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Brief communication: A departmental “command center” to facilitate staff safety and patient care during the peak of the COVID-19 pandemic

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ABSTRACT

During the initial peak of the COVID-19 crisis, for the approximately 6 weeks beginning on April 8, 2020 and continuing through mid-May 2020, our academic radiology department shifted all nonprocedural operations to a “Command Center” model. This intervention was designed to maximize faculty and resident safety while continuing to provide prompt radiology care to our patients and support to front-line clinicians. During this time most of our radiology faculty and residents worked remotely. The five on-site residents were stationed together in a single large reading room where they worked as generalists, supervised by remote faculty. This room became the hub of all clinical communications. This brief report describes this experience, reviewing what was done and what was learned.

1. Introduction

The appearance of the novel Coronavirus, now known as SARS-CoV-2, at the end of 2019 and the subsequent coronavirus disease (COVID-19) pandemic which had gripped much of the world by March 2020, required massive adaptations in the healthcare delivery system in the United States. In the State of Pennsylvania, a “Shelter in Place” order went into effect on March 30 and continued in some counties (including ours) until early June. At our academic medical center, as was the case throughout the US, elective care of all kinds was temporarily suspended, including all elective imaging, resulting in a substantial reduction of study volumes, to less than half of normal levels, which was typical throughout the nation. There was also very little traffic in our Emergency Department, and very little major trauma (see Fig. 1).

In early April, a statewide “shelter in place” order was put into effect due to rising case numbers of COVID-19. As clinical volumes were significantly reduced during this period, it allowed for remote reading with a minimal on site staff presence. Implementing such a model would minimize potential exposure to the virus for the faculty and trainees during the peak-levels of disease prevalence in our area. It would also minimize the potential need to quarantine radiology faculty members and residents who might have accidental exposure to the virus in the workplace. We were concerned about the need to preserve radiologist capacity as we reached peak-levels of disease prevalence in our region.

To accomplish this goal, we effectively needed to shift our department away from a subspecialty organization to a generalist workflow model, pooling resources into a single hub with remote subspecialist support. It was indeed fortuitous that our department had previously installed a fully functional home-PACS workstation base in the homes of all radiology faculty members, as this made it possible for faculty radiologists to provide rapid, high-volume interpretive services remotely. Had this infrastructure not already been in place, the only option would have been to sideline some of our faculty, so that others could better practice social distancing in the reading rooms. Resident PACS connectivity from home was less robust, however some remote functions were possible.

During this time, other clinical departments in the medical center ramped up their use of telemedicine services, and most reduced their onsite physician presence. A halt on elective surgeries idled many surgeons, although there was an attempt to rotate surgical teams on a weekly or bi-weekly basis. At our center, the prevailing mode of communication between Radiologists and clinicians remains the use of “landline” phones, and even with diminished work volume there was a sense that the usual phone extensions would need to be maintained so as not to unduly burden clinicians or impede access to the radiology staff.

The decision was made in the first week of April to temporarily minimize the physical presence of both faculty and residents on-site. Our “Command Center” strategy blended all of the subspecialty diagnostic radiology services into a single reading room, one that was large enough

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to maintain social distancing precautions per CDC guidelines, with a substantially reduced number of faculty and residents on-site. This centralized location became a communications hub for the entire department. All of the landline extensions were transferred in, and lines were added to the existing phone sets. In the “Command Center” model, remote-reading faculty were expected to provide subspecialized radiology interpretations, resident supervision and teaching within their subspecialties remotely, while the small number of on-site faculty in each subspecialty were mostly engaged in procedural work, including biopsies, drainage procedures, joint aspirations and injections, lumbar punctures and the like. The division of cardiovascular and interventional radiology (CVIR) was not included in this project.

By creating the command center, we believe that we were able to optimize the use of remote readers and keep our faculty fully engaged, while maximizing social distancing and staff/resident safety. We also preserved the overall institutions’ interface with our department without requiring that other departments make adaptations in the ways in which they interacted with our staff and utilized our services in the care of their patients. The main challenge we faced is that our department is organized by organ-system subspecialty divisions, whereby clinical and teaching activities are distributed into separate reading rooms, each with established modes of communication between the radiologists, referring clinicians and technical staff.

2. What was done

Consolidating communications to a single room required careful planning and cooperation with the IT department. As noted above, at our medical center landline telephones provide the bulk of inter- and intra-department communications, and our goal was that clinicians, technologists and others would not need to adapt to the change or learn any new phone numbers—they would simply dial the same extensions as they always would, and the calls were electronically routed to the command center. It was thus vital that these phone calls would be efficiently routed to the Command Center in a way such that their concentrated volume would not overwhelm the physical phone-capacity of the Command Center nor the ability for the on-site personnel to respond promptly. This involved customized call-forwarding and adding of extensions to the existing phone sets. To facilitate faculty remote-interpretation work, our VPN capacity was rapidly increased to allow essentially the full complement of faculty to be able to connect simultaneously if needed. Additionally, redesigned scheduling approaches were implemented at each divisional level, designed to optimize the division of labor between the approximately 7–8 on-site faculty and 1–2 fellows who were involved in procedural work, with the remaining faculty and fellows working remotely from home. These duties were rotated as needed on a section-by-section basis (usually weekly or bi-weekly).

Ultimately five residents each day were assigned to work on-site in the “Command Center,” rotated weekly. A senior resident (often one of the two Chief Residents) was assigned weekly and was in charge of command-center operations. The remaining residents remained at home; these had minimal clinical responsibilities but were able to partake in enhanced remote teaching provided by the faculty members who were also working from home. The five in-house residents each covered all subspecialty areas as-needed, similar to a general practice model, including diagnostic interpretations and telephone consultations to referring services, as well as providing an interface between the technical and subspecialized clinical staff and the remote radiology faculty. The command center also served as the primary point of contact for clinicians seeking radiology services for their patients. During this time essentially all resident supervision was provided by the remote faculty, leaving the in-house faculty free to focus entirely on procedural work. All but two of the in-house faculty were distributed to reading rooms away from the command center for purposes of social distancing, but with clear lines of communication between them and the “Command Center” personnel. Evening and night coverage was provided in our usual manner, with two in-house residents covering all diagnostic services with limited remote supervision by a number of subspecialty faculty who were “on call” to provide this coverage and supervision. At our center, attending final reads are routinely available until 10:00 p.m.

3. Results of our experience, and lessons learned

Clinical operations continued seamlessly, with no issues arising over the approximate 6 weeks of “Command Center” operations. By this we mean that there were no related incident reports, patients were served without delays or complaints from either patients or referring clinicians and the residents were uniformly positive in their assessment of the experience. Delays in answering telephone calls were rare, and faculty

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Fig. 1. Radiology daily case volumes by modality, calendar year 2020. Graphic of daily case volumes (by modality) show a substantial “trough” during the period we worked under the “Command Center” staffing model. For most of this period daily case volumes in Radiology were approximately 50% of usual.
availability for consultation to clinicians remained at pre-COVID levels. While formal RTAT metrics improved for most divisions, some substantially, with nearly all studies final-signed in less than an hour during this period, we believed that this was largely due to lower volume relative to the number of available staff. Safety incident reports diminished sharply, to less than 10% of their prior levels. Daily zoom-based huddles and regular meetings with clinical leaders from other departments, most especially the Emergency Department, contributed to rapid resolution of any identified concerns, and so there seemed to be a high level of clinician satisfaction with the service provided by our department during this time.

Remote faculty provided distance supervision to the on-site residents by phone, through the PACS system and, in some cases by using innovative Zoom-based teaching methods in an attempt to mimic viewbox teaching. This zoom-based teaching involved use of the PACS connection as well as screen-sharing to allow interactive discussion of the findings in each case under discussion, so that residents and faculty could “point out” findings on the images in real-time to each other. This involved “live case” readouts of current cases as well as teaching-file type cases. In addition, the faculty rapidly developed new lecture/discussion material which was presented to the at-home residents in didactic conferences that occurred at least twice daily (doubling our usual lecture schedule). Recorded lectures were also provided. Case-conferences and guided journal-readings and discussions also occurred throughout the workday and in the evenings. During each resident’s weeklong rotation in the “Command Center,” participation in the extra didactic offerings was limited, however they received direct supervision on the clinical cases they were interpreting in real-time. The ultimate phase-out of the command center was managed with careful preplanning and coordination with each division, and took place in mid-May as part of the general departmental re-opening plan, in a manner which was consistent with reopening guidance from the American College of Radiology and the overall institution.

Resident retrospective feedback of the approximately 6-week “Command Center” experience from a teaching and learning perspective was uniformly positive. This included informal feedback to the Vice Chairs of Clinical Affairs and Quality and Safety, who were in frequent contact with the command center residents and Chief Residents. Our residency program director also surveys all residents on a quarterly basis to assess their satisfaction with the educational experience. The survey breaks down the teaching and learning experience and assesses components of each individually, including viewbox teaching, continuous feedback to residents by supervising faculty, and didactics. Satisfaction scores for the educational experience in the spring survey were similar to prior (and subsequent) quarters, with scores in the “very good” (74%) to “excellent” (98%) range, with most scores essentially unchanged from prior quarters and some improved as much as 8–11%. In their written comments, residents stated that they were highly satisfied with the command-center workflow, both in terms of sharing the workload between both residents and remote faculty and in the level of supervision they received from remote faculty during this time. Residents also expressed a high level of appreciation for what they saw as a “real-life” experience of managing the radiology service across multiple modalities and organ systems in a “general practice” approach, and they enjoyed interpreting a variety of cases across multiple organ-systems throughout the day. Several residents commented that this experience seemed to them to be more like a realistic practice environment than is our usual subspecialty organ-systems approach. Many residents explicitly stated in their subjective comments that the teaching and learning experience had been changed during this time, but had not been materially diminished. Most noted an overall decrement in the amount of viewbox teaching which was missed, but commented that this had been counterbalanced by an increase in didactic, discussion and focused-topic teaching. In mid-April, at the nadir of departmental volume, the five command-center residents were each dictating on average approximately 60 cases/day, mostly skewed towards plain radiographs and CT. This overall volume was similar to pre-pandemic levels.

4. Conclusion

We report here on our experience in an academic department of radiology in which our usual mode of subspecialty practice was suspended in a time-limited adaptation to the local peak of a pandemic in our region. It is our hope that by sharing our experience the lessons learned may be helpful to other organizations should a similar need arise again. While subspecialized practice is the norm for academic institutions, extraordinary times call for extraordinary adaptations. In our experience, seamless continuation of the clinical, teaching and scholarly missions of our department was maintained—and in some ways even augmented—during the initial peak of the COVID-19 pandemic crisis, despite the majority of radiology faculty and residents in our department working remotely while sheltering at home. Our “Command Center” model enabled this success, which rested upon a robust IT infrastructure as well as clear, decisive leadership, with a high degree of autonomy afforded to each division, and open lines of communication at every level between all stakeholders.

Declaration of competing interest

The authors have no relevant disclosures or conflicts of interest.

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