Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Running a virtual allergy division and training program in the time of COVID-19 pandemic

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The coronavirus disease 2019 (COVID-19) pandemic has expanded rapidly in the United States and around the globe, much faster than anticipated. Hundreds of thousands are infected and unfortunately plenty of patients have died. As an academic allergy and immunology division in a large city, our clinical, educational, research, and community responsibilities have been tremendously impacted. Patients needed us more than ever, but mitigation efforts prevented us from seeing them routinely in person. Three weeks ago, as the first severe case of COVID-19 in Chicago was diagnosed and admitted to our intensive care unit, we understood we needed immediate plans. The change happened in multiple categories: clinical operation, training programs, and research (Table I). Although in the past decade we have witnessed a tremendously rapid progress in communication technology, these changes pale in comparison to the speed of change within the last 3 weeks. It was the time to harness this technology to be used for educational activities and patient care. Here, we report on the changes to our clinical and educational activities in response to the COVID-19 pandemic.

CHANGES TO ALLERGY AND IMMUNOLOGY CLINICAL PRACTICE

With the exception of urgent visits and biologic medication administration, outpatient clinical operations were transitioned to telemedicine. All faculty and fellows were trained emergently to perform virtual medicine through video and phone visits. Our inpatient consult service changed shape as well; the requested consults ran through an algorithm based on the need for physical examination, and the risk to COVID-19. Faculty volunteered in COVID-19 telemedicine clinics, which provided a unique opportunity to augment our typical curriculum evolving COVID-19 guidelines. The insight gained was tremendously helpful, not only for referring potential COVID-19 cases but also for understanding the impact of this infection on allergic conditions. The changes and strategies implemented by our division are summarized in Table I.

CHALLENGES AND CHANGES TO CLINICAL EDUCATIONAL PROGRAM

The training program was faced with difficult decisions on how to maintain clinical training. Previous reviews have found that supervision using telehealth can be an effective method of clinical training.[1,2] Both faculty and fellows were trained and provided with adequate information technology support. Faculty, who had previous experience with telemedicine visits, supervised the fellow's telehealth training. Fellows were instructed via university-provided Web-based sessions, through both prerecorded and live interactive sessions, on virtual visits. After these tutorials, fellows were directed to use the virtual hospital desktop. The virtual desktop can be accessed remotely by their office or home computer, in conjunction with a smartphone- or tablet-based video-conferencing application to perform visits. After Web-based tutorial training was completed, the fellow's first virtual visit occurred in a cleaned patient room while the patient was at home. These *ad-hoc* offices improved social distancing for the fellows. After the review, the supervising attending allergist joined the patient and fellow in a concluding group virtual visit. The first virtual visits allowed the supervising allergist to help the fellow navigate the electronic medical record, trouble shoot, and fix any problem in person. Once the fellow was comfortable, we allowed fellows to work from home.

The electronic medical record provided various methods for real-time conversation between the fellow and faculty during the virtual visit. Fellows and faculty created several new letter and documentation templates specific for the COVID-19 crisis. New modules for electronic patient education and coordination of care were created as well.

Regulations surrounding telehealth services were modified during this time of national emergency. The federal government instituted waivers for originating site requirements and other previous restrictions to allow for greater provision of telehealth services.[3] The billing and coding procedures for telehealth services changed as well. Staying current on the latest provisions at the local and national levels, communicating with the coding auditors, and educating fellows were essential because of the changing nature of this pandemic. The division held a virtual conference guided by hospital coding experts to go over new regulations, codes, and modifiers. Furthermore, training program directors discussed any new changes with fellows through group emails and separate short conferences.

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TABLE I. Challenges and solutions in the urban academic allergy and immunology division in response to the COVID-19 pandemic

Domains	Challenges	Solutions
Clinical	● Social distancing (including reducing exposure in outpatient clinic and reducing need to round on inpatient consults with large team of fellows, residents, and students)	● Converted all nonurgent in-person clinic visits to virtual (with video) or telephone visit ● All inpatient consults triaged for need for physical examination and risk of exposure to coronavirus; physical examination was not done if unnecessary. Discussion rounds were done virtually. Group rounds at patient rooms were avoided
	● New virtual/telephone visit model	● Rapid training of faculty and fellows on virtual/telephone visits
	● Increased telephone calls from patients concerned about possible COVID-19	● Nurses and fellows created phone call pools through a new triaged algorithm ● Faculty volunteered at special COVID-19 virtual visits at hospital level
	● Staffing and nursing shortage due to surge	● Stopped all visits at central clinic ● Moved any urgent visit to 1 satellite location
	● Need for coronavirus-specific patient communication (eg, letters, work-from-home excuse, coronavirus symptoms, and risk stratification)	● Standardized letters describing symptoms and when patients should call the COVID-19 hotline ● Generated COVID-19–specific letters
	● Biologic medications administration	● Except omalizumab and few cases with disabilities, all other biologics were given at home. Moved all biological injections to 1 satellite location
	● Allergen immunotherapy (IT)	● Halted all IT in accordance with AAAAI guidelines for 4 wk ● Created IT restart plans for interested individuals, with lowest possible frequency. Plans were discussed with patients over the phone
Educational	● Minimizing fellow exposure	● Converted all educational meetings to Web-based meetings
	● Staying current on COVID-19 literature	● Expanded journal club and staff meetings ● Expanded case conference
	● Added complexity of fellows schedule in response to increased educational activities and redeployment	● Shared calendar
	● Anticipating future COVID-19 challenges	● Frequent discussions with program directors of Allergy/Immunology
Research	● Patient recruitment	● Temporary suspension of all research recruitments ● Efforts were focused on completing information and chart reviews ● Expedited IRB amendments to switch consenting and follow-up visits to virtual and Web-based questionnaires
	● Basic science research	● Temporary halt of previous experiments ● Research lab members who were interested got involved in new studies related to COVID-19 experiments by other labs or volunteered in the clinical laboratory
Hospital and community	● Need for volunteers on the COVID-19 hotline ● Increased need for inpatient coverage for COVID-19 surge	● Faculty volunteered to screen concerned patients for COVID-19 ● Nurses volunteers in various COVID-19 testing areas ● All providers were added to hospital surge lists for COVID-19

AAAAI, American Academy of Allergy, Asthma & Immunology; *IRB*, institutional review board; *lab*, laboratory.

VIRTUAL SHARED CALENDAR FOR ACADEMIC AND EDUCATIONAL ACTIVITIES

Allergy fellowship educational activities were complicated by a multitude of factors. These factors include overloading of the daily clinic schedule with telemedicine training, the rapid publication of key COVID-19 articles, and social distancing. To address these challenges, the weekly calendar was revised. The training program created a new detailed, shared calendar to follow and document all the fellows' educational and clinical activities. The new calendar reduced scheduling conflicts. Given the rapidly developing crisis and publication of important findings, journal club required an expansion. An online, expanded journal club schedule was embedded in the above schedule. Faculty and fellows were assigned to cover allergy- and immunology-related articles with focus on COVID-19. Example was a 90-minute journal club through which 5 fellows thoroughly discussed the new practice parameters guidelines on COVID-19 pandemic contingency planning published by the American College of Allergy, Asthma & Immunology/American Academy of Allergy, Asthma & Immunology.[4] This journal club was followed by a divisional meeting to reinforce some of the changes that needed to be implemented in our clinical practice according to this publication. Similarly, social distancing required the in-person discussing of interesting or challenging cases be transformed to conference calls, with emphasis on cases related to COVID-19 infection.

SUPPORT SYSTEMS

The pandemic and fear of infections aside, going through this significant amount of change in a short period of time has been very stressful. As schools and daycares closed, those with young children faced difficulties to coordinate their personal lives. Unfortunately, grandparents were the high-risk population and not suitable babysitters in the COVID-19 pandemic. Performing telehealth visits, or participating in remote journal club, immunology lectures, and training sessions from home was not always easy. We addressed these issues with provisional planning and changing schedules whenever needed. The fear and uncertainty of the unfolding pandemic was particularly unsettling for fellows in training. An open dialog was essential to allow trainees to voice concerns regarding how this national emergency may impact their

individual experience. The availability of program directors and their rapport with fellows to address their concerns and provide reassurance on an almost daily basis were essential and helpful to address some of these challenges. Some other changes were made in response to fellows' concerns. For example, the traditional call schedules were reordered to share the responsibilities, and messages and phone calls were placed in clinical pools as the volume of patient questions increased in the face of the pandemic.

We also identified a need for future emergency planning, given the likelihood of the crisis worsening. There would be more difficulties, such as COVID-19 infection among faculty, fellows, and support staff, and increased inpatient responsibilities for all physicians including allergists. Contingency plans and schedules were placed for both inpatient and outpatient responsibilities, with 2 lines of backup for faculty, fellows, and other staff. Furthermore, we shared detailed information on the available resources by university for stress management, employee and family health, and contingency child care.

Although we are pressed with immediacy of the COVID-19 pandemic, we also need to keep a long-term view for the future of our specialty. The COVID-19 pandemic has impacted all parts of the world. Given the recent history of other epidemics (eg, severe acute respiratory syndrome, H1N1, ebola, and Middle East respiratory syndrome), it is unlikely that this will be the last epidemic/pandemic crisis. This type of crisis requires allergy divisions and training programs communicate by virtual global assemblies. Communication between program directors and fellows across different programs can provide support and solutions, which can be adapted at each division on the basis of their needs and resources. The entire specialty should unite with the societies such as the World Allergy Organization, the American Academy of Allergy, Asthma & Immunology, and the American College of Allergy, Asthma & Immunology in these difficult times to share experiences and knowledge to overcome present and future difficulties.

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