

## Managing COVID-19 in Surgical Systems

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*Dr. Brindle has no disclosures, Dr. Gawande is currently the CEO of Haven*

As COVID-19 spreads quickly from Europe and Asia to the rest of the world, hospitals are rapidly becoming hot zones for treatment and transmission of this disease in settings with rising community transmission. Health care workers are increasingly contracting this illness, decreasing the human resources available to care for a population in crisis.

Surgical care is a foundation of any health system with both elective and emergency procedures contributing to the health of our populations. However, operating theaters are high risk areas for transmission of respiratory infections given the urgency in management, the involvement of multiple staff, and the need for high transmission-risk activities such as airway management. Our systems are generally well-designed to deal with the occasional high-risk cases. The additional strain presented by a high prevalence of disease, limited resources, and staff under pressure, greatly increase the risks of transmission and the burden on our systems of care during this pandemic. It is necessary for us to act immediately so our systems can support essential surgical care while protecting patients and staff and conserving valuable resources.

We can benefit from some of the lessons provided from our colleagues around the world to help us stay on top of these issues as we plan our approach to surgery during the pandemic.

### **1. Prepare for a rapidly evolving situation.**

Any pathways and plans need to be developed with a recognition that the severity of the situation and the availability of resources may change on a daily basis.

### **2. Postpone elective operations immediately.**

Elective surgeries should ideally be postponed before it seems necessary. Postponing surgeries will reduce unnecessary patient traffic in the hospital and decrease the introduction and spread of disease between symptomatic and asymptomatic patients and health care staff.

In addition, reducing surgeries saves resources including hospital beds, personal protective equipment, as well as preserving the health of surgical staff.

### **3. Develop a clear plan for providing essential operations during the pandemic.**

This should include a plan to facilitate emergent life and limb saving surgeries as well as urgent surgeries such as cancer surgeries where long-term outcomes are dependent on timely interventions. The process should allow for the application of reasonable clinical judgement. For example, the biopsy of a suspicious breast lump is elective but cannot be postponed.

### **4. Educate all surgical staff on personal protective equipment and COVID-19 management.**

The appropriate use of personal protective equipment protects patients and staff from COVID-19 transmission, and yet these items are often not used appropriately. N95 masks that have been clearly shown to reduce transmission in a laboratory setting rarely work as well in practice. This is in large part because of a lack of awareness of appropriate donning and doffing procedures. All members of the surgical team should be trained in appropriate use of personal protective equipment. The risk of transmission and resource consumption in educational simulation sessions means that other forms of education must be undertaken. Our current situation should serve as a reminder of the importance of training for disasters and pandemics before the need arises.

### **5. Decrease exposure of health care staff.**

For confirmed COVID-19 cases or cases where there is an active influenza-like illness, limiting operating theater staff to the essential members is key. Trainees, in particular, should not be involved with cases unnecessarily. As COVID-19 becomes further established in our communities, asymptomatic patients who are carriers will increasingly enter the health care system for unrelated ailments and pose a risk for transmission. For this reason, reasonable measures should be taken even in asymptomatic patients such as strict adherence to universal precautions, frequent handwashing, and elimination of unnecessary staff. Keeping surgical staff out of hospital and self-isolating at home when they are not needed is a key measure to preserving our human resources.

### **6. Develop a dedicated COVID-19 operating space.**

The development of a dedicated COVID-19 operating theater may help to contain the spread of disease. The experience from centers such as Singapore as well as centers that have seen high volumes of cases in other parts of the world including within the United States and Canada provide some guidance on how these systems can be optimally designed. These include a number of key points:

1. Designate a specific operating theater for all COVID-19 cases. This room should be out of high-traffic areas and be completely emptied of all non-essential materials. When an anteroom is available, this should be used as an area for donning and doffing of personal protective equipment and exchange of equipment, medications and materials for the case. Instructional posters on appropriate procedures should be prominently displayed. If an anteroom is not available, a taped off area should be clearly marked for these activities just outside of the OR door.

2. No unnecessary items should be brought into the operating theater, this includes personal items such as pagers or cell phones and pens. Disposable caps and shoe covers should be worn and discarded after each case. Disposable pens should be provided in the room. Only the materials necessary for the case should be within the room and all disposables should be discarded at the end of the case.
3. All traffic in and out of the operating theater should be minimized. A runner or support staff should be dedicated to the Operating theater to provide all materials needed throughout the case with exchanges performed using a material exchange cart placed immediately outside of the room or in the anteroom.
4. When possible, the patient should be recovered in the operating theater with dedicated staff until they can be transferred to an isolation room on the ward or in the intensive care unit.
5. The path of the patient to and from the operating theater should be kept clear. This can be done using either security or a surgical team member travelling in advance of the patient to clear the way.
6. Consideration should be given to surgical approaches that could decrease operating staff exposure and shorten case duration.
7. Care pathways and protocols for COVID-19 cases should be very clearly developed and be specific to the needs of each site. This should include the identification of dedicated team members to manage COVID-19 cases each day.

## **7. The changing landscape of the pandemic may require patient transfers and repurposing operating theaters to support critical care patients.**

The intensive care needs of the COVID-19 patient population will be substantial, and may quickly overwhelm the systems that provide critical care. Operating theaters are optimally designed to provide support for ventilated patients and may become precious resources for the ongoing care of patients typically managed in the intensive care unit. This need may further strain the surgical capacity of health systems.

Hospitals need to be prepared to transfer patients between centers and share resources in order to optimize the care of regional populations.

The provision of surgery will continue to be an essential aspect of our healthcare system throughout the pandemic. All surgical systems will need to adapt to a rapidly changing environment. Having a clear surgical strategy during the COVID-19 pandemic will keep our systems resilient and effective and allow us to provide the very best care to the populations we serve. Forums for communication such as that established by the American College of Surgeons (<https://acscommunities.facs.org>) can be used to share recommendations and best practices .