better

patient care, which is supported by the fact that teaching hospitals generally provide higher quality of care than non-teaching hospitals.[53]

These claims are not just voiced by students. A letter to medical students published in the Philadelphia Inquirer written by two residents at the University of Pennsylvania echoed many of the points made by Ms. Farber saying, "Patients and families are begging for more frequent updates in this busy time, and we, as residents, often overlooked the role of medical students in this simple yet crucial task. Now, with students absent, it is even more apparent how helpful they were to the medical team, and how appreciative families were to have them as an advocate."[54] Attending physicians also published their own odes to medical students. Dr. David Hilden wrote in a diary entry, "Students are definitely a positive addition to our healthcare systems and I really miss them."[55]

Furthermore, a great attending will spend time quizzing students and teaching them about patients, but not all the time or every day. Students realize there is a time and place for learning, and can soak up knowledge even when attending physicians are not actively teaching. The physician time crunch argument fails to take into account the full picture of how medical students can save the medical team time nor how much students can learn from a physician who does not spend time actively educating students and thus is not a valid reason for keeping students out of clinical rotations.

Lastly, although this argument was popular at the beginning of the pandemic when many hospitals were not seeing a surge of COVID-19 patients, and hospitals had such low censuses that they were laying off healthcare workers, it is rarely raised as time has passed. This occurred in spite of the fact that many hospitals experienced surges even later during the fall and winter of 2021—times when students were permitted back in hospitals. Thus, this argument may have

merit at least at the beginning during phase one when hospital systems were planning and reconstructing hospital workflows and learning how to care for COVID-19 patients. With all these moving parts, adding medical students to the equation would be reasonably difficult for attending physicians to figure out not only their new role, but also the students' role. That being said, as time went on and the new systems became the new normal, the argument that physicians do not have time fades away during phase two.

Another objection raised in the initial AAMC letters guiding medical schools to students continuing clinical rotations is that they should help flatten the curve as they are not essential workers. This is problematic for two reasons. First, due to the fact that the risk of contracting COVID-19 in the hospital for medical students may be no greater than it is outside the hospital, the argument for flattening the curve does not have evidence to support that claim.

Second, while it is true that medical students are not essential workers, it is also true that every year medical students graduate and become physicians, immediately becoming essential workers. Therefore, if medical students return to clinical rotations it is possible they raise the curve and negatively impact the current public's health, but if they stay home and have a worse education, by the time they graduate, their poor medical education will negatively impact the future public's health.

Thus, this argument pins pandemic public health against future public health. The medical system depends on over 30,000 interns, or first year residents, to replace the ranks of residency programs around the country.[56] To get a picture of how important these interns are, a study from JAMA published in 2010 estimated that this group works on average 59 hours per week which translates to 1,770,000 hours of patient care, or almost 2 million hours where an intern can

make a sound medical decision or a mistake.[57] Another way to assess each intern's value is to examine the number of patients they see on the inpatient ward. While the ACGME permits interns to see no more than 10 patients a day, the average is necessarily less than that with at least one institution averaging 7 patients a day.[58] To vastly underestimate the time interns spend on the inpatient service, suppose they only work 26 weeks in the hospital and of those 26 weeks, 6 days per week, then interns as a whole will care for 32,760,000 "patient-days" in a year. Here the term patient-day just means if a patient is hospitalized for a week their stay was 7 patient-days. This does not even factor the 20 plus weeks that interns are seeing patients on the outpatient side or in the emergency room. All that is to say, this group of interns is incredibly vital to the care patients receive each year.

Medical students have very little time away from school, especially by the time they are entering their third and fourth years. Any amount of time exceeding a few months away from the hospital and medical schools would result in one of two options: graduating medical students with inferior educations or delaying graduation leaving residencies short of physicians caring for patients. By not sending students into the hospital, students would be able to help flatten the curve, but a year from now when 30,000 poorly trained interns are taking care of patients, there surely will be more lapses in patient care. On the other hand sending students in to clinics although possibly raising the curve would mean in a year's time as fourth year medical students become interns, they are more prepared to deliver quality medical care.

The important question then is how inferior is this education. A study published in 2009 surveying 21 program directors found that 33% of them believed interns lacked "adequate clinical judgement" even without a pandemic-disrupted education.[59] This statistic is concerning as is, but even more so when considering that all incoming interns will have even less clinical time

than previous interns. On the student side of the equation, the outlook is equally bleak. Students from the United Kingdom were asked if they felt less prepared for Foundation Year 1 (intern equivalent) due to the disruptions caused by COVID-19, of which 59.3% either agreed or strongly agreed.[60]

Another way to examine this question would be to examine the debate of 3 year versus 4 year medical schools. Although once vogue in medical education, there are only a handful of 3 year programs left across the country where students often commit to entering a specific specialty, and have far fewer breaks than 4 year medical students. Critics of these programs lobby a number of problems including but not limited to, "student burnout, faculty fatigue, the increasing complexity of medicine, quality issues, and diminished competitiveness for residencies."[61] Furthermore a study of Ohio State faculty who were asked about their institution's three year medical program noted a trend where faculty perceived limited student instruction in basic medical knowledge and neither student learning nor quality of teaching is enhanced.[62] Importantly, these programs were created with the foresight that they would be three years, an advantage that no medical school has had during the pandemic, and many of the students are not in need of career exploration. Therefore as several program directors already find their interns' medical education lacking and as three year medical programs have gone out of favor due to similar concerns, it is reasonable to expect even a half-year pause to be detrimental to the quality of medical education. With these two opposing public healths, the AAMC claim that students should stay home to flatten the curve is therefore short-sighted, and should not be used to bar students from rotations unless it is for a very short time.

The other reason for students to maintain their distance from the hospital comes from the urban bioethical principle of solidarity. Angus Dawson and Bruce Jennings summarize solidarity

as “standing up beside” in their piece titled, “The Place of Solidarity in Public Health Ethics.” This idea posits that any fellow human’s death or illness is harmful to all of us as we are all part of humanity, united and inextricably linked to others. COVID-19 offers students the opportunity to enact solidarity by “standing up (inside) beside.” Being able to empathize with patients from all walks of life is inherent to being a physician. By standing up inside with others, students will gain an appreciation for the collective good, or the idea that we are only as happy as the least happy of us is.[63]

On the other hand, one could argue that students would be employing solidarity as they bear witness to the daily tragedies occurring in the hospital with COVID-19 patients. After witnessing the personal struggles and hearing about the ever-rising death tally due to COVID-19, and learning about the disparities associated with this disease, the lesson of solidarity would crystalize for students. Seeing COVID-19 patients up close teaches students the value of wearing a mask, getting vaccinated if possible, social distancing, and all of the other sacrifices benefitting the collective good. Therefore arguing using the principle of solidarity is not a valid reason for keeping students out of clinical rotations.

This discussion of student safety, the physician time crunch, flattening the curve, and the ethical principle of solidarity have all come short of meeting an ethical reason to keep medical students out of clinical rotations during phase two. Therefore, as soon as there is adequate PPE and enough information about the virus to make an informed decision about a student’s risk, students should be allowed to return to clinical rotations when they are interested.

CHAPTER 7: HYPOTHETICAL PANDEMICS

The preceding discussion has focused on the current pandemic; the next step is to extrapolate to future hypothetical pandemics that are different in one type of way. The first modifiable variable to consider would be the contagion's lethal factor. How deadly the infection is would alter the student safety argument. The increased danger to students would make the paternalism of not allowing students to choose whether to return to clinics more palatable. In some ways this is comparable to society's tolerance for gambling, but intolerance for Russian Roulette, both inherently risky but one fatally so. Furthermore, if students are dying, the argument for keeping students out of the hospital due to a future need for physicians becomes much stronger.

Another variable to change is the contagion's R factor, or its contagiousness. The R factor can be defined as the average number of people a currently infected person will infect. In May of 2020 COVID-19 was estimated to have an R factor around 3 depending on the study.[64] Flattening the curve is essentially decreasing the R factor. Supposing the R factor of some future infectious outbreak was closer to 1 would mean that growth in the infection would be linear, and would be less likely to cause a pandemic. However, the more interesting case is supposing a future contagion has an R factor closer to 10. The first consideration is how quickly the pandemic would end. Supposing this pandemic has a weeklong course, and one is only infectious during that week. Then if the U.S. started with 10 infected individuals, after 8 weeks, 100,000,000 people would become infected. If it were that simple, it would be easy to ask students to stay away for two months and return once it blows over.

Unfortunately the R factor depends on other factors like number of uninfected people, temperature, human behaviors, and use of protective equipment to name a few. As the number of

infected individuals exponentially increases the fewer people are able to be infected and the R factor necessarily decreases. Nevertheless, as the R factor increases, there is more of an incentive for students to socially distance at home away from their clinical rotations. The reason being the cost of a medical student getting sick is so much higher. When the R factor is 3, it is likely that people are only infecting people they live with or work closely with. If the R factor is closer to 10, people will likely infect the people they had short interactions with—their friend, their neighbor, or their patient. Thus as the R factor goes up, the likelihood a student would be spreading disease in the hospital would go up, and more patients and students would be at risk. So a new pandemic with a high R factor would likely prohibit students from entering clinics until the R factor declines.

Another variable is knowledge about the infection. At the onset of this pandemic, very little was known, but as more and more people became infected physicians were able to see epidemiological trends, disease progression, and discover both effective and ineffective treatments. Without information about who the disease infects, how it is transmitted, and what happens to those infected, students who could be exposed to the infection by entering the hospital should remain on the sidelines. When students do not know what the risks of being exposed are, they do not even have "informed consent," i.e. autonomy let alone agency, and medical schools would be irresponsible sending medical students in to fight against the unknown. Just like how in this pandemic students should not be allowed to return until phase two, students in future pandemics should not be on clinical rotations until the risks of the disease are known.

While there are hundreds of other variables to consider in each pandemic, one more to consider would be the response of the region in which students are practicing. In April and May of 2020 some states in the U.S. started "opening up." Although not advised by most public health

experts, states started opening nonessential services like the beach and barbershops.[65] The first questions the medical school must ask then is do the hospitals have adequate PPE to care for patients and does the scientific community know the risks students would face if exposed in the hospital. If the answer is yes to both questions, students should be able to decide what is best for them. Otherwise, regardless of what the government is doing, medical schools still have a duty to protect their students and therefore how they continue educating their medical students should not be predicated on the socio-political situation their state or country is in.

CHAPTER 8: CONCLUSION

Along with an analysis of when students should return to the hospital, there are a few takeaways from this paper. First medical students need more agency. The Association of American Medical Colleges (AAMC) is the body issuing decrees guiding medical schools on when students can be reincorporated into clinical rotations. The authors of such documents includes four medical doctors and one doctor of philosophy.[18] Medical students have not been given a voice when they have valid ideas and opinions on the situation. An article published in March of 2020 in the New England Journal of Medicine surveyed students, residents and fellows asking them what their feelings were towards the COVID-19 pandemic. Responses encompassed a number of human emotions from fear about catching the disease while pregnant to guilt about potentially exposing housemates to feeling relieved to be working.[66] The responses all demonstrated a maturity and understanding of what this disease is and can do, and gave the pandemic a student's context that none of these doctors at the AAMC could speak to. With this in mind governing bodies like the AAMC need to include medical students to have a nuanced perspective in their decision-making process affecting students.

Another takeaway is that students need to be incorporated in telehealth visits. A few years ago, physicians were not performing virtual visits with patients. As these types of visits become more predominant in healthcare, this new curriculum for medical students and residents needs to be developed. Students will need to learn what to expect and the etiquette of virtual visits, how to interpret the audible and pixelated visual cues that could make the difference between making a diagnosis and appropriate treatment and letting a disease progress, and ways to incorporate modified physical exam maneuvers to assess a patient. Complicating this process will be

the fact that physicians are also new to using this technology. It will be invaluable to begin creating a curriculum for medical students to be ready in time for rotations incorporating virtual office visits.

A third takeaway is that sending students away from the hospital is not guaranteed to be the best for students. Supposing that nosocomial spread is minimal and community spread to be rather high, the hospital may actually be a safer place for students. If epidemiologists like Deborah Yokoe are correct when believing their physicians are more likely to be infected away from the hospital, precluding students from the rotation is not safer for students.

To further explore this claim made in the beginning of the pandemic, medical schools should consider constructing a retrospective trial. This proposed trial would involve medical students in their clinical years and would incorporate both quantitative data and qualitative data. The quantitative component would ask students how long they were sidelined from clinical rotations and if they contracted COVID-19, was it while they were on clinical rotations or while they were barred from entering the hospital and clinics. The qualitative component would gather students' perspectives on how they perceived their medical education during the pandemic. Do they feel adequately prepared for residency, do they feel their medical school kept them safe, and should their medical school have adopted a different approach to continuing medical education during the pandemic would all be appropriate questions to assess the subjective experience of medical students. These data would be vital to future pandemics in giving insight to many of the ethical questions created by this pandemic and would help future medical school administrations determine how to continue educating their students in a pandemic.

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