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Lessons learned during the COVID-19 pandemic: a single institution radiology chief resident experience

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ABSTRACT

Coronavirus Disease 2019 (COVID-19) has posed incredible new challenges for radiology residency programs, including resident training under tenuous and uncertain conditions, barriers to communication, deployment-induced anxiety, and social isolation. Chief residents and program leadership play a critical role in guiding radiology residents through these unprecedented times. Best practices and creative approaches experienced in a single institution's residency program located in New York City are shared in an effort to encourage other programs struggling with similar obstacles to prioritize resident education and wellness.

1. Introduction

Coronavirus Disease 2019 (COVID-19), caused by the novel coronavirus *severe acute respiratory syndrome coronavirus 2* (SARS-CoV-2), was first reported in December 2019 in the city of Wuhan, Hubei Province, Central China [1], and subsequently declared a pandemic by the World Health Organization on March 11, 2020 [2]. The Accreditation Council for Graduate Medical Education (ACGME), a non-profit organization that set standards for US Graduate Medical Education (GME) programs, has defined three stages of operation during the COVID-19 pandemic [3]: Stage 1, "Business as Usual;" Stage 2, "Increased Clinical Demands;" and Stage 3, "Pandemic Emergency Status." In March 2020, the GME program at our institution located in New York City, the United States center of the pandemic, entered Stage 3, whereby "most or all residents/fellows need to shift to patient care" [3]. Radiology residents from our program- 36 residents total (ie. 9 residents per year, broken down as 6 integrated interventional radiology (IR/DR) residents and 30 diagnostic radiology (DR) residents, 3 of which are pursuing early specialization in interventional radiology (ESIR); including 2 chief residents elected during their third year)- were redeployed to intensive care units (ICUs) and general medical floors (GMFs) at our main hospital in Manhattan as well as an additional hospital in Queens. At the time of this writing, our resident redeployments had decreased, but not yet concluded. Below are lessons we learned.

2. Lessons learned

2.1. Communication

Effective communication is a core value in our department, both as a guiding principle of effective patient care and as a staple of interaction within the department. A lecture based communication curriculum is annually provided [4] and faculty and trainees participate in *Communication Workshops*: small-group, peer-led, sessions created to help faculty and trainees develop tools for expressing empathy and dealing with difficult situations specific to radiology. Similar forms of communication skills workshops have been studied and deemed an effective tool for communication training for radiology trainees [5]. Our workshop, instituted in 2018 and held multiple times annually for all faculty and trainees, has served as a backbone for our radiologists across all divisions and levels of training to further develop patient-centered as well as inter- and intra-departmental communication skills.

Prior to COVID-19, email-based "Weekly Announcement" correspondences were sent each Sunday evening by the chief residents to provide resident-directed updates. Group chat-based WhatsApp messages are also utilized by all residents to disseminate information quickly when needed. Upon news of GME redeployments, these

Abbreviations: ACGME, Accreditations Council for Graduate Medical Education; COVID-19, Coronavirus Disease 2019; DR, Diagnostic Radiology; ESIR, Early Specialization in Interventional Radiology; GME, Graduate Medical Education; GMF, General Medical Floor; ICU, Intensive Care Unit; IR, Interventional Radiology; PD, Program Director; PPE, Personal Protective Equipment; VPN, Virtual Private Network

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resident-directed e-mails continued with the addition of supplemental weekly video conferencing “Resident COVID Updates” by the Program Directors (PDs), typically 45 min in length and taking place during a resident-protected lecture slot. These sessions included updates from the PDs, followed by Q&A sessions where residents were given the opportunity to ask questions verbally for the entire group, via private chat directed only to the PDs or group at large, or anonymous questions asked initially to the chief residents and repeated on behalf of the unnamed resident. Given the rapidly evolving situation and associated uncertainties, the department prioritized maintaining an open forum for communication as well as transparency of the circumstances. While there was much our program could not control, the consistency and solidarity of communication ultimately made our resident community more cohesive.

In addition, the chairman of the Department of Radiology, Dr. Robert J. Min, held biweekly department-wide video conference updates for all faculty and trainees, typically 60 min in length, on Tuesdays and Fridays. Beyond the updates he provided, these meetings offered a unique opportunity for faculty and trainees to share their stories. Each member of the department experienced the challenges associated with COVID-19 in their own way, personally and/or professionally, as a patient and/or as a health care professional, each with their own unique experience. The biweekly updates were an opportunity to gather and cope collectively; despite the physical distance from each other, it quickly became evident that these sessions brought our department closer than ever.

2.2. Preparation

While impossible to know what awaits during unprecedented times, every effort was made to prepare for the anticipated worst-case scenario. Contingency planning was initiated early. In the summer of 2019, Dr. Geraldine McGinty, Chief Contracting and Strategy Officer and Associate Professor of Clinical Radiology and Population Science at Weill Cornell Medicine, organized a Scenario and Contingency Planning Exercise for members of the radiology department, including the chief residents. The goal of the exercise was to foster discussions of how the future may unfold, how various scenarios may impact the department of radiology, and how the department would adapt and maintain its focus to succeed. A pandemic was one of many scenarios discussed that day alongside a variety of innovative and outside-the-box potential solutions. Though merely an exercise, that event reflected the forward thinking and insightful nature of our department. Likewise, the department immediately initiated recovery and re-engineering planning, with early involvement of the residents. Levels of department-wide advanced preparation equipped us with the tools and skillset to handle subsequent challenges.

In late March 2020, radiology residents were redeployed to ICUs and GMFs. At a given time, we had at least 8 of our residents actively redeployed, with redeployments lasting 2–3 weeks. The remainder of the residents continued staffing vital services across the department of radiology. Our deployed residents, though closer in internal medicine training than attendings, were still quite removed from these experiences, many having done their internships at different hospitals or multiple years prior. Amongst the many preparations in place for these residents were virtual conferences with infectious disease specialists, hospitalists, and medicine residents who would soon be our colleagues on the frontlines. A variety of “cheat sheet” PDFs and instructional videos, such as proper donning and doffing of personal protective equipment (PPE) and skills pertaining to COVID-19 management intended for providers not typically involved with this line of work were shared amongst residents. Chief residents gathered and disseminated every resource pertaining to COVID-19 management, ICUs and GMFs, enhancing our residents' preparedness to care for COVID-19 positive patients.

Additionally, the balance required to maintain social distancing in a radiology residency while maintaining a sense of “normalcy” was discussed early, both at our institution and across the country. By April 2020, a variety of publications addressed the critical issues of radiology residency preparedness, the impact of COVID-19 on radiology trainees, and strategies for survival for COVID-19 and radiology residency [6–8]. A number of changes were made to our program to allow for social distancing, including the conversion of resident noon conferences into virtual video conferences and the creation of a Teleradiology resident rotation. Responsibilities on Teleradiology included protocoling through the hospital's Virtual Private Network (VPN), interpreting images via portable home resident workstations, participating in multidisciplinary video conferences, creating educational lectures for co-residents and engaging in multiple educational resident video conferences throughout the day. It was impossible to know exactly how the COVID-19 crisis would unfold; however, advanced preparations and remaining open-minded allowed us to adapt to challenges quickly and effectively.

2.3. Leadership and strengths

Every member of our residency is a leader. Just as chiefs and seniors lead their juniors, all residents can have the same impactful leadership role with their co-residents based on their own individual skills and interests. We quickly learned that no two residents are alike in their strengths. Whether it is passion for education, dissemination of information and news, willingness to work extra shifts, or checking in on the wellbeing of colleagues, every resident has a role and can add significant value to the situation at hand. No contribution is too small, each meaningful in its own way.

When redeployment became a reality, our rising and current chief residents unanimously volunteered for redeployment, amongst many others. Our program redeployed all residents- junior and senior, DR, IR/DR, and ESIR- with the mindset that at the end of the day we are all physicians with something to offer. Beyond serving as doctors on the medical services we staffed, we provided a unique role as radiological consultants embedded within our teams. We reviewed the imaging for all patients during daily morning rounds, and answered questions about appropriate imaging and resource utilization, tasks our residents were already familiar with as part of a resident-driven clinical imaging rounds consultation service our residents have provided since 2014 [9]. However, in the era of social distancing, all clinical imaging rounds were postponed. Our redeployed residents filled this newfound void of face-to-face interaction between referrers and radiologists by naturally hosting daily imaging rounds, which often changed management for patients on the service.

Many of our residents reported feeling anxious about the medical tasks that came with redeployment, especially the more senior residents who hadn't seen a ventilator or repleted electrolytes in years. However, we continuously sought to find ways to be helpful to our medicine colleagues while on service. For example, our radiology residents had access to portable ultrasound units, allowing for point of care ultrasound that could rapidly identify critical findings. Additionally, the redeployed residents served as a direct line of communication to coordinate life-saving procedures performed by co-residents on the Interventional Radiology (IR) service. Consulting services such as IR or vascular surgery were needed and stretched across multiple critical care units in the hospital. To help fill the need, our residents were able to step in to perform procedural tasks to expedite patient care, such as placing vascular access or performing bedside ultrasound-guided abscess drainages. In these ways, our radiology residents offered significant contributions to the frontlines with their unique skill set to diagnose, care, and treat these COVID-19 positive patients. Additionally, our residents welcomed the humanistic task of providing daily communications to family members unable to be with their loved ones, a particularly impactful role during this time.

2.4. Education

Aspects unique to a radiology training program include a structured day and an emphasis on education. Our residency grants residents protected education time from 12:30–2:00 pm, during which residents gather in a conference room and participate in both didactic and case-based lectures. In order to preserve this educational component of training while adhering to rules of proper social distancing, an initial change was the conversion of resident noon conferences into virtual video conferences. Inpatient and outpatient imaging volumes were drastically decreased by March 2020, resulting in fewer interpretive educational opportunities for our residents. In response, new morning interactive case conferences were created with special attention to breadth and depth of topics. A Google spreadsheet was sent to faculty members of all subspecialties, and attendings voluntarily signed up for daily lecture slots. To introduce an element of constancy, each day of the week was devoted to one subspecialty on a weekly basis. This also allowed for easier participation in the interactive case conference by fellows and attendings in each subspecialty who were aware which day of the week to consistently join the conference virtually, resulting in richer discussions.

Additionally, new resident-led case conferences were introduced in the afternoons where residents on the Teleradiology rotation created case-based lectures of their choosing to present virtually to their colleagues. We encouraged all residents, including those redeployed, to join for these virtual conferences and typically had 15–20 residents participate at a time. A faculty member of that subspecialty was invited to join the conference to help clarify or answer any questions that arose. These resident-led conferences contributed to the supportive and nurturing environment of our program and allowed residents to remain engaged, both in creating the educational materials and participating in the conferences. More importantly, the daily educational video conferences allowed our residents to maintain their sense of purpose in radiology and provided structure throughout their day. A wealth of additional virtual resources have been made available through other institutions and professional societies, such as the American College of Radiology, American Roentgen Ray Society, Association of Program Directors in Radiology, Association of University Radiologists, and Radiological Society of North America, amongst many others [6]. We created a shared document with links to these educational resources, as well as resources that focus on virtual health and wellness, which continues to be updated regularly.

Our residents also benefited from simulated education, allowing trainees to practice a procedure or clinical scenario in a simulated environment [10]. Simulations have historically been an important educational tool within our residency and have become particularly invaluable in recent weeks. Chetlen et al. detail the history of simulation within radiology and highlight its potential use in the acquisition of procedural, interpretive, and non-interpretive skills (e.g. managing contrast reactions, communication skills and professionalism). Simulated education can be applied to all radiological subspecialties in a myriad of ways with a number of associated advantages including standardizing resident education and allowing trainees to gain experience while mitigating risk of harm to patients [10]. During a time of low imaging volume for our trainees, an even greater emphasis has been placed on simulated education. Attendings from different subspecialties donated their time to resident education by creating modules for residents to supplement the number and breadth of cases seen at the workstation. This addition of simulation provided residents the opportunity to scroll through cases in real time, make the findings, and compare their findings with the answer key provided by the attendings.

In addition to simulated education, portable home workstations were shared amongst our residents to allow for interpretation of imaging from home. Utilization of these portable home workstations allowed for a safer work environment for trainees and attendings by allowing for increased social distancing outside of the conventional reading room. Residents working from home were able to look at the images, prepare a full dictation report, and read out the case virtually with the attending on service that day. The combination of implementing additional daily educational resident video conferences, encouraging use of existing virtual resources, expanding upon simulated education, and utilizing portable home workstations for image interpretation allowed our residents to thrive educationally during this time.

2.5. Wellness

Physician burnout was recently declared a public health crisis [11,12], with recent surveys demonstrating radiology residents to be particularly susceptible, and reported rates affecting as many as 50% of trainees [13–16]. Recognizing that residents have a better sense of personal accomplishment when they feel socially supported by their co-residents [11], our residency program strives to promote health and wellness. Prior to the COVID-19 pandemic, our residency participated in multiple activities to encourage resident bonding, such as an annual resident wellness retreat, monthly happy hours, and group fitness classes. The foundation laid by these initiatives helped build resident camaraderie, which is essential not only for cohesion in the group, but also for strengthening individual wellbeing.

The COVID-19 pandemic introduced a number of new stressors for our residents: the prospect and uncertainties of redeployment, the fear of becoming ill or exposing loved ones, and the sense of loneliness while social distancing were amongst a few. These became particularly transparent during a virtual resident Town Hall with clinical psychiatrists facilitating a discussion on mental health provided by our department. The psychiatrists asked open-ended questions and participants had the opportunity to discuss their thoughts and feelings, many of which were shared by all. This session led to the realization that residents now faced many unique challenges that required new methods to foster wellness.

A unifying theme across our most effective techniques was the impact of a small gesture. For example, our program received a number of generous donations from members of the community. Distributing donated treats to reading rooms throughout the hospital– coined “ice cream rounds” based on the initial distribution of ice cream– was a simple, yet effective, way to improve morale. Additionally, the act of discussing stressors with co-residents during the virtual Town Hall was a cathartic experience for many, demonstrating that communication in itself can be a therapeutic tool. As chief residents, we reached out regularly to residents quarantined or redeployed, recognizing that they were the most at risk to feelings of anxiety and isolation. The impact of a text message, email, or phone call, even when brief, was far-reaching. We encouraged residents to connect with each other via a Zoom link active 24/7 and our residents convened weekly for a virtual “happy hour.” Maintaining these forums for open and honest communication ultimately enhanced personal wellness amongst our residents as evidenced by an improved ability to cope with ever-changing schedules, personal expression of wellbeing, and an overall increase in number of residents sharing a positive attitude towards the current situation.

Furthermore, mental health resources available through our institution were distributed to all residents and a shared document of additional ideas to foster individual health and wellness was continuously updated. We recognized that a useful resource for one resident may be ineffective for another and sought to provide a wide array of tools to maintain wellbeing for all residents. Now, more than ever, we must ensure that wellness remains at the forefront.

3. Conclusion

The era of COVID-19 has been a challenging time for all. As chief residents, it was our responsibility to organize our residency, provide leadership, create a forum for open communication, maintain resident

education and uphold resident wellbeing. Ultimately, we have come to realize that it was not one singular action that facilitated positivity in the pandemic, but rather the culture of our residency program. These approaches, drawing on the underlying values of our department and the empowerment of each individual member of our residency, led to a remarkable increase in morale in an unprecedented, rapidly changing and far-reaching health crisis. We urge those involved with radiology residencies to prioritize their residents and involve them in any decision-making process, while encouraging a culture of open communication, transparency, and wellness. Investing in this culture continues to contribute to our departmental success.

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