


Surgery Response During the COVID-19 Pandemic Single Institution Experience in New Jersey

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Introduction

As of April 11, 2020, there are 503 594 active cases per the Johns Hopkins Coronavirus Resource Center.¹ Hospital systems at the epicenter in New York and Washington are now at or above their capacity, and extraordinary measures are beginning to take place, including planning for “pop-up” hospitals and intensive care units (ICUs), resource triaging, and early graduation from medical schools. While much of the United States has not seen significant numbers of patients as a result of COVID-19 surge, reports from Italy, Spain, and China have made clear that the situation will become widespread.

In most academic hospitals, surgeons will not be primarily responsible for the treatment of COVID-19, but surgeons will play an essential role in patient care as consultants and hospital leaders, and the impact of these patients on the health care system will have a significant effect on the practice of surgery for the near future. As there has not been such a widespread societal response to a pandemic in the United States in living memory, there is no precedent for how to shape a modern surgery program to respond to it. In general, surgery programs will need to simultaneously assist in the management of the pandemic and the patients affected by it, continue to manage surgical patients both inpatient and outpatient appropriately, and protect the providers from infection while maintaining the training of residents. A variety of response plans have been implemented around the country. Here, the adjustments made by our surgery department are presented, with the available evidence to support them.

Our center is an urban safety-net tertiary care center in Camden, New Jersey, which is currently the state with the second-highest number of cases of COVID-19 after New York,¹ with an impending COVID-19 surge in central and southern New Jersey where we are located. The hospital is closely affiliated with the nearby Cooper Medical School of Rowan University. Our surgical services include Oncology/Hepatobiliary, Trauma, Colorectal, Bariatric/Minimally Invasive Surgery, Vascular, Breast, Thoracic, Pediatric, Plastics, and Cardiac surgery. Our General Surgery residents cover Transplant at a nearby center. Mid-level coverage is provided by a combination of surgical trainees and advanced practice providers (APPs).

Surgical Scheduling

The department has followed guidelines from American College of Surgeons (ACS) and Society of American Gastrointestinal and Endoscopic Surgeons to reduce the amount of “elective” cases for the foreseeable future.² While there is no universal classification system for “elective” versus “urgent” or “emergent” cases, and all cases lay on a spectrum of acuity, all specialties have taken significant steps to reduce their scheduled case volume. In general, life-threatening and limb-threatening surgical indications continue without restriction (eg, Trauma, Vascular, Cardiac), and cancer resection cases are proceeding with minimal delay (Hepato-Pancreato-Biliary, Thoracic, Breast, Colorectal). In contrast, other cases have been canceled (Bariatric, nonincarcerated Hernia, Plastics, etc). The hospital created a committee of senior surgeons to provide guidance and final decisions where individual providers and groups had disagreements or uncertainty. In patients with resectable cancer for whom there are alternative approaches with neoadjuvant chemotherapy, those patients were referred accordingly. For scheduled cases that are not canceled, patients were available to be tested for COVID-19, 24-48 hours preoperatively with in-house COVID-19 testing so that their cases can be canceled if positive, given worse surgical outcomes reported in infected patients.³

No changes have been made to surgical versus nonsurgical management of common emergency surgery indications, for example, antibiotics for uncomplicated appendicitis, as has been proposed by some organizations like ACS if patients are known to be infected or hospitals lack resources.² However, nonsurgical options remain available if the benefits begin to outweigh the risks. The surgery department has not implemented a policy of avoiding potentially aerosolizing techniques like laparoscopy and thoracoscopy,⁴ but may adjust if more evidence to show risk becomes available.

Intraoperative Considerations

Our hospital has made adjustments to intraoperative protocols in the cases still being performed in non-COVID-19-confirmed patients to minimize exposure and save resources.

Operating room (OR) personnel was minimized by limiting operative teams to 1 attending and 1 resident, or 2 attendings. Similarly, there is no more than 1 circulator nurse and 1 scrub tech, with 1 circulator nurse outside the room if many supplies are needed. Only anesthesia personnel remains in the OR during intubation or extubation, given the high risk of aerosol exposure during this portion of the case.⁵ In general, teams open the fewest possible supplies before they are needed and minimize breaks of personnel, all to use the least possible number of gowns, gloves, masks, and eye protection. In order to avoid possible infection from the aerosolized virus in laparoscopy, a closed suction device is utilized to aspirate pneumoperitoneum with special care to avoid unintentional leakage, and incisions are kept as small as possible to avoid leakage around ports.⁶

For patients confirmed to have COVID-19 infection who require surgical procedures, a multidisciplinary team has created a comprehensive OR plan with designated several rooms specifically for COVID-19 patients and alternative negative pressure rooms for overflow if those are filled. Intubated patients proceed directly to the OR from their rooms. Nonintubated patients are transported to a negative pressure room, intubated with rapid sequence intubation, and a clamped endotracheal tube until a closed circuit is established. The patients are then brought to the designated COVID-19 ORs. Other than the primary members of the OR team, no other workers are allowed in the OR during procedures. Specimens are double bagged and the exterior stabilized before transport. Patients are extubated in negative pressure rooms and then taken to designated negative-pressure postanesthesia care unit bays for COVID-19 patients that have been established for patients not returning to an ICU.

Call Schedule

One of the first adjustments at our institution was to ensure that medical staffing would remain adequate in the likely event of provider infection and quarantine. The medical service also made early requests for surgery residents and APPs to be rotated onto COVID-19 care as the COVID-19 patient census increased. Preserving surgical staffing levels initially included recalling residents on external rotations and research and implementing travel restrictions for foreign and domestic travel. Visiting trainees were not removed from the center, but that decision was left up to their home programs. Anticipating that quarantine of providers would be inevitable from reports of hospitals in New York and Washington, the general surgery program created 2 teams of residents, 1 to be present in the hospital and 1 to be on-call at home as a reserve. These teams alternate each week. Night coverage was

provided by a separate third team of residents for 5 nights, and surgery residents assigned to research covered for the remaining 2 nights. The day team assigned to the hospital works 7 days, while the home team is only on home call with academic assignments for 5 days of the week. This allows all trainees to have at least 4 days off every 28 days, in line with the Accreditation Council for Graduate Medical Education work-hour requirements, which have been maintained, despite some moves to erode them as an emergency response.⁷

Our APPs have created a parallel system with half working 1 week and a half working the next, with the same hours that they were providing before. Rather than plan for only 1 response scenario, the administration also designed multiple levels of pandemic response systems, with progressively more residents lost to infection and rotation on the internal medicine services, and fewer available to cover Surgery in “skeleton crews”. The skeleton crews cover combined services. Patient volume by service will vary from center to center. Still, our hospital found that combining team coverage for Emergency, Pediatric, and Thoracic surgery was well balanced by a combination of Bariatric, Breast, Colorectal, and Oncologic Surgery, presumably because of a high sustained rate of cases on Emergency Surgery. The Trauma service has remained separate from its normal levels of staffing. Within each subspecialty, 1 attending would round week at a time to prevent exposure of all attendings within a specialty at once to allow a reserve of backup faculty if the covering attending becomes exposed to COVID-19. Where possible, the specialty groups have tried to avoid providers who are at higher risk of morbidity and mortality (age >65 or those immunosuppressed) from infection from taking rounding call, and instead assigned them to telemedicine and administrative roles.

Prior research has sought to determine the safety of reduced staffing systems with mixed results. Suspecting that decreased numbers of providers on the weekends would lead to worse outcomes, several groups have studied outcomes for procedures and admissions during the weekend or late week.⁸⁻¹² Our department reviewed this data when deciding how to schedule our APPs, residents, and attendings during the pandemic. While some studies show no difference in outcomes over weekends, some do show increased mortality and length of stay. However, none of these studies utilized randomization instead of using retrospective database reviews to conclude. It is unclear if the inherently increased risk of procedures and admissions that had to be done urgently over a weekend was fully corrected for in these studies, and the overall mortality in all of these studies was quite low, indicating a significant

potential number needed to treat to prevent mortality, even if the results are valid. Given the weakness of the evidence against reduced staffing, compared to the clear benefit of reducing provider exposure to infection, the hospital felt that the benefits outweighed the possible risks.

Clinic

Some of the earliest changes the department made were related to outpatient care. As many appointments as could be safely managed with telemedicine were switched over, particularly scheduling and surveillance appointments.¹³ Clinics use several commercially available video conferencing programs, specifically WebEx, Zoom, and Doximity. While the department's immediate response was to cancel clinic visits that could be safely canceled and rescheduled, regular clinic resumed schedule once telemedicine was adequately set up. For those appointments that have continued—urgent visits or certain post-op checks—staff and provider interaction with patients is minimized to the attending and 1 medical assistant to preserve personal protective equipment (PPE) and avoid exposure. Physicians maintained social distancing within the physician documentation room and have staggered patients to minimize crowding.

A recent meta-analysis supports the safety of this change to telemedicine in the surgery clinic by Asiri et al.¹⁴ Their review found that telemedicine in surgical care was associated with improved patient education, patient satisfaction, and equivalent preoperative evaluation and planning as in-person care.

Preserving PPE

Resource availability during the pandemic is a constantly evolving problem. Like most centers, our hospital did not have large stocks of PPE available at the start of the crisis and was unable to obtain enough to provide all healthcare workers with N95s or powered air-purifying respirators (PPARs) for continuous use with every patient. To preserve PPE for the highest risk encounters, the hospital implemented the following system.

Surgical residents and attendings receive 1 N95 per day that they perform aerosolizing procedures or provide care for a patient with confirmed COVID-19. Additionally, they receive 1 surgical mask a day for routine work within the hospital. PPARs are used for thoracic and head and neck procedures. Faceshields are reused as able when they are not soiled. Personal scrub caps are permitted so long as they are washed daily.

Health of Personnel

As most surgery programs are already at minimal levels of staffing to remain fiscally responsible and maximize cases per trainee, it is paramount to protect the few providers from infection. Adjustments to minimize provider–patient contact as well as provider–provider contact while still managing patients, as well as possible, were performed. This began with early cancellation of group activities like out-of-hospital social events and then moving regular activities Grand Rounds and didactics to an online medium. Trainees were asked not to see patients in the ambulatory setting. The department implemented a tele-signout system as well to minimize contamination between day and night teams. Concerning inpatient consults, our traditional, hierarchical system of subsequent examination by junior then more senior providers has been adjusted to having only 1 surgeon, either a chief or attending when in-house, performing an in-person history and physical exam. For some lower acuity consults in which imaging and history are more relevant than a physical exam, consultant teams can use phone interviews and chart-checking alone to perform the consult, with an option to do an in-person exam if it is later deemed necessary. Surgeries performed on confirmed COVID-19 patients are done by 1 attending and single resident physician without any additional trainees to expedite the case and minimize exposure time to anesthesia, OR staff, and surgery, and to conserve PPE. Staff are screened weekly for symptoms of COVID-19 and tested for fever when entering the hospital daily. The previous policy of only wearing surgical scrubs within the hospital and changing to other clothing when coming or going to work has been continued. The hospital has increased the expectation of PPE use during routine patient care tasks like turning patients, changing linens, inserting IVs and nasogastric tubes, etc, to include masks and eye protection. Medical students were withdrawn from surgical rotations early in the pandemic.

Ward Rounds

Our department has made changes to its practice of daily rounding on the wards. Our program previously had a typical system of early morning rounds by the medical students and residents, followed by group rounds with attendings later in the day. This system would have required significant PPE use and excessive exposure to providers, so changes were made accordingly. Residents “chart check” patients for vitals, intake and output, pain score, etc, and then round with 1 attending per service. Only the attending enters patient rooms during rounds to perform an exam. In individual

patients for whom the physical exam is less critical for their decision-making, telephone interviews are used for rounds. The program created a rounding schedule between teams to minimize the number of teams in the hallways at once. From a patient distribution standpoint, particular floors are designated to take patients known or suspected to have COVID-19 infection and other floors to take non-COVID-19 patients to avoid contamination between rooms during rounds.

End-of-Life Care/Code Status

While no formal changes to the hospital's policy for end-of-life care have been made, consideration has been given to the increased cost of heroic measures during the pandemic, and inquiries into the legality of "forced do-not-resuscitate" policies have been made. Some hospitals have reported considering not offering cardiopulmonary resuscitation to patients who go into cardiac arrest with COVID-19,¹⁵ given the reported low likelihood of survival after an arrest, the high resource cost of post-arrest care, and potential for infection of workers providing advanced cardiac life support (ACLS).¹⁶ The hospital has not made any changes to ACLS policy but continues to emphasize early and frank discussions about code status with patients and their families. The hospital did make a change in staffing policy to prohibit trainees from participating in ACLS due to the high risk of infection during emergency intubation, chest compressions, and other procedures.¹⁷

Limitations

It should be noted that all policies in place during a pandemic should be fluid and responsive. While the practices we have designed and described here represent the best planning we have been able to do and have served the hospital well so far, it would be short-sighted to claim that they will all stand the test of time without more adjustments, and our department is engaged in continuous review of them. Additionally, limited attention has been paid to how to de-escalate the response as the curve is eventually flattened, and COVID-19 patient volume decreases. More research and sharing of information will be essential throughout the pandemic.

Conclusion

The response to the COVID-19 pandemic from surgical departments requires numerous changes to outpatient and inpatient care, call schedules, staffing levels, resource usage, and even surgical decision-making and technique. Surgery departments can limit exposure to their providers

while providing the best possible care to patients, both COVID-19 related and otherwise, by following guidelines to control infection and save resources while still providing appropriate surgical care in the short and long term.

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