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Adaptation and restructuring of an academic anesthesiology department during the COVID-19 pandemic in New York City: Challenges and lessons learned



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The novel SARS-CoV-2 pandemic starting in 2019 profoundly changed the world, and thousands of residents of New York City were affected, leading to one of the most acute surges in regional hospital capacity. As the largest academic medical center in the Bronx, Montefiore Medical Center was immediately impacted, and the entire hospital was mobilized to address the needs of its community. In this article, we describe our experiences as a large academic anesthesiology department during this pandemic. Our goals were to maximize our staff's expertise, maintain our commitment to wellness and safety, and preserve the quality of patient care. Lessons learned include the importance of critical care training presence and leadership, the challenges of converting an ambulatory surgery center to an intensive care unit (ICU), and the management of effective communication. Lastly, we provide

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suggestions for institutions facing an acute surge, or subsequent waves of COVID-19, based on a single center's experiences.

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Introduction

On March 11, 2020, the World Health Organization (WHO) declared the Coronavirus disease 2019 (COVID-19) outbreak to be a global pandemic [1]. Soon after, New York City experienced an exponential increase in COVID-19 hospitalizations. As the largest academic medical center in the Bronx, Montefiore Medical Center faced the greatest surge in hospital admissions in its history. This event was complicated by nationwide shortages in personal protective equipment (PPE) [2], mechanical ventilators, and advanced monitoring-capable beds. In response to a March 23, 2020 emergency order by the governor of New York State, Andrew Cuomo, mandating an increase in hospital bed capacity by 50% [3], our institution rapidly restructured and mobilized resources, and employed novel solutions. As the COVID-19 surge became inevitable and threatened to overwhelm healthcare resources, the U.S. Surgeon General recommended a suspension of elective surgery and clinic visits on March 22, 2020 [4]. This recommendation was endorsed by the American Society of Anesthesiologists, Ambulatory Surgery Center Association, and American College of Surgeons, and it was soon mandated by state and local authorities [5–7]. In our institution, elective surgeries were suspended starting March 19, 2020.

While Montefiore Medical Center typically maintains a 106 intensive care unit (ICU) bed capacity, at the peak of the COVID-19 outbreak, capacity was more than doubled to 258 ICU beds, with over 90% occupied by SARS-CoV-2-positive patients. Nonclinical spaces such as conference halls were converted into patient care areas. Ratios of patient to providers varied across the several existing ICUs, newly formed ICUs, and provider types. In the department of anesthesiology, staff were deployed to the COVID-19 ICUs from March 30 to May 18, 2020, with all members of the department returning from ICU deployments by July 1, 2020. Elective surgical cases resumed in our institution on June 10, 2020, with only emergent or urgent cases being performed throughout the surge period. In this article, we share the transformative experience of our anesthesiology department and the valuable lessons we learned during the COVID-19 pandemic in New York City (Tables 1 and 2).

Deployment and scheduling of anesthesiology faculty

The pre-COVID-19 anesthesiology staffing schedule consisted of non-call daytime assignments, late calls, overnight general OR, subspecialty home calls and obstetric anesthesiology calls. During the pandemic, all clinical assignments were converted into 12-h in-hospital clinical shifts or 24-h subspecialty pager call. Nonclinical assignments, vacation, and meeting time were suspended temporarily in anticipation of the increased personnel needs of the COVID-19 response. Attending anesthesiologists were assigned three to four shifts per week. Personal preferences such as night shifts, weekend shifts, or clustered assignments were accommodated when possible. These 12-h in-hospital shifts were decided upon at the direction of the department leadership including the Chair. This model provided faculty with an equitable and standardized schedule, maintained staffing balance in the OR and ICUs, and allowed for built-in days “off”, which were separate from post-call days. Faculty were aware that they could be deployed during these days in the event of staff illness or absence. This time off was also created so that faculty could attend to their families and their own well-being. Changes in frequency of public transportation during the pandemic did not affect staff punctuality.

Twenty-four-hour subspecialty home calls in cardiothoracic, neuroanesthesia, pediatric, and solid organ transplantation were maintained for emergent cases. Subspecialists were off duty post-call. When not on subspecialty call, subspecialists maintained a 12-h shift schedule in the OR or the newly formed ICUs as mentioned above.

Staffing of the ORs and non-OR anesthetizing locations for emergency cases was maintained. OR faculty were available in-house for emergency airway management. Similar to the pre-pandemic era,

Table 1
Summary of recommendations for a department of anesthesiology during a COVID-19 surge.

Category	Description
All clinical staff –anesthesiology attendings, residents and fellows, CRNAs, anesthesiology technicians	<ul style="list-style-type: none"> • Empower and promote leadership for those with recent intensive care (ICU) experience such as residents, fellows, and certified registered nurse anesthetists (CRNA) • Build in “time off” for wellness • Prepare to assist staff with medical or family care-related absences, disruptions in public transport
Anesthesiology attendings	<ul style="list-style-type: none"> • Staff five key groups: 1. Operating room (OR) services including general and subspecialty cases 2. ICU deployments 3. Non-ICU, non-OR services such as obstetric anesthesiology and pain services 4. Wellness and Resources 5. Research and Quality Improvement • Convert existing schedules to an ICU schedule of 12-h shifts, adjusted for personal preferences and needs
Anesthesiology Technicians	<ul style="list-style-type: none"> • Provide up-to-date education on decontamination of anesthesia equipment, and the use of protective equipment such as circuit filters and plastic sheets
At risk staff	<ul style="list-style-type: none"> • Based on personal preference, assign non-patient care roles such as didactics, case coordination, scheduling, research, centralized communication such as website and clinical protocol creation, and quality improvement
Converting an Ambulatory Surgery Center (ASC) into a COVID-19 care facility	<ul style="list-style-type: none"> • Select COVID-19 patients based on severity depending on the facility's capabilities in the following areas: laboratory, blood banking, hemodialysis, pharmacy, oxygen supply, and staffing for 24-h care
Personal Protective Equipment	<ul style="list-style-type: none"> • Anticipate shortages of respirators, gowns, gloves, and other equipment by stocking early • Anticipate the need for specific anesthesiology equipment: emergency airway equipment, central and arterial line kits, plastic sheets for protecting anesthesia workstations, viral filters for anesthesia machine circuits, disposable video laryngoscopes, infusion tubing and others
Communication	<ul style="list-style-type: none"> • Create an easily updated and accessible department website for protocols, policies, resources related to COVID-19 care • Schedule frequent departmental Town Hall teleconferences • Convert meetings and didactics to teleconferencing • Reduce email volume as much as possible
Quality Improvement and Research	<ul style="list-style-type: none"> • Create intubation and other COVID-19-related protocols • Screen and disseminate relevant, high quality, COVID-19-related information

pediatric anesthesiologists screened and staffed cases in non-operating room anesthetizing locations such as diagnostic imaging.

Anesthesiology faculty roles in the ICUs varied depending on their skills and assigned ICU. For example, anesthesiology faculty were the primary intensivists in one of the newly formed OR-ICUs, which consisted of six ORs converted into ICU-level COVID-19 patient beds. Cardiac anesthesiologists were the primary intensivists staffing the Ambulatory Surgery Unit (ASU) converted into a COVID-ICU in our quaternary care center. In other newly formed ICUs, anesthesiology faculty held consultant responsibilities such as airway and ventilator management, sedation, fluid administration, hemodynamic support, and placing patients in the prone position.

Scheduling was maintained on SpinFusion, a web-based scheduling software program (SpinFusion, Inc, Denver, Colorado, United States). A manual schedule was generated for new assignments because the pre-pandemic automated process was a multi-step, complex algorithm with rules based on faculty and clinical assignment profiles. Because of the complexity of creating a new coding algorithm and limited time, it was not possible for a new, fully automated generation of the schedule to be created.

Critical care anesthesiologist staffing

At Montefiore Medical Center, adult critical care services and all medical and surgical ICUs are administered by a centralized Division of Critical Care Medicine within the Department of Medicine. This unique organizational model is referred to as an “ICU Without Walls” [8]. While this model has been championed by some [9] and is widely implemented throughout Europe [10], it remains relatively

Table 2
Summary of recommendations for a department of anesthesiology for resuming elective surgery after a COVID-19 surge.

Category	Description
Leadership Committee	<ul style="list-style-type: none"> Establish a core committee to define criteria based on guidelines for resuming elective surgeries while protecting staff and prioritizing cases
Equipment	<ul style="list-style-type: none"> Plan for adequate supplies of personal protective equipment (PPE)
Operating Room (OR)	<ul style="list-style-type: none"> Reorganize block schedule to prioritize patients based on risks of further delay
Case Scheduling	
SARS-CoV-2 Testing and Screening	<ul style="list-style-type: none"> Establish testing centers and policies for preoperative non-urgent patient testing Perform temperature screening for all individuals entering facilities
Preoperative	<ul style="list-style-type: none"> Convert in-person appointments to Telehealth as much as possible to avoid crowding of patients in waiting rooms and to meet the high volume of patients returning for their surgery
Anesthesiology Clinic	
Ambulatory Surgery Center (ASC)	<ul style="list-style-type: none"> Increased hours, including overnight post-anesthetic care unit (PACU), may be needed to increase capacity in backlog and accommodating patients' preferences for a COVID-negative environment
Operations	
Resurgence	<ul style="list-style-type: none"> Ensure that ORs and intensive care unit (ICU) beds dedicated to COVID-19 positive or unknown patient care remain available, including anticipating a need for conversion of ASCs and other clinical areas Increase staff wellness to address the previous surge and promote resilience for future surges Education: promote research efforts and gathering of best evidence of COVID-19-related patient care
Preparation	<ul style="list-style-type: none"> Continue correct donning and doffing education of all clinical staff

unique in the United States. One of its many benefits is a pooling of resources across departments, allowing for efficient deployment of staff across critical care services. This centralized model proved ideal for the COVID-19 outbreak. Prior to receiving the first COVID-19 patient, staffing and unit surge plans were developed. Within a few weeks of the first COVID-19 admission, all ICU-trained anesthesiologists were deployed to 100% critical care duties. Within the anesthesiology department, ICU-trained anesthesiologists provided frequent didactics on COVID-19 and general ICU topics, and created patient care protocols. Critical care anesthesiologists were also readily accessible to non-ICU-trained anesthesiologists.

Pain anesthesiologist staffing

The Pain Center was closed in accordance with institutional and governmental policies. Pain physicians with recent OR experience were deployed to the general pool as described above. Pain physicians removed from the ORs were assigned other crucial roles such as transitioning the pain program to telemedicine and e-consults for inpatients. Pain physicians jointly certified in hospice care assisted the palliative care team with goals of care discussions. This additional staffing was significant during a time when palliative care services were overwhelmed. As visitors were no longer allowed in the hospital, there was an urgent need to update patient families.

Deployment and scheduling of anesthesiology residents and fellows

Montefiore Medical Center is one of the largest graduate medical education (GME) sites in the United States. Anesthesiology residents were deployed by the central deployment office, which was established by the hospital administration at the beginning of the surge and functioned separately from the GME office. This central deployment office received updates regarding the creation of new COVID-19 ICUs. A majority of the CA-3 residents had already achieved the minimum required case numbers to graduate. Although this deployment did not impact their graduation requirements, it did shorten their clinical experience in the missed rotations.

Anesthesiology residents and fellows staffed six newly formed ICUs in addition to the preexisting ICUs. The residents' experiences from their prior ICU rotations proved instrumental in educating non-ICU-trained bedside nurses and other multidisciplinary staff. To provide continuity of care and, to the

extent possible, preserve vacation time that was previously granted, anesthesiology residents were assigned two weeks of ICU followed by a two-week rest period. Any vacations that were previously granted coincided with the two-week rest period. The residents were supervised by the anesthesiology faculty and the Accreditation Council for Graduate Medical Education (ACGME) supervision, and work hour rules were strictly followed. During one of the two rest weeks, residents were assigned one OR overnight call each, with the exception of residents on previously granted vacations. This unique schedule allowed for built-in quarantine time should a resident or fellow become ill.

The cardiac, regional, pediatric anesthesiology and chronic pain fellows were placed on the same schedule as the residents. Residents staffed the labor and delivery floor along with the obstetric anesthesiology fellow, and this call system remained unchanged from the pre-COVID-19 schedule.

Residents and fellows were debriefed at the end of their assignments in the newly formed ICUs. Additionally, all residents were debriefed in small groups by a wellness expert. Following the debriefings, no major immediate changes in resident schedules or evaluative processes were made, however, resident feedback of the surge ICUs will be incorporated in future. More importantly, the debriefing sessions were an opportunity for residents to share their thoughts, emotional responses, and collective experiences of the deployments. The sessions allowed departmental leadership to express their gratitude for the high level of commitment and professionalism that was evident in the residents' performance.

Deployment and scheduling of CRNAs

One significant obstacle to open more intensive care environments at our institution was the availability of nurses, in particular, those with ICU training. CRNAs were deployed to assist the ICU consult services, emergency departments, and newly formed ICUs, which were primarily staffed by non-ICU-trained bedside nurses. In the latter locations, they served as a nursing educator for the management of airways, ventilators, vasopressors, and resuscitation. The overwhelmingly positive feedback confirmed the significant roles CRNAs provided during this pandemic. Similarly to the anesthesiology attendings, scheduling was converted from SpinFusion to a manual process due to the need for overnight staffing and evolving clinical assignments.

At risk staff

The department reached out to all members who were pregnant, over the age of 65, or had high-risk medical conditions to discuss their preference regarding direct clinical care during the pandemic, in which definitive risk factors, including short- and long-term sequelae on fetal outcomes, remain largely unknown. Members with personal concerns and need for accommodations with child care and sick family members were also encouraged to come forward. The number of affected staff – among anesthesiology attendings, residents, fellows, CRNAs, technicians, administrative staff – was a small percentage of the department, and they served in other capacities based on their skills. Attending anesthesiologists not assigned to clinical settings were assigned administrative responsibilities such as the creation of COVID-19-related quality improvement and patient safety protocols along with existing committees (Fig. 1), management of a department pandemic resource website, case coordination, staff scheduling, sustaining didactics, and wellness efforts such as debriefings and sponsored meals. Outside of the department, staff members were deployed to our institution's occupational health services to assist the call center with the high volume of ill employees. Lastly, staff members were deployed to clinical roles without patient contact, such as pre-operative Telehealth assessments in preparation for resuming elective surgeries.

Conversion of an ambulatory surgery center into a COVID ICU

The Hutchinson Metro Campus of Montefiore Medical Center, referred to as “the Hutch”, is a standalone 16 OR ambulatory surgery center (ASC) that was converted into an inpatient COVID-19 facility with 14 ICU beds and 60 floor beds. Within one week, the ASC-ORs were repurposed for ICU patient care and the ASU and PACU areas received inpatients not requiring ICU level of care. 24-hour

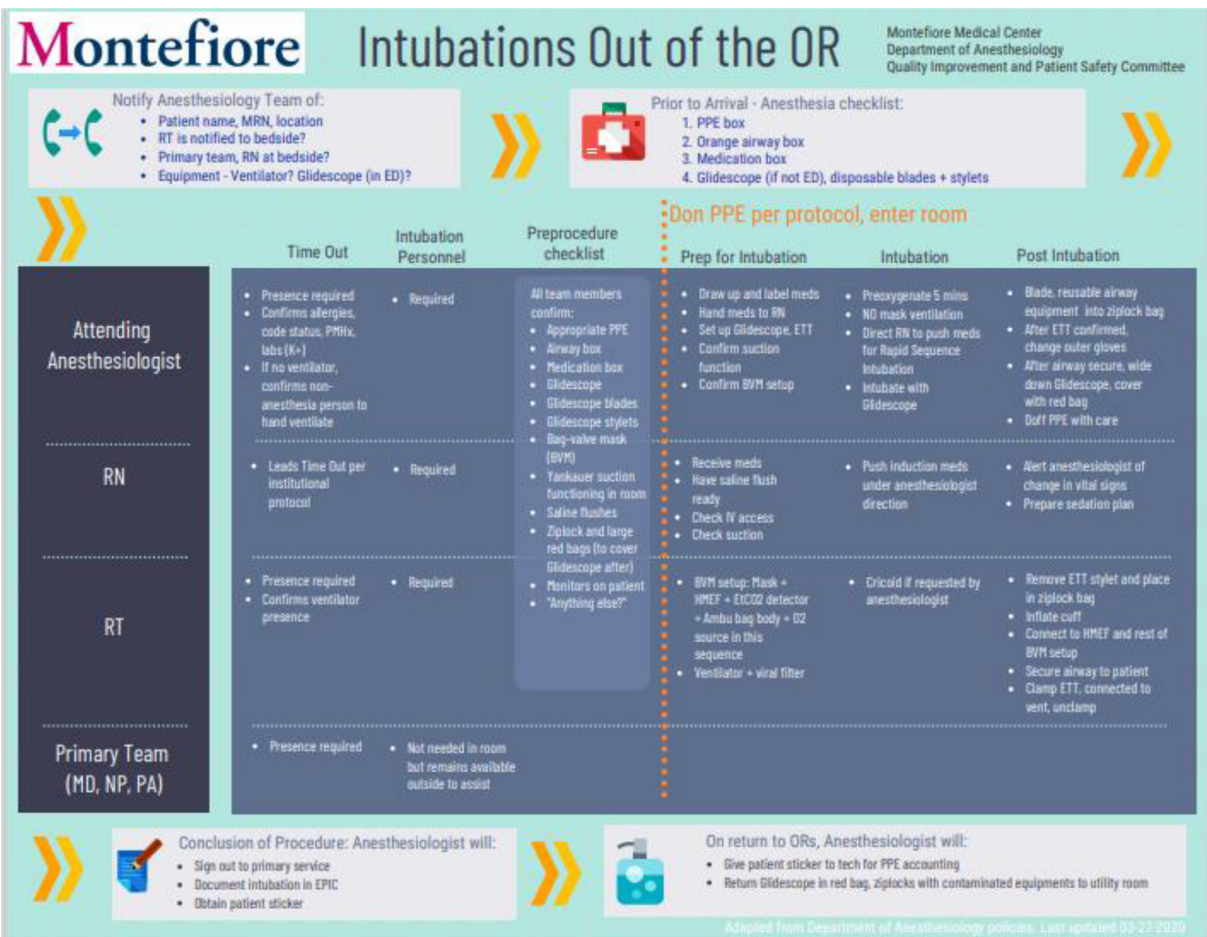


Fig. 1. Infographic for Out of OR Intubations, Department of Anesthesiology, Montefiore Medical Center. Original artwork by the authors.

laboratory, radiology, nutritional, respiratory therapy, and critical care pharmacy services were established. The ASC-ICU medical team consisted of an attending anesthesiologist, residents, CRNAs and ASC nursing staff. Access to critical care consults through a centralized command center was provided.

There were many inherent challenges in converting an ASC into an inpatient hospital facility. Staffing was one concern since this ASC previously operated from 6 am to midnight on weekdays only, and the center now remained open continuously. Previously, patients who required postoperative mechanical ventilation were supported with a backup anesthesia machine until hospital transfer occurred. The existing oxygen supply was equipped to handle 1200 outpatient surgery patients per month, under the assumption that high flow oxygen consumption would occur no longer than 16 h per day. The demand for oxygen was anticipated to drastically increase to accommodate ventilator-dependent COVID-19 patients, and the oxygen farm was upgraded to a larger tank.

The absence of hospital-level laboratory services made the management of critically ill patients difficult. Blood specimens were couriered to a nearby hospital, while blood gas specimens were analyzed on point-of-care instruments. Many of the medications available in an ICU were not available in the ASC. Hemodialysis was also unavailable, necessitating an exclusion of patients with renal failure from transfer to the ASC-ICU. Because of these challenges and a decrease in patient volume, critical care services were consolidated to the main hospitals after six days, and the inpatient floors were closed five days thereafter.

Personal protective equipment and other resources

There were significant concerns among staff members for PPE that was on a nationwide shortage [2]. The department and perioperative leadership explored various types of respirators to distribute to staff. Even in the earliest phases of the COVID surge, access to an adequate supply for providers was challenging. At the peak of the COVID surge, one disposable N-95 mask was distributed to OR personnel daily. Because of concerns about obtaining additional supplies, the initial rollout was envisioned to be two masks per week per personnel with reuse, but adequate supplies were procured and this rationing plan ultimately did not need to happen. The chief anesthesiology technician along with department leadership coordinated the distribution of institutional PPE as well as those sourced by department members. The team also secured other equipment readily needed for COVID-19 care, including anesthesia circuit filters, clear acrylic intubation boxes, and clear plastic sheets for airway management and protecting anesthesia workstations. Reusable equipment such as video laryngoscopes were replaced with disposable equivalents. Anesthesiology technicians received updates on institutional policies, perioperative infection control, terminal cleaning, and breakdown of contaminated anesthesia machines. Our anesthesia technicians were instrumental in the continued delivery of anesthetic care during the pandemic including ICU settings where anesthesiology machines had been requested due to the volume of ventilator-dependent patients.

As part of the planning for reopening, adequate supplies of PPE were secured, including disposable N95 respirators. While powered air purifying respirators (PAPRs) have not been available, in order to accommodate variable N95 mask fits, three different types of common N95 respirators are available to staff on a daily basis.

Communication

Social distancing policies, heterogeneous schedules, and new clinical assignments posed challenges for interdepartmental communication. In addition to the COVID-19-specific departmental website, twice weekly virtual “town halls” were organized by departmental leaders using Zoom (Zoom Video Communications, Inc., San Jose, California, United States). Prior to the pandemic, any departmental announcements typically occurred weekly on Friday mornings at our primary site, and this practice was no longer possible. Telecommunications allowed staff at all campuses, post-call and pre-call staff to participate, thus enhancing communication compared to prior.

Education

Departmental Grand Rounds were preserved by converting the lecture hall format to entirely online sessions. The content, previously comprised morbidity and mortality cases and topics of direct relevance to our anesthesiology practice, was revised to suit the current needs, such as wellness and self-care, COVID-19-related education, and updates in ICU management. Similarly, resident lectures were converted to an entirely online format. Because of the importance of social distancing and various locations of departmental members, this format for departmental meetings is expected to continue for the foreseeable future.

Quality improvement initiatives

Existing departmental committees on Wellness, Quality Improvement and Patient Safety were maintained, prioritizing the acute COVID-19-related departmental needs. The Quality Improvement and Patient Safety committee created emergency OR and out-of-OR intubation protocols to streamline this often stressful process. Adult and pediatric emergency airway tackle boxes were reconfigured and tailored to COVID-19 patient concerns and medication shortages. Committee members utilized platforms such as Google Sites (Google LLC, Mountain View, California, United States) and Venngage (Venngage, Toronto, Canada) to create websites and infographics, respectively, which disseminated information in a user-friendly format (Fig. 1). The Quality Improvement committee served as a centralized outpost for dissemination of verified COVID-19-related resources, limiting the volume of daily emails.

Academic research efforts

The beginning of the COVID-19 outbreak was marked by limited understanding of the disease and its management. While our department's primary focus was the provision of high acuity patient care, faculty members with relevant expertise and research interests were encouraged to apply for grants, collaborate with other specialties, and publish peer-reviewed data in efforts to expand COVID-19 knowledge.

Resuming elective surgery after the surge

On June 8, 2020, Governor Cuomo announced the reopening of elective surgeries in New York City [11]. After the peak of COVID-19-related admissions in our institution, on April 13, 2020, a slow but steady decline in patient volume occurred. The average daily decrease in the COVID-19 inpatient census over the subsequent eight weeks was approximately 20 patients a day. At the time of this writing, the number of COVID-19-positive inpatients has remained under 50 and the number of ICU admissions have remained under 5 since June 25, 2020.

This pandemic forever changed certain aspects of anesthesiology practice. From preoperative SARS-CoV-2 testing, continued availability of PPE, ongoing ICU needs, and preparation for future outbreaks, the authors anticipate that there will be no “return to normal,” but instead a different landscape. Compared to the rapid termination of elective procedures, reopening and resuming elective surgeries required a more complex, coordinated effort (Table 2).

A core team consisting of the anesthesiology department chair, surgery department chair, and perioperative leadership was established to determine the process for resuming elective surgery. These recommendations were informed by society guidelines such as those of the American Society of Anesthesiologists, American College of Surgeons, Association of Perioperative Registered Nurses, and American Hospital Association, which released a Joint Statement on April 17, 2020 on the criteria for reopening of elective surgery [12]. In accordance with these guidelines, supplies of PPE, pre-procedural testing, ICU bed availability, and case prioritization were organized.

The OR block schedule that existed prior to the pandemic was suspended to prioritize elective procedures based on urgency of intervention and risks of further delay to the patient. A tiered approach to reopening to previous full capacity was created in light of this goal. A percentage of ORs at each

campus, ranging from one to six ORs, are maintained in a negative pressure environment for COVID-19 positive or untested patients.

A negative SARS-CoV-2 test of less than 72 h is required for all patients presenting for elective procedures. Nasopharyngeal swab polymerase chain reaction (PCR) tests are performed by licensed practical nurses (LPNs) across seven testing sites, including two drive-through testing centers. Same day SARS-CoV-2 PCR testing with processing times of 2 h is reserved for patients undergoing highly aerosolizing procedures such as bronchoscopy. Temperature screening is required for all individuals entering the facility.

The preoperative testing clinic for patients with complex medical comorbidities previously consisted of in-person visits with a nurse practitioner, attending anesthesiologist, or resident. Since the pandemic, a full-time anesthesiology attending has been added to facilitate the transition to Telehealth. At the time of this writing, 50% of preoperative anesthesiology appointments are via Telehealth to meet the backlog of elective procedures in a manner that reduces in-person interaction and patient crowding in waiting rooms.

Our ASC has undergone changes to accommodate a larger patient volume due to the elective surgery backlog and patient preference to have their surgery in a COVID-19 negative, free-standing surgery. These changes include longer hours of operation and provisions for an overnight PACU. An additional goal is to prepare for an ASC closure should a COVID-19 resurgence occur. Maintaining a SARS-CoV-2 negative status for the entire building will be of utmost importance due to the demonstrated insidious spread of SARS-CoV-2 and the increased incidence of post-operative morbidity and mortality in the setting of COVID-19 [13,14]. Efficient and effective donning and doffing of PPE for intubation and ACLS was crucial during this outbreak, and remain an important component of preparation for any resurgence or future pandemic.

Discussion

The COVID-19 outbreak in New York City necessitated a comprehensive restructuring of the Department of Anesthesiology at Montefiore Medical Center. The challenges faced included work hour restrictions for trainees, contractual obligations, staff preferences, provider wellness and safety, large-scale medical absences, and working outside usual clinical duties. To adapt to these constraints, we employed creative solutions (Table 1). We learned important lessons, demonstrated the value of clinical anesthesiology for a hospital system, and noted opportunities for improvement.

The principal take home message for hospital systems that have confronted the COVID-19 pandemic is the importance of surge planning and preparation. These measures have long been appreciated and recommended in epidemics and disasters [15–18]. Anesthesiologists are well positioned to be leaders in this planning whether they directly administer critical care services because they have extensive experience working with a multitude of clinical specialties across various hospital sites.

In staff deployment, each individual's unique skillset must be considered. One model is to divide the anesthesiology workforce into three groups: a subset for elective and urgent OR procedures, a second subset of critical care intensivists involved in ICU staffing, and a third subset that deliver of out-of-OR non-ICU care such as obstetric anesthesia and pain management [19]. The authors recommend two additional groups: a fourth team for effective communication of resources and wellness, and a fifth group focused on maximizing research initiatives, quality and patient safety.

In addition to scheduling clinical assignments that allow for illness and medical absences, it is vital to promote wellness amongst staff and trainees. The COVID-19 outbreak in New York City created tremendous stress amongst healthcare providers and support staff, with long-term effects anticipated [20]. Wellness initiatives should be implemented and resources must be provided. One simple example is our model for assigning anesthesiology residents to two-week blocks of ICU followed by a two-week rest period.

Another important lesson is the immense value of critical care training in anesthesiology. At our institution, the anesthesiology intensivists took on leadership roles during the COVID-19 outbreak, providing expert patient care and hands-on assistance for staff deployed to the ICU. Moreover, we noted the importance of critical care in anesthesiology residency training. Residents and fellows seamlessly transitioned from their scheduled OR clinical rotations to become full-time critical care

providers. They worked alongside nonintensivist attending anesthesiologists deployed to the ICU, combining workflow proficiency with clinical experience. Some have argued that the COVID-19 outbreak further highlights the importance of simulation for medical education [21,22]. An editorial from 2010 argued for a greater focus on perioperative medicine with residents being required to select either a critical care or pain medicine six-month track in their final year of training followed by an optional, specialized 12-month fellowship [23]. Such a model, especially with a fast-track option, would enable trainees to graduate in five years with two years of subspecialty training.

As the New York City area and our institution heal and return to normal activities, the humbling experiences from the initial surge should be remembered, evaluated, and shared. The lessons from our center highlight areas for improvement in anesthesiology practice, education, and organization. It is our duty to our patients and specialty to emerge from this tragedy better prepared for future challenges.

Declaration of competing interest

None.

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Practice points

- During the pandemic surge, the need to extend anesthesia critical care capacity while maintaining subspecialty availability for emergent operating room procedures were the primary drivers of staff scheduling.
- In collaboration with the GME office and a newly formed staffing command center, a small core of anesthesiology trainees were assigned to OB rotations and emergent OR cases, while the remainder were deployed to expanded critical care areas.
- Trainee redeployment was based on the level of training and experience and ensured compliance with ACGME duty hour regulations.
- High-risk staff, including those over 65 and pregnant, were given the option to continue clinical work or to be reassigned to vital administrative roles such as populating the staffing schedule, developing a departmental informational webpage, assisting with PPE supply management, and coordinating department-wide educational activities.
- Communication was enhanced with the creation of a COVID-19-specific departmental website as well as twice weekly departmental virtual “town hall” meetings.

Research agenda

- Using tools such as checklists and mock drills (simulation), departmental and institutional pandemic preparedness should be regularly evaluated to determine current readiness and identify knowledge or performance gaps that will inform future pandemic responses.
- The potential value of additional resident critical care training needs to be studied to determine whether this would be beneficial in future scenarios in which anesthesiologists are emergently shifted to staff intensive care units.
- The role and value of rapid dissemination of care pathways and treatment protocols through curation of digital media or other types of communication should be evaluated.
- Using surveys, review of critical events, and patient outcomes, optimal staffing strategies for newly formed ICUs, including staff type, skills, and subspecialty needs, should be evaluated.

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