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Medical Students as Essential Frontline Researchers During the COVID-19 Pandemic

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The authors have informed the journal that they agree that both Mark N. Alshak and Han A. Li completed the intellectual and other work typical of the first author.

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Abstract

As the coronavirus disease 2019 (COVID-19) pandemic hit the United States in March 2020, there was widespread disruption of clinical medical education: Hospital clerkships were suspended nationwide, and students were moved out of the hospital and continued their studies remotely through virtual learning systems. Frustrated by not being able to directly care for patients, medical students across the country formed diverse volunteer initiatives to help frontline clinicians. In this article, the authors describe the essential role of medical students at Weill Cornell Medicine in quickly designing and building a large registry of COVID-19 patients who presented at 3 New York City hospitals. The Cornell COVID-19 registry, which contains granular clinical information on more than 4,000 patients, informed hospital operations and guided clinical management during the first wave of the pandemic. One month after its creation, the registry led to the first published description of the clinical characteristics of a U.S.-based cohort of hospitalized COVID-19 patients. Using their experience as a model, the authors propose that students who cannot participate in their clinical clerkships because of the pandemic can augment their traditional medical education by contributing to COVID-19 research. In the case described in this article, students reviewed management of COVID-19 patients, followed inpatients throughout their hospitalization (much like students would on clinical rotations), and refined their interpersonal skills through discussions with patients and patients' families during follow-up calls. The authors conclude that medical students who are displaced from their hospital rotations can further their education and provide an invaluable contribution to the fight against COVID-19 by serving as essential frontline researchers.

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The disruption to medical education due to coronavirus disease 2019 (COVID-19) has been

immense. On March 17, 2020, the Association of American Medical Colleges recommended that

all clinical rotations cease.[1] Since then, vital board examinations and learning opportunities for

visiting students have been disrupted or cancelled entirely—shifting medical education that

would normally occur in the hospital to remote and entirely virtual learning systems.[2–3] The

anxiety and uncertainty caused by these changes have been compounded by a sense of

helplessness: Medical students across the country have expressed frustration at not being able to

help care for patients, particularly in areas where there was concern that hospital systems would

be overwhelmed. Moving quickly and efficiently, medical students organized volunteer efforts to

help frontline clinicians. These ongoing efforts include procuring and distributing personal

protective equipment, providing childcare for health care workers, and organizing meal

donations to hospital employees.[4,5] At Weill Cornell Medicine (WCM), second-and third-year

students helped organize and conduct COVID-19 research. As student leaders in this effort, we

are sharing our experience as it may be useful in discussion of how to enable students to continue

their medical education despite suspension of clinical rotations.

Our Contributions: The Cornell COVID-19 Registry

Medical students have stepped up in less-publicized ways during the pandemic, including

making essential contributions to COVID-19 operational and research efforts. As medical

students at WCM in New York City, we were uniquely affected by the pandemic, given the

severity of the cases and the speed at which COVID-19 spread through the city, which was one

of the initial U.S. epicenters of the disease. In early March, there was a paucity of data about

COVID-19 and a lack of evidence to inform hospital operations and clinical care. Many

physician–scientists who would typically lead research efforts aimed at improving understanding

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of this disease were called to the frontlines of the pandemic, limiting their capacity to gather the necessary data to address key clinical questions.

Second- and third-year WCM medical students with clinical clerkship experience, working remotely, saw an opportunity to use their knowledge to directly contribute to research efforts that could guide patient care. Under the guidance of faculty mentors, a group of more than 70 medical students mobilized to create the Cornell COVID-19 Registry. This registry includes the following information, which was manually abstracted from patient charts: presenting symptoms, comorbid conditions, hospital course events, and clinical outcomes for all COVID-19 patients who presented at 3 hospitals affiliated with NewYork-Presbyterian Hospital between March 3 and May 15, 2020. As the student leaders of the registry project, we worked closely with faculty to select variables to create a structured abstraction tool, using REDCap software 10.0.28.[6] Once the abstraction tool was available, faculty and student leaders taught all the students in the group via video conference how to use the abstraction tool and how to understand various clinical problems that might arise. We also worked with faculty during these video conferences to train the group to use the abstraction tool. Once students began doing chart abstraction, we— the student leaders—were available to answer questions about specific clinical situations through a direct messaging communications platform, providing chart abstractors with real-time assistance. Due to the urgent need for the registry, we were available throughout the day to offer immediate answers. When we were not able to provide adequate guidance, we contacted faculty for assistance. This approach enabled us to answer all inquiries in a timely fashion without overloading faculty with questions.

We created a manual to provide a step-by-step streamlined approach for finding information in the electronic medical record (EMR). Furthermore, we met daily with the faculty to discuss updates, quality assessment, and registry troubleshooting. The heart of the operation proved to be the 70 students who had volunteered to create the registry and who made up the abstraction team; their clinical knowledge and experience with the EMR allowed them to quickly learn and optimize the abstraction process, provide input on variables to add or modify, and collect the large amounts of data that were needed. This student group enabled the quick creation of an accurate registry. Medical students drove many of the improvements that were made to the abstraction tool. They also led efforts to fill in multiple gaps in essential baseline characteristics, such as body mass index and race/ethnicity, which were not always available when patients first presented to the hospital.

Within 2 weeks of the initial meeting, the manually abstracted data were transformed into a clinical dashboard that frontline physicians were using to guide hospital operations and patient care. Physicians used the data to identify clinical characteristics of patients at high risk of decompensation—such as being older than 65, male, or obese and/or requiring supplemental oxygen within 3 hours of presentation to the emergency department—allowing them to allocate scarce monitoring equipment appropriately. Data on hospitalizations and intubations guided the creation of temporary intensive care units (ICUs) through conversion of surgical suites and general wards and the subsequent dismantling of these units. Finally, prognostic characteristics identified by the registry helped inform clinicians' discussions with patients and their families about clinical outcomes.

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In April 2020, 1 month after the creation of the registry, our findings were published in the *New England Journal of Medicine*, providing the first description of the clinical characteristics of a U.S.-based cohort of hospitalized COVID-19 patients.[7] The registry grew to a final size of more than 4,000 patients, containing granular clinical information that could not have been gathered through automated queries of the EHR. The registry was closed to enrollment after data about the initial peak had been captured, new daily cases had decreased, and students had begun to return to clinical activities.

At the time of writing in March 2021, the registry continues to serve as the basis for many COVID-19 research projects at WCM, leading to research collaborations across departments and institutions. In addition, efforts are underway to reopen the registry to add patients hospitalized after the initial peak of cases and to include the long-term sequelae of COVID-19. Student leaders and chart abstractors remain involved with many projects, helping conceptualize and carry out these endeavors; examples include demonstrating the role of obesity in severe cases of COVID-19[8] and the increased risk of venous thromboembolism in adult hospitalization patients with COVID-19.[9]

Student Involvement in COVID-19 Research: Educational, Emotional, and Essential

The COVID-19 pandemic has spurred discussion about how medical students can help during these unique and trying times. Ideas have ranged from enlisting medical students as frontline health workers to offering incoming medical students the opportunity to join a national service program for public health.[10,11] However, to the best of our knowledge, none of these ideas to date have focused on medical students' ability to contribute to clinical research. The core clinical years of medical school are integral in shaping a student's medical education through building clinical knowledge and refining the interpersonal communication skills required of any

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physician, according to the Liaison Committee on Medical Education accreditation standards.[12]

Through this registry project, students were expected to follow their patients and update the

charts on a regular basis, much like they would on an inpatient rotation. This activity allowed

them to learn about the real-time management of COVID-19 patients and the progression of their

disease and outcomes. This opportunity also gave medical students a close look at how large-

scale research with human subjects is designed, organized, and performed. Additionally, a group

of students made phone calls to patients to ascertain their status 30 days after hospital discharge.

Many of these students faced difficult conversations with patients and their families regarding

end-of-life care and death, the same types of conversations they would have been having face-to-

face if rotations had not been suspended. In anticipation of a difficult conversation, students were

able to turn to faculty for guidance and support. Time and time again, students shared with each

other a feeling of attachment to patients they had never met. By participating in COVID-19

research, students affected the development and implementation of evidence-based guidelines,

gained perspective into the organizational structure needed to create an institutional database,

and advanced their medical education.

Moving Forward

Although we were slowly phased back into the hospital in July 2020, a future COVID-19 wave

may displace us again.[13] We hope that our experience creating the registry described in this

article can serve as a model and a call to action for academic medical centers to incorporate

medical students in COVID-19 research for the benefit of the students, the medical community,

and public health. Medical students are a massive workforce reserve that can be brought to bear

in the fight against COVID-19. The extent and duration of the COVID-19 pandemic remain

unknown.[14] What is known is that medical students have proven able and willing to help with

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clinical research in a way that has been invaluable to WCM. Our experience shows that medical

students can partner with clinical investigators to become essential frontline researchers,

enabling us to have outstanding educational experiences that will shape our futures as physicians

long after the pandemic subsides.

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