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Rescheduling Nonurgent Care in Radiology: Implementation During the Coronavirus Disease 2019 (COVID-19) Pandemic

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Abstract

Objective: To meet hospital preparedness for the coronavirus disease 2019 pandemic, the Centers for Disease Control and Prevention and ACR recommended delay of all nonemergent tests and elective procedures. The purpose of this article is to report our experience for rescheduling nonemergent imaging and procedures during the pandemic at our tertiary academic institution.

Methods: We rescheduled the nonemergent imaging and procedures in our hospitals and outpatient centers from March 16 to May 4, 2020. We created a tiered priority system to reschedule patients for whom imaging could be delayed with minimal clinical impact. The radiologists performed detailed chart reviews for decision making. We conducted daily virtual huddles with discussion of rescheduling strategies and issue tracking.

Results: Using a snapshot during the rescheduling period, there was a 53.4% decrease in imaging volume during the period of March 16 to April 15, 2020, compared with the same time period in 2019. The total number of imaging studies decreased from 38,369 in 2019 to 17,891 in 2020 during this period. Although we saw the largest reduction in outpatient imaging (72.3%), there was also a significant decrease in inpatient (40.5%) and emergency department (48.9%) imaging volumes.

Discussion: The use of multiple communication channels was critical in relaying the information to all our stakeholders, patients, referring physicians, and the radiology workforce. Teamwork, quick adoption, and adaptation of changing strategies was important given the fluidity of the situation.

Key Words: COVID-19, nonurgent care, rescheduling

J Am Coll Radiol 2020;17:882-889.

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Dr Mahoney is on the board of directors of RSNA, and board of chancellors of ACR. She receives a nonfinancial support from GE Healthcare (GE research agreement) and personal fees from Elsevier. Dr Rybicki is a director of Imagia company. The authors state that they have no conflict of interest related to the material discussed in this article. The authors are nonpartner, non–partnership track employees of University of Cincinnati, Cincinnati, Ohio.

1546-1440/20/$36.00 ■ https://doi.org/10.1016/j.jacr.2020.05.010

INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic continues to wreak havoc throughout the world, with an increasing number of countries and states under lockdown, shelter-in-place, or stay-at-home orders. Beginning in early to mid-March, there was a dramatic increase in the number of COVID-19 cases in Western countries. For example, in the United States, there were a total of 98 confirmed COVID-19 cases on March 1, 2020, followed by a "hockey stick" inflection with 1,158,341 cases at the time of writing [1]. This led to rapid action at medical centers around the world to mobilize resources in response to the emerging pandemic [2].

As the COVID-19 pandemic grew, the Centers for Disease Control and Prevention (CDC) advised that all health care facilities should prioritize urgent and emergency visits [3]. The goal was to ensure staff and patient safety, prepare hospitals for a potential surge in COVID-19 cases, and preserve personal protective equipment. The CDC recommended delay of all nonemergent tests, visits, and elective procedures [3]. ACR mirrored the CDC recommendation and urged imaging centers to "reschedule non-urgent outpatient imaging including screening mammography, lung cancer screening, non-urgent CT, MRI, ultrasound, plain film X-ray exams, and other non-emergent or elective radiologic and radiologically guided exams and procedures" [4].

Given the CDC, ACR, and hospital guidelines, at our institution, we started the rescheduling process on March 16, 2020. Our top priority was the safety of our patients and staff members. The purpose of this article is to report our experience for rescheduling nonemergent imaging tests and procedures during the COVID-19 pandemic at our institution.

METHODS

We used the Standards for Quality Improvement Reporting Excellence 2.0 guidelines to describe the framework of this practice implementation [5].

Setting

The University of Cincinnati Medical Center is a large, urban, tertiary academic medical center. We have two hospitals and five freestanding outpatient imaging centers. Our annual imaging volume is 430,000 studies with 300 technologists and 52 clinical faculty in the department of radiology.

Team

Our vice chair of operations (F.J.R.) led the rescheduling team, which included the department chairperson, imaging enterprise director, vice chairs, section chiefs, and executive business director. We had daily virtual huddles with discussion of rescheduling strategies, issue tracking, addressing problems in real time, refining the process, and escalating communication. Each leader provided succession planning in the event of illness or other inability to participate.

Description of the Rescheduling Implementation

Principles. Decisions often had to be based on sparse data, specifically regarding the risk to the patients and staff of a busy department and the timing of our local surge. Because data were sparse, we opted for greater safety and made initial decisions to limit scanning to centers in which we could manage traffic and those with highest concentration of sick patients requiring imaging.

We opted to take full advantage of staff not clinically deployed to optimize the implementation of the rescheduling process, and we reviewed all cases using radiologists, schedulers, residents, and administrative leadership. We created a tiered priority system to reschedule patients for whom imaging could be delayed with minimal clinical impact.

When possible, we maintained the organizational infrastructure of the department. However, we made implementations as needed (residents creating spreadsheets, technologists triaging reading room calls and directing to section heads or the vice chair).

With the changing COVID-19 situation, we were obligated to either defer patients with no set reschedule time or to select a re-entry point. Out of safety concerns, we decided to define an initial re-entry point for the rescheduled patients as May 4.

Timelines. With a growing number of COVID-19 cases at a local level, there was an urgent need to immediately start the rescheduling process in mid-March. This was also a time of great uncertainty about the expected number of patients in our hospitals. Our state modeling projections predicted a large surge for Ohio. Therefore, we had to move expediently to increase scanner capacities to accommodate the potentially large numbers of infected patients. We also had to consider the anticipated delays related to scanner disinfecting processes between patients. A decision was made to implement the rescheduling initially for the first 2 weeks (March 16 to March 27). During this time, we also saw a high rate of self-cancellation by patients due to the community-based concerns and fears. As the number of COVID-19 patients steadily increased, the state of Ohio issued a stay-at-home order on March 22. A decision was then made to extend the rescheduling of nonurgent imaging tests to May 4.

Imaging Facilities. We reduced the number of imaging facilities open to only include the main hospitals, in which we had the greatest number of scanners and best ability to sanitize. This led to the temporary closure of all of our freestanding imaging centers. The rationale was to reduce the number of technologists on site and to have staggered shifts with the purpose of decreasing staff exposure. Schedulers, technologists, and radiologists, including residents, called patients with existing appointments to postpone the appointments, explained the rationale, and recommended deferred assessment in 6 to 8 weeks or as otherwise deemed appropriate.

Workflow During Implementation. To optimize knowledge and therefore safety, we mandated the clinical review of every patient scheduled until May 4. We created a high-level process map to assist central schedulers, technologists, and radiologists (Fig. 1). This involved using a radiology triage person who served as a single point of contact for patients and referring physicians. Many telephone calls into the respective reading rooms were directed to our triage coordinator who distinguished urgent from nonurgent examinations. New examination scheduling ceased during this period. Only select administrators and technologists had access to the schedule and were made aware of urgent indications requiring immediate scheduling.

Radiologists were tasked with reviewing all scheduled outpatients, and this was primarily performed on a per section basis. We performed a complete electronic medical record (EMR) review to determine the need for either keeping the scheduled appointment or rescheduling. The review included the indication for the study, medical problem list, verified reports for any pertinent previous imaging, most recent note placed by the referring provider, and any subsequent communications found in the system regarding symptoms and management. The severity and complexity of findings on prior scans were carefully considered. The likelihood that intervention (surgery, radiation, etc) would need to be performed within the next few months was also assessed.

A tiered framework or category of urgency [6] was used to prioritize studies for patients who required imaging to make critical clinical management decisions and reduce morbidity or mortality. Although wait lists are uncommon in the United States and unfamiliar to radiologists in our region, there is precedent for patient prioritization tools [7], especially when wait times are long. Following are a few examples of our priority tiers.

Tier 1: Patient Requisitions for Emergent Studies Did Not Need Approval From Radiologist

1. CT pulmonary angiography
2. New focal neurological deficit
3. Mental status changes

Several requests for "pain" or "severe pain" were considered, but the department made the decision to not allow these cases to be placed in tier 1. Clinical consultation was required and enforced by the vice chair. Studies that came from the emergency department were generally placed in tier 1.

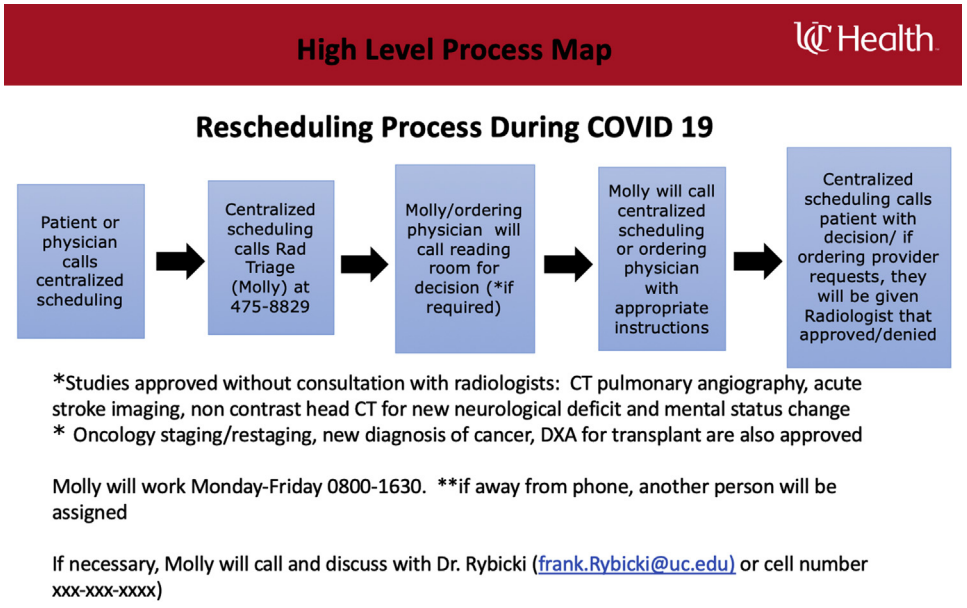

Fig 1. High-level process map for rescheduling non-emergent imaging studies. COVID 2019 = coronavirus disease 2019; DXA = Dual-energy X-ray absorptiometry.

Tier 2: Patients Whose Appointments Were Not Rescheduled

1. Neoplasm with potential progression findings concerning for active disease on most recent imaging, or for which treatment options hinged on imaging results
2. Recent surgery (3-6 months) with signs or symptoms related to complication or recurrence of the initial problem

Tier 3: Patients Whose Appointments Were Rescheduled

1. Breast and lung cancer screening (RADS 3 and 4 category lung cancer screening studies were handled on a case-by-case basis to determine scan urgency.)
2. Chronic pain
3. Known malignancy with prior stable imaging
4. Cases for whom the indication was not clear and review of the EMR showed ambiguous appropriateness. (For most of these cases, the referring clinician was contacted, and in some cases placement in tier 2 was justified.)

EMR Documentation. Patients were rescheduled and demarcated within the scheduling interface of EMR. Additionally, documentation was entered in each patient's chart, including readily retrievable communication(s) to the patient, referring provider, or a standard chart note (Fig. 2). Two key concerns dominated our discussions: adequate EMR documentation and the ability to prospectively track all rescheduled patients. We redeployed our residents (on work-from-home shifts) to facilitate the EMR communications and to chart patients on a subspecialty and modality basis.

Communication. We disseminated information about the rescheduling implementation plan widely and frequently throughout the department and obtained feedback. Section chiefs communicated the discussions from the daily huddles to their section members via e-mail, group texts, or virtual meetings. The vice chairs of education (E.E.) and research (A.V.) informed the residents and research staff, respectively. The imaging director (B.A.) held daily meetings with the technologists across the enterprise. In addition, the chair (M.M.) sent out a department-wide daily e-mails highlighting the minutes of the leadership huddle. We also communicated with referring clinicians' and surgeons' offices including systemwide e-mails and personal telephone calls to alleviate the number of incoming requests.

Special Considerations

Interventional Radiology Procedures. Given the unique needs of interventional radiology (IR), the IR section chief (A.M.) created a separate process for outpatient vascular and interventional procedures. In addition, all clinic visits were provided by telehealth. The IR process included a tiered framework with three comprehensive lists of procedures and a process map (Fig. 3).

- List A included urgent or emergent procedures that needed to be scheduled. Representative examples included port for chemotherapy due to start in the following week, exchange

Dear Provider,

Due to pandemic of **COVID-19**, the UC Health & Department of Radiology are following the guidelines of the Centers for Disease Control and Prevention (CDC) and the American College of Radiology (ACR). These guidelines advise medical facilities to reschedule elective/non-urgent outpatient visits, imaging exams and procedures.

As a result, @NAME@'s upcoming elective imaging study was rescheduled. This chart note is intended to notify you of this change and to note that the Department of Radiology is taking every possible precaution within the guidelines.

If an imaging exam/procedure is needed in a time sensitive manner, we recommend that you create a new EPIC order for the study and include a note in the order that the patient needs imaging earlier than rescheduled date despite COVID-19 precautions. Your new order will be reviewed by a radiologist who may ask you for additional clinical information and feedback. Lastly, for each rescheduled patient, UC Health Scheduling and/or our technologists made one or more attempts to reach the patient. This communication to patient has been documented in medical record.

Thank you for referring your patient for imaging in our department. We are proud to provide the most comprehensive imaging services and strive for excellence in patient care and safety.

UC Department of Radiology

Fig 2. Electronic medical record notification to provider about rescheduling radiology examination because of coronavirus disease 2019 (COVID-19). UC = University of Cincinnati.

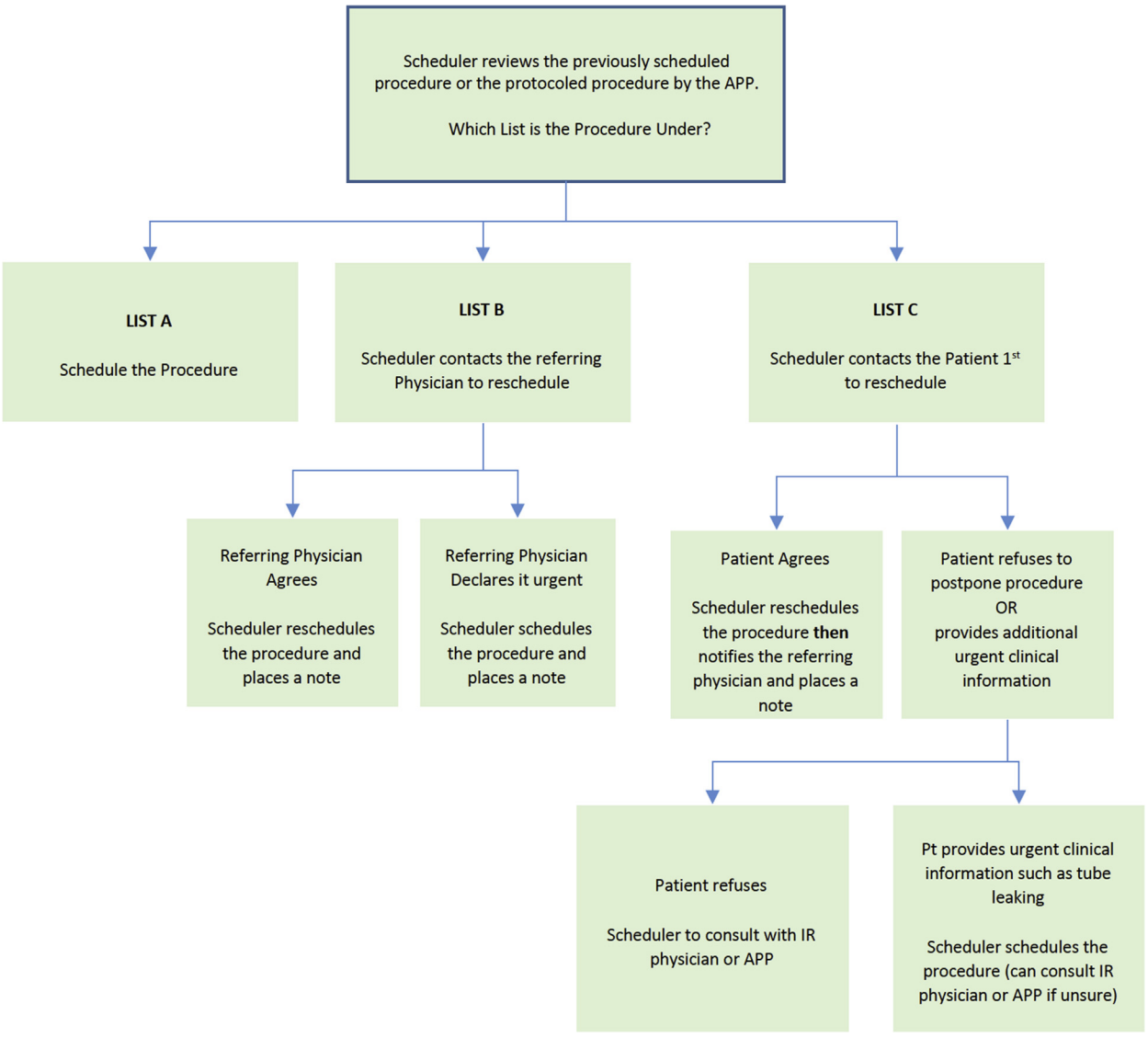

Fig 3. Interventional radiology (IR) process map for rescheduling. APP = advanced practice provider, Pt = patient.

of drainage catheters for malfunction, leaking, falling out, malposition, or catheter break.

- List B included cases that need to be rescheduled but can be scheduled if determined urgent by referring physician or IR radiologist. Examples included renal, liver, bone marrow biopsy (unless referring physician declared it as urgent) and chemoembolization or radioembolization (unless interventional radiologist declared it as urgent).
- List C included cases that should be rescheduled or postponed. Examples included thyroid biopsies, dialysis access planning venograms, and varicocele embolization.

Breast Imaging. Diagnostic assessment and core biopsy of cases with high suspicion for malignancy or known cancer were not postponed to avoid progression of disease that could negatively impact patient outcomes. We used multidisciplinary coordination to determine priority for elective surgery and neoadjuvant or adjuvant treatment for breast cancer patients [8].

Nuclear Medicine. Rescheduling of certain radionuclide therapies was challenging. Therapies such as I-131 radioiodine for thyroid cancer require significant patient preparation (ie, multiple days of a low-iodine diet and receiving intramuscular injections of thyrotropin alfa on two separate days). We opted to complete I-131 therapies that were already scheduled. In addition, patients receiving parenteral radionuclide therapies were continued as scheduled, but new patient consents and therapies were deferred.

Research Studies. As per the university guidelines, all nonessential research ceased. Only essential or critical

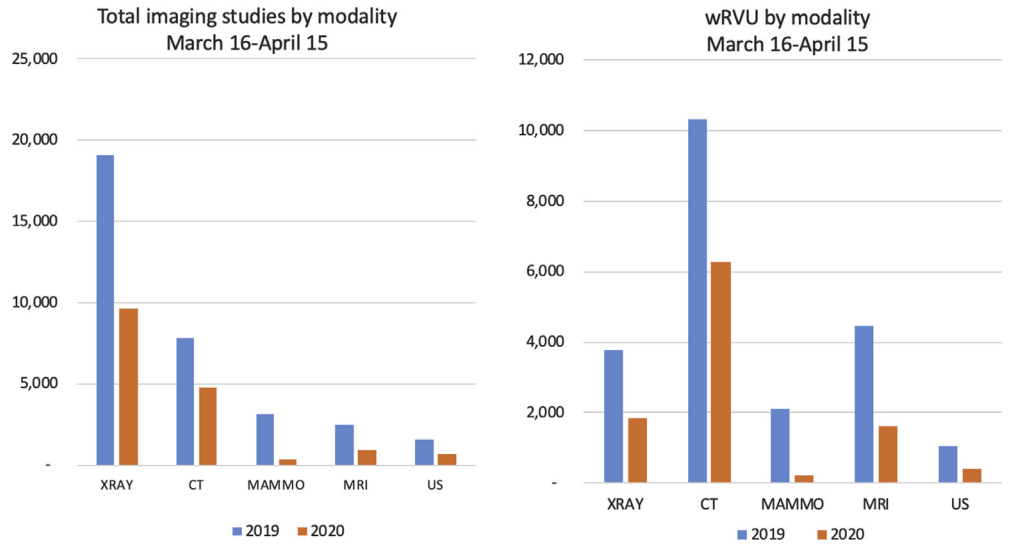

Fig 4. Decrease in the imaging volumes and relative value units during rescheduling. MAMMO = mammography; US = ultrasound; wRVU = weighted relative value units.

(COVID-related) research that required approval of the College of Medicine research committee and the institutional review board was allowed. We implemented a tracking system in conjunction with the clinical trials office to identify essential or critical research scans to ensure that these were not rescheduled.

RESULTS

A total of approximately 30,000 studies were rescheduled. We compared the volumes of imaging studies using a snapshot of a monthlong period beginning from the start of our rescheduling process. There was a significant decrease in overall imaging volume (53.4%) compared with the same period (March 16 to April 15) in the previous year. The total number of imaging studies was 38,369 in 2019 compared with 17,891 in 2020 during this time period. The total weighted relative value units in this time period was 21,737 in 2019 compared with 10,354 in 2020 (a decrease of 52.4%) (Fig. 4).

Although we saw the largest reduction in outpatient volumes (72.3%), there was also a significant decrease in imaging in the inpatient (40.5%) and emergency department (48.9%) settings. Total outpatient imaging volumes during March 16 to April 15 was 20,717 in 2019 compared with 5,739 in 2020, inpatient imaging was 15,592 in 2019 compared with 9,279 in 2020, and emergency department imaging was 7,262 in 2019 compared with 3,709 in 2020.

DISCUSSION

Our department began rescheduling all nonurgent studies in the second week of March through May 4, 2020. During this process, we relied on the guiding principles detailed previously and quickly realized the importance of frequent communication. The use of multiple channels to disseminate information (virtual daily huddles, e-mails, group texts, telephone calls, EMR messaging, virtual faculty meetings, hospital web page) was critical in relaying the information to all of our stakeholders, patients, referring physicians, and the radiology workforce. The process maps and EMR templates we developed were critical in allowing internal staff to deliver consistent messages.

Managing operations with flexibility is important [9]. We followed a "scrum methodology" [10], creating quick sprints and making quick adjustments in the process map. All team members had a specific role, but all of us were working toward quick adoption and adaptation of changing strategies. Developing a generalized plan for common tiered systems for all sections and all hospital and outpatient imaging centers was not feasible, and hence the tasks were subdivided to individual leaders. This worked well because the individual leaders had an in-depth understanding of their systems plus interpersonal relations with referring physicians for optimal execution.

Like many other health systems, we are witnessing the tremendous impact of this pandemic. The imaging volumes have drastically reduced, and this parallels the impact seen across other radiology departments in the country and the world [11,12]. Interestingly, in addition to the decreases in nonurgent imaging, we also saw a decrease in emergency department imaging volumes, suggesting that patients are less willing to come to hospitals during the COVID-19 outbreak. This trend was also seen in multiple other emergency departments around the country [13]. The health impact of delaying imaging for a large proportion of patients

is unknown and difficult to estimate. Although the social distancing and stay-at-home orders are reducing COVID-19–related mortality and morbidity, they may also result in an increase in non-COVID-19 deaths and delays in care [14].

As the number of COVID-19 cases in our region hopefully nears a plateau, we are now actively working on a recovery or re-entry plan. This will involve a phased process to ensure adequate social distancing. We will be implementing the valuable lessons that we learned during the rescheduling process, including clear communications. For example, we are posting social media messages about our steps to maintain patient safety. Our residents are also contacting and reassuring patients regarding the safety of our imaging facilities. We understand that how we operationalize our recovery, including patient experience during re-entry, is critical for our stabilization.

Limitations and Issues That We Faced

Given the acuity and fluidity of the COVID-19 situation, our rescheduling process did not follow the usual stringent guidelines of a practice implementation plan. We did not have a perfectly streamlined process from the outset. The virtual daily huddles were important and helpful to refine our process in real time, as issues and loopholes were quickly identified and addressed, resulting in an improved and integrated plan by week 3 of rescheduling. This included robust EPIC documentation (including backfilling from week 1 and 2) and assimilating a master list of all rescheduled patients.

The pandemic highlighted some aspects of our academic medical center that are not nimble. For example, our technologists and radiologists belong to different health systems with different e-mail domains, which limited file sharing capabilities and added extra steps to our communications. A common limitation reported by radiologists was the difficulty in obtaining accurate clinical indications from the EMR efficiently, resulting in a time-intensive process. The indication for the study was not readily seen on some of the schedule filters. The order entry in our system uses clinical decision support for all cross-sectional imaging; however, no hard stops exist if meaningless, misleading, or inaccurate information is entered. For example, a clinician can enter "*" (asterisk) or "other" as the study indication, which in turn required a deeper chart review. For some patients, the severity of symptoms and activity of disease were not clear even after extensive review of the EMR. These patients were contacted to ask about new or progressive symptoms since the last scan to provide a more accurate assessment of the urgency for scanning.

We also received some initial pushback from some of our referring physicians who did not agree with our tiered framework and insisted on starting their own independent algorithms. This required discussions at physician leadership levels, and we were able to address their concerns on a case-by-case basis.

We could not reach some patients despite multiple attempts, and a few presented for their scheduled appointment. There was an initial lack of consensus as to whether to perform these scans versus send the patients home after explaining the rationale for rescheduling. It was finally agreed that it was best to reschedule the walk-in patients for overall safety of patients and radiology staff members.

TAKE-HOME POINTS

- The rescheduling process during the COVID-19 pandemic was different than our usual departmental processes in which there is an abundance of information, data, and conversations before implementing a practice plan. During the COVID-19 phase, we had to make quick decisions but the actual risks were unknown and data were extremely limited.
- We used a tiered priority system to reschedule patients for whom imaging could be delayed with minimal clinical impact. Safety and the need for information mandated a detailed EMR review of each patient.
- We faced multiple challenges that taught us indispensable lessons. There was lack of institutional nimbleness due to different health system information networks, resulting in additional steps. We learned that information systems need to be proactively consolidated and linked within an institution to facilitate communication. The EMR searches were time intensive, highlighting that accurate and easily accessible clinical information is a requirement for efficient and medically sound triage decisions.
- Recognition that no one system fits all within a radiology department was vital for us. We designated a manageable team that represented all sections of the enterprise, including key department leaders, to coordinate efforts and obtained daily feedback.
- Our rescheduling process was not perfectly streamlined, and we had to be flexible in our operational strategy, particularly given the changing COVID-19 situation. Agile iterations of the process helped us to rapidly respond to changing timelines and resources.
- Clear, effective, and frequent communication through multiple channels was critical as we relayed our policies and procedure information to all our stakeholders including patients, referring physicians, and the radiology workforce.

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