Chapter 44
Maintaining Surgical Quality in the Setting of a Crisis

John R. Romanelli

With the recent COVID-19 pandemic, it is certainly reasonable to reflect upon the maintenance of surgical quality in the setting of a crisis situation. Given what has transpired – and in fact is still ongoing at the time of this writing – there are certainly lessons that are applicable to future events that can be learned from how we treated surgical patients during the crisis situation. This chapter will delve into the following topics: hospital resources and the impact on surgical scheduling; cessation of elective surgery and ramifications for patient care; scarce resource allocation during the crisis; redeployment of surgical workforce during a crisis; delays in care delivery of routine problems due to the crisis; and the re-emergence back into elective surgical care following a crisis. The challenges in maintaining surgical quality during this crisis are illustrated, while the solutions highlight principles that are foundational in quality systems.

J. R. Romanelli (✉)
Department of Surgery, University of Massachusetts Chan Medical School - Baystate Medical Center, Springfield, MA, USA
e-mail: John.Romanelli@baystatehealth.org

J. R. Romanelli et al. (eds.), *The SAGES Manual of Quality, Outcomes and Patient Safety*,
https://doi.org/10.1007/978-3-030-94610-4_44

Hospital Resources During Crisis Situations

Most hospitals have an administrative structure that springs into action once a crisis situation unfolds. While the pandemic is fresh on our minds, this could also result from other crisis states such as a bed crunch caused by influenza; other infectious agents, much like the Ebola scare in the last decade; mass casualty incidents such as multiple traumas in blunt or penetrating situations; or other crises that cause normal hospital functions to cease or be altered significantly.

Typically, hospitals start with an incident command team. This should be structured to include key administrators, department chairs or other designated leaders, the emergency department, supply chain, nursing, bed control, and other important stakeholders, some of which may be unique to the crisis at hand. Many healthcare systems have a disaster plan of some type, and this should be activated as soon as it is apparent that the hospital's function has to shift to new priorities. Early priorities of the incident command team should be to assess what critical resources are needed immediately and what shortcomings they believe the healthcare system or hospital has or will have and to establish a timeline of need. They must begin to assess the capability of an expanded number of beds (and where to house the surge of patients) and an expanded number of critical care beds (and again, where to house those units). They must also decide whether or not the cause of the crisis will lead to unique needs (e.g., in the case of an infectious pandemic, if isolation beds will be needed and negative airflow rooms are available or could be created). Communication systems have to be tested and implemented.

An important aspect of a crisis affecting healthcare delivery is the impact of this crisis on the local or regional area. If the crisis affects many centers, such as the COVID-19 crisis, regular communication between leadership of local hospitals – even if from competing systems – is critical to understand the regional impact of both the problem itself and the

altering of other healthcare deliveries. Further, if the crisis is broader in scope, then communication between hospital leadership (with representation on the incident command team) and local, state, and federal government officials is also important. These conversations must be bidirectional: the governmental authorities need to learn about the scope of the problem, and the hospital systems need to be informed about decision-making that impacts delivery of care. One such example during the COVID-19 crisis was the edict that elective surgery cease in most states. While societies such as the American College of Surgeons (ACS) and SAGES published communication suggesting the need to stop performing elective surgery, state governments and their Departments of Health made the call for this to be implemented by hospitals.

A critical step in early crisis management is to gain an understanding how much "say" the healthcare providers might have. In this example of the shutdown of elective surgery, most states left it to surgeons to determine what cases were truly elective and what cases were of an urgent or emergent nature. While certainly some surgeons could abuse this distinction, and still perform relatively elective cases (by calling them "urgent"), it is incumbent upon operating room leadership or department chairs to monitor for this activity and stop it if necessary. Nonetheless, the decision-making power should never be taken away from doctors and their patients to make surgical decisions, and at least in this most recent crisis, that decision was urged to stay between the providers and patients by both surgical societies and most states governments.

One of the most important tasks of the incident command group is to have a committee or subgroup that monitors bed availability. In surge conditions, they must continually plan for new units to be created, staffed by appropriate nursing and ancillary support, and to have these units equipped with all of the necessary medical and computing equipment. As the surge begins to ease, understanding how many beds per day become available will be a necessary step before lifting a

prohibition on elective surgery. The same holds true for interventional radiology and interventional cardiology or vascular procedures, which may require bed usage post-procedure.

Central to quality in disaster management are data, transparency, and continuous analysis. Hospital systems are able to learn and adapt to various resource constraints using these important principles. As regards data, critical to an institutional response is the acceptance of information from all staff and, uniquely for COVID, from around the world. The data should be distilled and actionable such as the use of PaO_2/FiO_2 ratio in determining which patient requires prone positioning or D-Dimer levels in determining which patients require therapeutic anticoagulation. For transparency, daily briefings within specific units and about overall hospital operations reduce staff anxiety about resource constraints and encourage collective solutions. Data transparency is important at all levels from individual patients to regional trends. Lastly, in learning, eventually, a generative approach can be employed to anticipate and adapt; protocols are collected, updated, and shared continuously based on data and evidence. A mature operational team continuously reviews performance and can plan for a progressively better response.

Cessation of Elective Surgery and Ramifications for Patient Care

The decision to cease elective surgery is a difficult one for hospitals as it is a major source of revenue. It is typically a last step that happens once a crisis situation unfolds. In the case of COVID-19, this difficult decision was made by both societies and state governments, and it was one of the first times that this has ever occurred on a mass scale, at least in the United States.

Once elective surgery stops, two situations must be monitored. The first is that the clinical staff supporting surgeons must be in contact with patients who are displaced off of the schedule to ensure that their disease processes do not worsen,

moving them into the "urgent" category. If so, they need to be re-scheduled and have their surgeries performed. The second is that medical offices must keep "bumped patient lists" so that re-scheduling can occur in a timely and orderly fashion once the cessation of elective surgery is lifted.

Another question that can be raised by the cessation of elective surgical work is how to manage patients with unfolding clinical needs. For example, a patient with right upper quadrant pain might still be able to receive an ultrasound to diagnose cholelithiasis. If that is negative, a nuclear medicine study might be needed to diagnose biliary dyskinesia. But what if that is unavailable? Would upper endoscopy be available, or were the endoscopy units also limited to emergent and urgent cases only? And then how that patient would be managed without surgical intervention?

Separating patients into acuity levels is a potential helpful exercise to help determine what patients should not be delayed in receiving surgical care. The ACS published a very helpful document [1] called COVID-19: Guidance for Triage of Non-Emergent Surgical Procedures. In this document, they described the Elective Surgery Acuity Scale, which separates patients into three tiers based on low, intermediate, or high acuity and then subdivides those tiers into healthy and unhealthy patients. In this example, Tier 1 patients (low acuity) are recommended for postponement of having the cases be performed at an ambulatory surgery center (ASC); Tier 2 are recommended for postponement "if possible" or consideration of being moved to an ASC; and Tier 3 are recommended to not be postponed and should only be performed at a hospital setting. Obviously, there is room for clinical decision-making by the surgeon and patient in this regard.

Cancer patients present a unique and interesting dilemma regarding the timing of surgical intervention. SAGES published very useful documents [2–4] offering recommendations on how to treat cancer patients in the setting of the COVID-19 crisis, but these recommendations could be broadly applied.

Another consideration is that operating room personnel are now a resource that could be redeployed into other critical need situations throughout the healthcare system. The operating room nurses could assist with triage, help in other critical care units, or work toward screening patients, in the case of infectious disease. Post-anesthesia care units could be re-purposed as critical care beds if needed. Hospital supply chain personnel could be tasked with managing the needs dictated by the crisis and as such could be diverted from operating room tasks.

Scarce Resource Allocation During a Medical Crisis

One of the more frightening aspects of a crisis is the dwindling of resources to an amount insufficient to meet the needs of patients. One can argue that the inability to perform elective surgery amounts to a scarce resource situation. This concept delves into ethical decision-making in choosing which patients received what is deemed as limited in supply. An early consideration for hospitals during, for example, a pandemic, is to form a scarce resource team led by an institutional bioethicist (if one is available). The idea is that such a team would comprise of clinicians that are not charged with taking care of a particular patient facing a need of an item in scarce supply at the given time. The formation of a team like this would be directed by the incident command team.

During the early part of the COVID-19 pandemic, a central concern was the availability of ventilators. Confronting the difficult concept of having to choose between two patients for one available ventilator is a terrifying prospect for physicians who took an oath to "Do no harm." Having guidance as to how to choose which patient is awarded the scarce resource is impossible as the clinician charged with care delivery to multiple patients that may drain said resources. Given that we all serve as advocates for those we care for, it would be a conflict to advocate for the same ventilator for two different patients. Alas, the concept of a scarce resource team, divorced from

direct care delivery, can help choose where to allocate ventilators when there remains an insufficient number.

This concept is not limited to ventilators during an infectious pandemic. Dialysis could become available on a limited basis if many patients were going into acute renal failure. And of course, many care givers were troubled by a lack of appropriate personal protective equipment during the recent pandemic. Even operating room availability in a mass casualty event should be considered a scarce resource.

There are medical resources to guide scarce allocation teams in decision-making. The Massachusetts Department of Public Health issued this guide [5] to advocate for the formation of teams such as described herein and to help clinicians make these difficult decisions. Typically, one must factor survivability as an initial criterion. Triaging patients into low, intermediate, and high chance of survival can help to direct resources appropriately. This concept originated in battlefield and military medicine but can certainly be applied in a civilian crisis. Next a score such as SOFA (Sequential Organ Failure Assessment) could be employed to help make such a determination. The elements of SOFA [6] include PaO_2/FiO_2 ratio, platelet count, total bilirubin, blood pressure, Glasgow Coma Scale, and creatinine, thus quantifying dysfunction of the respiratory, coagulation, hepatic, cardiovascular, neurologic, and renal systems. This score could be combined with an analysis of major comorbidities and indicators of 1-year morbidity to objectively predict which patient has a better chance for survival and thus would be more appropriate to direct a resource toward.

Trauma systems apply these lessons of scarce resource allocation by using two principles: reduction of uncertainty through risk stratification (triage) and staged interventions that achieve the most in a minimal time. Quality, in a classic mass casualty event, means that arriving patients should be quickly risk stratified based on their apparent injury and vital signs, imaging studies kept to a minimum, and interventions be limited to 30–60 min per patient. This allows for rescue first, followed by recovery and restoration. Arguably, the nature of the COVID-19 pandemic cannot achieve this type

of quality, as scientists have not identified a means to rapidly limit the extent of illness on presentation, while risk stratification requires time and extensive testing. The best achievable quality for this current mass casualty event is in the prevention of errors, that is, good quality might be defined by teams adept at early identification of escalating severity. Good quality might be defined by rapid intervention teams that are organized around specific interventions such as intubation, proning, invasive lines, or clinical trial enrollment.

Surgeons bring unique skills in this scarce resource allocation situation. Surgeons could and should be added to allocation teams, especially if time is freed with the shutdown of elective surgery, such as in COVID-19. Given that general surgeons have to be conscientious of all organ systems, they, along with internists, can take a generalized look at patients without the bias of being a single-organ system-based specialist. Further, surgeons might be forced into making these difficult choices if operating rooms become scarce (like a mass casualty situation) or if post-anesthesia care unit or critical care beds are limited by a patient surge. Lastly, surgeons may have to decide upon the relative urgency of a disease process to decide if patients need to have their operations performed in a more timely fashion, as previously described, and some of these tools could be employed to help in that decision-making analysis (e.g., choosing which urgent patient to operate on first).

Redeployment of the Surgical Workforce During a Crisis

In some critical situations, surgeons may be forced to redeploy to other areas of the hospital to augment the existing, if not exhausted, workforce. This might mean seeing patients in the emergency department; it might mean working in intensive or critical care units; or it might mean covering other areas of general surgery such as trauma or emergency general surgery. As stated in the SAGES publication, the Primer for Taking Care of Yourself During and After the COVID-19

Crisis [7], while being forced into unplanned clinical situations may provoke feelings of fear and anxiety, "what we do know is that regardless of our current specialty and regardless of the time since we practiced general medicine, that our contribution in fighting this medical nightmare is a unique and noble one. Our surgical training and heritage will support us. The role we may serve during the present need eclipses and stretches our normal patterns of practice, but not beyond the depth of our training backgrounds." Certainly needing to cover trauma admissions may seem uncomfortable and outright daunting after not performing trauma surgery for years – decades? – but our training will indeed begin to guide us, and our colleagues deployed to critical care units for pandemic needs can certainly assist us in decision-making. Materials such as those published as a part of ATLS can also serve as a reminder of basic core principles to help the redeployed surgeon.

Further, the surgical workforce comprises of more than just the attending surgeons. Trainees or advanced practice providers may also need to cover different areas of the hospital, leaving surgical teams short of their normal coverage. OR nurses or PACU nurses may be asked to work in other areas of the healthcare system to help handle surge or crisis needs, or they may be uprooted from an ambulatory OR to an inpatient OR. This may force urgent surgical procedures to be conducted with an unfamiliar team, which can hamper outcomes, slow operative times, and lead to frustration on the part of the surgeon or the team. Thus it becomes incumbent to prepare diligently for these cases, foster good communication in the room (and with the anesthesia team), and anticipate delays that would otherwise be atypical. Similarly, anesthesia staff will likely be asked to help in the critical care units in the setting of a pandemic or mass casualty, reducing the complement of available anesthetists that can work in the operating room. Lastly, hospital systems may have to divert resources away from community hospital settings toward the tertiary care centers as they may need an increase in help to combat the crisis. This may adversely impact the ability for surgeons to be able to care for their patients at the community hospital.

The ultimate concern for surgeons is to be placed into a situation where they have to urgently operate on a disease process or patient with a clinical situation far outside the norm of their practice. While there is no "one size fits all" solution to this issue, open discussion with surgical leaders at your institution about your concerns, communication with colleagues with more experience in treating the problem, and utilizing best clinical judgment and learning developed after rigorous and thorough surgical training and experience should, at a minimum, produce an outcome that is acceptable given the difficulties and obstacles created by the crisis. "Damage control" methodology might serve as a base to deliver the patient to an acceptable state until more experienced help can be lent to aid in the definitive surgical procedure to address an emergent problem. Also, some clinical decisions might need to be altered given the limitations in resources; for example, if the institution has no critical care beds available, then leaving the patient intubated with an open abdomen and wound vac may not be preferable in a patient with an acute abdominal catastrophe. In that case, temporary closure of the abdomen and extubation may be a preferable alternative.

Delays in Care Delivery of Routine Problems Due to the Crisis

One of the unexpected issues that may arise during or after a crisis situation, especially if prolonged, is the delay in treating clinical problems. This may lead to disease processes that worsen over the interval of time that operating rooms are not functioning at peak capacity. This has the potential to be a hidden issue as patients may avoid coming to the hospital for a period of time even after the crisis eases. One can foresee that, in an infectious disease crisis, patients may be afraid to present with clinical problems for fear of catching the illness and then in turn putting their families at risk.

There are two aspects to this delay in care. The first is obvious – clinical problems such as biliary colic, diverticulitis, or paraesophageal hernia with volvulus that may not be emergent, and may not even be urgent, so they are delayed during the period of reduced operating room availability. While these patients can potentially wait to receive surgery, they also are not purely elective cases (e.g., bariatric or cosmetic surgery). It is incumbent on surgeons and their outpatient staff to remain in communication with patients, who may become urgent should their disease and symptoms worsen. One can surmise that these patients could easily be overlooked as the emphasis on care delivery is crisis-related, but this could lead to worsened outcomes if the operation is then performed under less-than-ideal circumstances.

The second aspect to care delays is patient-driven. During the COVID-19 crisis, there were anecdotal reports of an increase in the number of amputations from limbs that were not salvaged by vascular surgery due to patients remaining at home for fear of contracting the virus. There were similar reports of patients presenting in a delayed fashion with long bone fractures, who presented with DVT and/or pulmonary emboli that may not have occurred had the orthopedic repairs taken place shortly after injury. One could foresee diverticulitis turning into an urgent Hartmann's procedure rather than a planned minimally invasive diverticular resection due to the disease smoldering at home without timely intervention. Although surgeons could not have prevented these complications, it is important to consider how messaging is done by healthcare systems about the safety of having medical procedures performed in the setting of an infectious pandemic. Similarly, in the urban mass casualty setting, indicating that the area around the hospital is safe for patients to arrive and receive care can help prevent unnecessary delays in treating urgent problems, which could then lead to poorer outcomes.

Re-emergence Back into Elective Surgical Care Following a Crisis

How to reschedule surgery must be coordinated with the operating room as block availability may not immediately be repatriated. At the hospital level, decisions have to be made as to what types of surgery to prioritize. For example, the hospitals may want to begin with purely outpatient procedures at low risk for needing an inpatient bed when overall bed availability may be strained. In hospital systems that blend employed and private practice surgeons, there might be consideration of giving the private surgeons earlier or more access to operating rooms as they were likely financially impacted by the crisis in a more severe manner. Certainly, acuity should be considered in the rescheduling of cases. One must also consider the impact on cancer patients that might have been delayed; these cases may have some priority although one could argue that some of the patients were likely given different care plans (chemotherapy, radiation therapy, etc.) to initiate some form of treatment while waiting for surgery to become an option. The remaining cancers likely were tumors with slow growth (e.g., papillary thyroid, prostate), such that the delay likely would not have impacted the outcome. Nonetheless, it is likely that surgical oncologists would want some type of priority prior to initiating a re-emergence plan. SAGES has released an excellent document with recommendations as to how to manage cancer patients during the COVID-19 crisis [7], but how to integrate the delayed patients back into the operating room schedule is a concept made more complex by the interim care decisions that were implemented during the delay.

An obvious factor in developing such a re-emergence plan is the total number of operating rooms available. Was some of the PACU space re-allocated to critical care beds? If so, this can limit how much surgery – elective or not – can be completed safely. When governmental agencies lift the restrictions on elective surgeries, will the hospitals have the full

suite of rooms available? Will redeployed staff now be repatriated to the operating room? Will the anesthesia staff be completely available for the operating room schedule? Can outlying community hospitals in healthcare systems be utilized as an alternative source of operating room real estate – and can the same level of surgical quality be delivered there? Are there staff losses from people who left healthcare jobs later in the pandemic that now impact the number of operating rooms that can be safely utilized?

Furthermore, some thought has to be given to what occurred with patients during the delay created by the crisis. For instance, what happens if bariatric patients gained weight during the period of delay – should that now further delay their ability to undergo elective bariatric surgery? What happens if patients who had stable medical conditions have worsened while at home and isolated – do they now need more extensive preoperative medical clearance (which, in turn, will delay them further)? Do patients need to be seen again by surgeons, either in the office or via video or telehealth, prior to rescheduling their operations?

The recovery of normal operations across the United States and globally is dependent on local epidemiology, but the quality metrics remain the same. CMS has suspended penalties understanding that quality metrics will be necessarily be worse under the pandemic; however, at least a few regions that have achieved low infection levels have returned to normal levels of surgical volume with normalized quality. Length of stay, mortality, thromboembolic events, respiratory failure, and renal failure were measurably worse for surgical patients requiring urgent and emergent care but have improved to baseline during the period of recovery. Unwinding the redeployed surgical workforce and their operating environment requires attention to our quality systems and metrics. They serve as a guide to safe restoration. If quality remains compromised during recovery, we as surgeons must use our measurement systems to understand why and course correct.

While during a crisis the return to "normal" is a highly desirable achievement, arriving there in a safe and orderly fashion actually represents a complex series of decisions, both by providers and hospitals, to ensure maximum efficiency, safe surgical outcomes, and the ability to service all of those who were inconvenienced by the crisis itself.

Conclusion

A crisis such as a pandemic or mass casualty creates a ripple effect across a healthcare system; surgery is one of the most affected areas. Hospital resources often have to be commandeered quickly to provide for the needs of the crisis. The cessation of elective surgical care wreaks havoc with schedules and inconveniences of many patients but is often a necessary step to prepare for a surge of admitted patients. Scarce resources need to be allocated and addressed in a thoughtful, yet ethical manner. The surgeons and their teams may have to be redeployed to other areas of critical need. Delays in care may have clinical ramifications for patients that have to be dealt with and may worsen their ultimate outcomes. Emergence from the crisis and gravitating back to normal involves critical discussions with key stakeholders in a fair attempt to provide the best care to the most patients in as timely a fashion as possible.

References

1. https://www.facs.org/covid-19/clinical-guidance/triage.
2. https://www.sages.org/recommendations-surgical-management-colorectal-cancer-covid-19/.
3. https://www.sages.org/sages-recommendations-surgical-management-gastric-cancer-covid-19-crisis/.
4. https://www.sages.org/sages-ahpba-recommendations-surgical-management-of-hpb-cancer-covid-19/.

5. https://www.mass.gov/doc/crisis-standards-of-care-draft-planning-guidance-for-public-comment-october-6-2020/download.
6. https://www.mdcalc.com/sequential-organ-failure-assessment-sofa-score.
7. Dort J, Romanelli J, Choudhury N, et al. SAGES primer for taking care of yourself during and after the COVID-19 crisis. Surg Endosc. 2020;34(7):2856–62.