



COVID-19 and Medical Education: A Four-Part Model to Assess Risks, Benefits, and Institutional Obligations During a Global Pandemic

Paul Barach, MD, MPH; Rami Ahmed, DO, MHPE; Eric S. Nadel, MD; Frederic Hafferty, PhD; and Ingrid Philibert, PhD, MA, MBA



From the Children's Hospital of Michigan, Wayne State University School of Medicine, Detroit, MI (P.B.); Jefferson College of Population Health, Philadelphia, PA (P.B.); The University of Queensland, Australia, St Lucia, Australia, (P.B.); Department of Emergency Medicine, Indiana University School of Emergency Medicine, Indianapolis (R.A.); Department of Emergency Medicine, Brigham and Women's Hospital, Massachusetts General Hospital, Boston, MA (E.S.N.); Harvard Medical School, Boston, MA (E.S.N.); Division of General Internal Medicine and Program in Professionalism and Values, Mayo Clinic, Rochester, MN (F.H.); and Frank H. Netter MD School of Medicine, Quinnipiac University, North Haven, CT (I.P.).

The coronavirus has brought unprecedented changes to health care and medical education in the United States. The coronavirus disease 2019 (COVID-19) pandemic is emerging as nothing less than an “existential crisis” that is threatening to reshape American society. By mid-December more than 74 million cases of COVID-19 have been confirmed throughout the world with more than 1.6 million deaths. In the months since the first US case of COVID-19 was diagnosed in February 2020, the disease has resulted in nearly 17 million individuals infected and more than 300,000 deaths.¹ In March 2020, during the peak of the pandemic in New York City, the Association of American Medical Colleges (AAMC) and the Liaison Committee on Medical Education issued guidance that medical students should not be involved in the care of patients with COVID-19 or persons under investigation,² and many medical schools near the early epicenter of the pandemic discontinued clinical rotations. Concurrently, several medical schools and a few US states initiated plans for senior medical students to graduate early and support the growing clinical demands due to COVID-19.³ Medical students removed from clinical settings initiated novel efforts for voluntary contributions to assist with the health care crisis, such as at the COVID-19 Student Service Corps at Columbia University Irving Medical Center.⁴ Residents and fellows in a range of acute care settings continued to triage patients with symptoms that could be COVID-related and provided care for COVID-19–positive patients.

The practice of medicine carries inherent risks, especially during outbreaks of highly contagious diseases such as Ebola, H1N1, tuberculosis, and COVID-19. Exposure risks remain and extend to medical students and resident/fellows functioning in clinical settings and create ethical dilemmas around service vs potential risks of illness. At the time of an unprecedented crisis in the US health care system, institutional leaders and medical educators are tasked with meeting patient care demands and ensuring the health and well-being of learners across the medical education continuum while preventing stagnation in their education and promoting medical students and residents' professional growth. The 1980's HIV/AIDS epidemic was the first major infectious disease outbreak during which residents' exposure to a contagious disease was analyzed with an emphasis on physicians' “duty to treat” in spite of personal fears and perceived risks.⁵ The debate about exposing learners to a dangerous infectious disease reemerged during the 2003 to 2004 severe acute respiratory syndrome (SARS) outbreak.⁶ When patients with the Ebola virus entered the US health care system, the leaders of several institutions that received these patients decided that medical students and residents would not be involved in their care.⁷ Given the spread of the virus and its lingering presence, key considerations going forward include whether and to what extent medical students and residents/fellows should be involved in caring for patients with COVID-19, how this will affect their learning

competencies, and how to ensure their safety and well-being.⁸

A global pandemic and national health care crisis necessitate that leaders assess the risks and rewards of particular clinical placements for medical learners (medical students and residents/fellows). In this commentary, we offer a framework to guide medical schools and teaching hospital leaders' decisions about the deployment of these learners during the pandemic on the basis of 4 considerations:

1. The degree of risk inherent to learners in a given clinical or educational activity during the pandemic by using the principle of as low as reasonably achievable (ALARA) adapted from the nuclear industry;
2. The anticipation of an ethical benefit that balances the risk, for which we add a new concept of as high as conceivably achievable (AHACA) to help in considering the benefits in the context of supporting formal risk-benefit assessments;
3. Specific efforts at the program and institution levels to reduce risks for medical learners (and other frontline professionals); and
4. An explicit process of informing learners about their exposure risks of different service deployments during a pandemic and obtaining formal consent.

To create this framework, we drew on information about minimizing the risks in inherently dangerous industries, learned from practices during earlier outbreaks of dangerous infectious disease, and sought guidance from ethics experts.⁶ We provide examples of how this risk framework can be applied to specific situations in which medical students and residents/fellows function in a clinical context.

CONSIDERATION ONE: AS LOW AS REASONABLY ACHIEVABLE AS A FRAMEWORK TO SUPPORT DECISION MAKING IN REDUCING EXPOSURE RISKS IN CLINICAL AND EDUCATIONAL ACTIVITIES

We draw on lessons and concepts from the high risk and highly reliable nuclear industry to offer education and institutional

leaders a tool to address how best to reduce the risks to medical students and residents/fellows during a dangerous pandemic. The omnipresent threat of radiation produced the ALARA risk assessment framework.⁹ As noted on the Centers for Disease Control and Prevention (CDC) website about exposure to radionuclides: “[E]ven if it is a small dose [of radiation], if receiving that dose has no direct *benefit*, you should try to avoid it.”¹⁰ Where a benefit exists, the ALARA framework describes the *informed assumption of risk* exposure mitigation through (1) minimizing time, (2) maximizing distance, and (3) using shielding.¹⁰

We feel the ALARA framework could be useful when assessing the risks of health profession learners as they care for patients with COVID-19. Implementation of the framework requires guidelines for its application for individual and collective exposures to COVID-19. This could include residency program directors and institutional education leaders developing risk protocols and metrics for the availability and correct usage of personal protective equipment (PPE), just-in-time training, and more effective and responsive bedside supervision.

CONSIDERATION TWO: AS HIGH AS CONCEIVABLY ACHIEVABLE (AHACA) TO ASSESS THE BENEFITS OF ACTIVITIES AGAINST THEIR RISKS

A key consideration of any risk-benefit assessment is the anticipated benefit to learning, patient care, and the larger community that results from learners' engagement during the pandemic. For junior learners, balancing risks and benefits suggests that settings adhered to ALARA principles that also offer substantial educational or patient care benefits should drive the priorities of teaching institutions. We add the concept of AHACA to the vocabulary to help define benefits in the context of caring for patients with COVID-19. This offers institutional leaders a tool to balance the risks with benefits in the areas of patient care, clinical learning, or giving learners opportunities to demonstrate their professional commitment directly or in support of

individuals on the frontlines of the pandemic.⁴ During COVID-19 surge operations, the contribution of all clinicians is vital to ensure patient care, distribute the work, and prevent exhaustion of frontline clinicians. Excluding residents/fellows from care for patients with COVID-19 deprives them of important educational, crisis management, and leadership opportunities.¹¹ Caring for patients with COVID-19 also reinforces their Hippocratic oath and physician professionalism. Given the higher rates of COVID-19 illness in minority populations, excluding residents/fellows from care for patients with COVID may also violate concepts of medical equity and social justice that have gained center stage after recent national events. Exceptions to the argument for AHACA benefits include individuals at higher personal risk such as pregnant women and individual learners with a suppressed immune system. Another exception may be activities in acute care settings after medical students' "early graduation," with the rationale that their clinical contribution and benefit are limited and may not offset the risk of caring for patients with a highly contagious disease.

CONSIDERATION THREE: EFFORTS TO REDUCE THE RISKS FOR LEARNERS AND OTHER FRONTLINE PERSONNEL

Institutional leaders' use of the ALARA framework might focus on:

1. Limiting exposure to key activities (comparable to the ALARA concept of minimizing radiation exposure);
2. Use of telemedicine to allow distancing of learners (comparable to the concept of maximizing distance); and
3. Appropriate use of PPE (comparable to the concept of shielding).

To further ensure adherence to ALARA principles, all learners in patient care settings (volunteers and those in a training or under employment contract) must be trained in infection prevention and control and must be provided with CDC-prescribed

and risk-appropriate PPE.¹² This suggests that institutions should not deploy medical learners if appropriate PPE and other measures to ensure their safety (ideally using ALARA principles) cannot be guaranteed. An Accreditation Council for Graduate Medical Education (ACGME) guidebook for well-being includes "rules of clinical engagement" for residents/fellows that empowers them to decline to participate in care in settings in which appropriate PPE is missing and supervision cannot be ensured.¹³

In **Box**, we offer for consideration practical suggestions drawing on the joint principles of ALARA and AHACA while actively reducing exposure risks of COVID-19 for medical students, residents/fellows, and other health profession learners in clinical settings. These recommendations are supported by the guidance from national organizations, such as the CDC,¹² the AAMC,² and the ACGME^{13,14} (see the **Box**).

The AAMC-issued guidance in the spring of 2020 that medical students should not provide direct patient care for COVID-19—positive patients,² consistent with other national efforts that appear consistent with ALARA principles. On March 29, 2020, the federal government issued temporary regulatory waivers through the Centers for Medicare & Medicaid Services to offer flexibility to the nation's health care system as it responds to the COVID-19 pandemic.¹⁵ It included regulatory relief to academic medical centers to allow residents to use telemedicine services to provide patient care and extending care in a clinical format that reduces exposure and is safe for residents/fellows. The ACGME provided guidance to accredited programs and sponsoring institutions during the pandemic, with the aim to protect residents/fellows and their education, consisting of 4 expectations¹⁴:

1. Adequate resources and training, including providing residents/fellows with "appropriate infection protection for the clinical setting and situation" and "assigning residents only to sites that ensure the learner safety and the safety of their patients";
2. Adequate clinical supervision;

BOX. Using the As Low As Reasonably Achievable/As High As Conceivably Achievable Considerations to Support Decision Making in Clinical Settings

- Limit the number of physicians/residents entering patient rooms, doing consults, or seeing clinic patients, especially in high-risk settings such as intubating patients and aerosol-inducing procedures.
- Develop coronavirus disease 2019 (COVID-19)—specific safety and infection control protocols for high-risk procedures or refine existing protocols.
- Ensure COVID-19—specific competency-based training and assessments for junior learners before their participation in invasive procedures.
- For patients with known COVID-19 and persons under investigation, consider whether a learner can substantially contribute to care and/or learn vs the extent to which the risk of potential harm outweighs the benefits of care and learning.
- Take patient histories using remote monitoring technologies (eg, mobile phone, laptop, etc) from outside the room to determine risk; use existing communication technology in patient rooms to allow them to speak with physicians and nurses before they enter the room.
- Assess the dynamic and changing exposure risks of each learner and physician daily using for example daily surveillance chat-bots; consider staff daily self-attestation, testing all health care providers regularly and, as indicated, after potential patient exposure.
- Use simulation-based assessment and virtual skills assessments to ensure learners have the relevant competencies to safely work in clinical settings during the COVID-19 pandemic (including how to correctly don and doff personal protective equipment, basic principles of infection control, and self-monitoring for exposure risks in work, learning, and personal contexts).

3. Adherence to ACGME resident work-hour requirements; and
4. Allowing fellows in accredited subspecialty programs to provide unsupervised care in their core specialty for up to 20% of the time in an academic year if specific requirements for this role are met (eg, fellows are board eligible or certified in the core specialty and they have been appointed to the medical staff at the sponsoring institution).

APPLYING THE FRAMEWORK TO SPECIFIC CLINICAL CONTEXTS

The [Table](#) provides a list of potential clinical activities, stratified by the level of the learner and the level of “risk” and “benefit” the imputed level of learners’ “consent” for the activity. “Benefits” in the context of patients with COVID-19 arise from the rare opportunities afforded to learners as a result of unique circumstances provided by the pandemic that may not be experienced in traditional circumstances. The categories in the [Table](#) suggest a range of activities, and their predicted risks, suitable for different levels of learners, particularly medical students vs residents/fellows. In contrast with medical students, who have yet to complete their undergraduate medical

education, residents are qualified physicians and should be involved in the care of patients with COVID-19.

CONSIDERATION FOUR: ROLE OF CONTRACTS, INFORMED CONSENT, AND PHYSICIANS’ “DUTY TO TREAT”

A perspective published in 2008 discussed physicians’ “duty to treat” in the context of 3 decades of real and perceived high-risk situations, spanning the HIV/AIDS, SARS, Ebola, and avian flu epidemics.⁶ It emphasizes that physicians have been at the frontlines of deadly outbreaks as part of their professional obligations and, as a result, were regularly infected with the same diseases as their patients. The authors discuss the strengths and limitations of 5 arguments supporting a physician’s duty to treat:

1. Explicit consent (a signed contract for an infectious disease specialist, executed with a full understanding of the risks);
2. Implied consent (taking a job as an emergency medicine resident that implies informed consent to assume risks associated with the work, including treating individuals with infectious diseases);

TABLE. Coronavirus Disease 2019 (COVID-19): Learner Risks, Rewards, Level of Consent, and "Duty to Treat"^a

Type of activities	Details	Risks	Consent or "duty to treat" rationale ⁶	Institutional responsibility	Benefits
Risks are low to high					
Medical student volunteer activities in low-risk settings ^b	Call center staffing from home; telemedicine checking in with patients, making masks and other PPE; supporting research and surveillance work from home	Low	Explicit consent (to volunteer)	Ensure activities are "safe," offer appropriate training and supervision	Provides leadership opportunity in support of frontline staff and opportunity for training in triage principles and critical resource utilization
Medical student volunteer activities in moderate-risk community settings ^b	Working with community organizations and engaging in support activities in the community. These opportunities may include activities such as staffing at a call center; staffing volunteer organizations; creating items needed by health care organizations; and shopping, delivering groceries, babysitting, and doing other errands for caregivers, health care workers, patients, or families of patients	Low to moderate	Explicit consent (to volunteer)	Ensure activities are "safe," offer appropriate training and supervision and PPE as warranted; under medical school liability	Provides leadership and team-building opportunities in support of frontline staff; provides significant psychological benefit to frontline workers; development of a sense of community that "we are all in this together"
Medical student volunteer activities in patient care settings (including volunteer activities and clinical clerkships) ^b	Deployment in lower-risk settings. Activities include service in traditional medical clerkship student roles and volunteer service as "scribes," runners, clinical support, and similar activities	Low to moderate	Required component of medical student clinical education; explicit consent (to volunteer)	Offer supervision and appropriate training, including training in infection prevention and provide adequate PPE for both clinical clerkship and volunteer activities; under medical school liability	Allows students to fulfill clinical clerkship requirements; as volunteers, students support frontline staff; provides mentorship opportunities and observation of frontline personnel
Residents/fellows providing patient care activities in an educational context ^{13,14}	Provide routine care alongside fully trained physicians and staff, taking call, and taking care of all patient care and consider including aerosol-generating procedures with proper training and strict supervision	Moderate to high	Contractual agreement	Offer supervision and appropriate training, including training in infection prevention and provide adequate PPE; under hospital liability	Provides critical frontline clinical leadership growth and opportunities to learn and use principles of crisis resource management

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TABLE. Continued

Type of activities	Details	Risks	Consent or "duty to treat" rationale ⁶	Institutional responsibility	Benefits
Medical student deployment after "early graduation," cross-deployment of residents/fellows and fellows in unsupervised practice in their core specialty ³	During COVID-19 surge operations, provide care alongside fully trained physicians and staff, taking overnight call and caring for patients	Moderately high to high	Licensure for supervised practice (medical students), appointment to medical staff (fellows in unsupervised practice)	Offer just-in-time training before redeployment and provide adequate PPE; provide adequate supervision for early graduated students; ensure trainees are protected under hospital liability	Provide for added staffing to respond to clinical surge situations; educational benefits will vary by context and are not the primary rationale

^aPPE = personal protective equipment.
^bCOVID-19: Frank H. Netter MD School of Medicine, Quinnipiac University. Three tiers of medical student COVID-19 volunteer activities. Traci Marquis-Eydman, MD, written communication, March 29, 2020.

3. Special training (an individual trained as an infectious disease specialist, fully understanding the inherent risks);
4. Reciprocity (the individual's training and added special qualifications were subsidized by public funds, and society has a right to expect a return on investment); and
5. Oaths and codes, such as the Hippocratic oath.

The authors of the perspective point out that some of these arguments are stronger than others or are based on a more complete understanding of the inherent risks and benefits.⁶ Applying the ethical considerations and formal consent component of our framework to the context of the COVID-19 pandemic suggests that explicit consent in a contract for a faculty position in an infectious disease unit has more “power of argument” than the implied consent of an emergency medicine resident working in a hospital with a population of patients with COVID-19 or the “oath and codes” argument. An example of the latter is the medical student who recited the Hippocratic oath during her White Coat Ceremony 3 years ago, including “I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm,”¹⁶ and who now is being asked to interview patients who may be infected with the coronavirus in her local primary care clinic.

LOST LEARNING OPPORTUNITIES

Malm et al⁶ concluded their 2008 perspective by stating that on the heels of the SARS outbreak in several nations, pandemic planning received added priority. The authors' accurately predicted the foci during the 2020 COVID-19 pandemic, focusing on the needs of first responders, the allocation of scarce resources (eg, vaccines, PPE, and ventilators), and the movement of needed equipment. The authors also noted that in the response to SARS, less attention was focused on the staffing needs during a serious infectious pandemic. Unfortunately, their recommended solution—to bring

more needed health care workers under the umbrella of contract-based consent—appears to have not been heeded in the intervening 12 years. This means that for COVID-related staffing decisions, policies to guide the efforts and contracts that explicitly define the inherent risks of deployment for staff or volunteers and content of formal training activities are still under development. The shortage of PPE experienced in the spring of 2020, and the ongoing expected PPE shortage in the present COVID waves, is a particular concern for the deployment of medical students and residents/fellows in settings in which they will encounter COVID-19—positive patients. Exposure under these circumstances may put them at risk that is not defensible from an ALARA perspective, from an ethics rationale, and from the standpoint of the inherent benefits of their deployment (using AHACA concepts) that could offset these risks. One reason for using the framework and the information in the [Table](#) and [Box](#) is that it enhances leaders' understanding of the multiple factors that influence decisions to place learners in a clinical context. These include the real cost of adequate PPE, medical students' limited ability to make a contribution to patient care for COVID-19—positive patients, and the existence of other ways for students to learn about the pandemic and contribute to the clinical effort. The rapid removal of medical students from clinical settings at the beginning of the pandemic was deemed necessary to keep them safe, yet students may not have fully comprehended the rationale or appreciated their institutions acting “in loco parentis.” Some of the medical student volunteer COVID-19 activism may have grown out of students feeling “left out” during a major crisis in the nation's health care system. Given the widespread and the surging presence of the coronavirus in the United States, it likely will not be possible or advisable to adhere to a medical students should not be involved in the care of COVID-19 patients position indefinitely.

Medical learners (medical students and residents/fellows) play many value-added

roles in providing care, and this is their duty. Our risk management framework addresses the expectations of benefits and achievable safety for these learners. There is a need to formalize the social contract for medical students and residents/fellows who become ill or are harmed while providing care for COVID-19—positive patients as part of a plan to clarify the meaning and consequences of “informed consent.” The Liaison Committee on Medical Education accreditation standards for medical schools include requirements for policies for health and disability insurance for medical students,¹⁷ and the ACGME Institutional Requirements require health and disability insurance for all residents/fellows.¹⁸ These policies have yet to be “tested” under the current pandemic. There also is an urgent need to create and develop actionable institutional policies to address medical students’ and residents’/fellows’ roles in caring for COVID-19—positive patients going forward. This is critical given the longer-term focus on COVID-19 for the US health care system.

CONCLUSIONS

Hospital and medical education leaders need to find more effective, ethical, and transparent ways to reduce the exposure risk inherent in deploying medical students and residents/fellows alongside trained staff during a pandemic and to balance these risks and benefits to patient care and education. In making medical learner assignments, institutional and education leaders should consider the level of training and the risks and benefits of the educational or clinical activity being assessed. Our 4-part innovative framework supported by ALARA and AHACA principles provides a robust and ethical foundation for supporting learning and leadership opportunities and facilitates intellectual, professional, and personal growth for learners at all matriculation levels. The four-part framework helps to justify risky activities selected to integrate learning and service in ways that affirm the deep commitment of learners to their chosen

profession and the ethical obligations of academic medical leaders. Benefits for society include providing care for a rapidly growing number of infected patients, relief of patient suffering, and, for learners, opportunities for pragmatic learning during an extraordinary time for the nation’s health care system. Institutional and national guidelines for deploying medical students and residents/fellows in the care of patients with COVID-19 should also acknowledge these learners’ desires to continue their learning, contribute to care, and fulfill their professional duty as physicians.

Thinking about medical education from a risk-benefit perspective supports a novel decision-making approach that can offset activities that carry a higher risk, with an understanding that these fully disclosed risks are offset by more substantial anticipated benefits including issues of commitment, development of clinical competencies, collegial loyalty, and social identity.

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Correspondence: Address to Paul Barach, MD, MPH, Children’s Research Center of Michigan, Children’s Hospital of Michigan, Wayne State University School of Medicine, 3901 Beaubien, Room 5177, Carls Bldg, Detroit, MI 48201 (pbarach@wayne.edu; Twitter: @Paul_Barach).

ORCID

Paul Barach:  <https://orcid.org/0000-0002-7906-698X>

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