



PROCEEDINGS

“COVID-19 AND SURGICAL CARE”
**Proceedings of the 8th Session of the
Harvard Medical School Department
of Global Health And Social Medicine
Covid-19 Seminar Series**



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“COVID-19 AND SURGICAL CARE”
Proceedings of the 8th Session of the
Harvard Medical School Department of
Global Health And Social Medicine
Covid-19 Seminar Series

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Introduction

On May 21, 2020, the Harvard Program in Global Surgery and Social Change (PGSSC) hosted a webinar as part of the Harvard Medical School Department of Global Health and Social Medicine's COVID-19 webinar series. The goal of PGSSC's virtual webinar was to share the experiences of surgical, anesthesia, and obstetric (SAO) providers on the frontlines of the COVID pandemic, from both high-income countries (HICs), such as the United States and the United Kingdom, as well as low- and middle-income countries (LMICs). Providers shared not only their experiences delivering SAO care during this global pandemic, but also solutions and innovations they and their colleagues developed to address these new challenges. Additionally, the seminar aimed to explore the relationship between surgery and health system strengthening and pandemic preparedness, and to outline the way forward, a possible roadmap for prioritization and investment in surgical system strengthening. Throughout the discussion, other themes emerged as well, such as the definition of elective surgery and its implications during a persistent global pandemic, the safe and ethical reintroduction of surgical services, and the social inequities exposed by the stress placed on health systems by COVID-19. These proceedings document the perspectives shared by participants through their invited lectures as well as through the panel discussion at the end of the seminar.

The Timeline of Covid-19 and its Relationship To Surgery

John G. Meara, MD DMD MBA

In late December, Wuhan, China reported a case series of pneumonia that turned out to be caused by the coronavirus, COVID-19. By the end of January, the WHO declared a public health emergency, and six weeks later, the WHO declared COVID-19 a pandemic. Now coronavirus is essentially ubiquitous. It is everywhere. It has traveled around the globe. And we have all lived through this.

We have seen some very granular, specific topics come out in the surgical literature. We have seen articles about emergency procedures, changes, and protocols that came up very rapidly, what has happened to the SAO workforce, how we conserve personal protective equipment (PPE) in a surgical environment, and so on. This is one end of the spectrum, the very granular perspective from the front lines. The other end of the spectrum, though, is more philosophical. What is the link between surgical care and pandemic preparedness, at a national level or a global level?

We can go back about 400 years to frame this. The Treaty of Munster and the Peace of Westphalia, created in 1648, formed our modern conception of sovereignty. This was the end of the 30 Years War in the 80 Years War, and this is where the concept of sovereign autonomy came from. This meant that sovereign countries had no right to invade other countries, but it also had a corollary which led sovereignties to feel like they had no responsibility to other countries.

About 400 years later, an article by Richard Haass in Foreign Affairs turned this concept of sovereign autonomy upside down. It argued that countries should have a feeling of sovereign obligation, that we have a responsibility to other countries into the world.¹ And this article was not necessarily a health article – while a paragraph or two focused on health, it also discussed a number of different issues with sovereignty. An online discussion with him about this message led to an article that I published with Brian Till.²

We took his concept of sovereign obligation a little further, particularly in health care, with two major premises. The first is that global health security is promoted by holistic, strong, stable health systems everywhere. In other words, health deserts anywhere are a threat to people everywhere. The second major point was that health equity and social justice are really best promoted through this concept of sovereign obligation, not autonomy or fierce nationalism. And you wonder, is that still an issue today?

Yes, it is still alive and well, this sense of fierce nationalism, as evidenced through a recent MSNBC article entitled, “A wave of vaccine nationalism hinders global efforts to halt coronavirus.”³ This is certainly still an issue.

So in terms of global health security and surgery, what have we learned from COVID? I would like to leave our speakers with three thoughts, and the different speakers will speak to different aspects of this:

- What is the role of transnational cooperation and transparency?
- What is the role of surgical capacity and surgical workforce as a reservoir of critical care capacity for pandemic response?
- What have we learned about our prior concepts of health system strength and structure?

I bring up that last point because prior to coronavirus, the United States had the highest ranking for global health security. And we all know how the United States and in particular the East Coast, fared, despite the fact that the US system spends the most on health care. You look at New York City. New York City has more staff, stuff, and space than maybe any city in the world, and yet they did not fare well. I think that might speak to our approach to systems and the fact that we may have concentrated on hospital systems, but not community systems,

which are equally important to health. And then you look at another system, the United Kingdom. The UK has a national health service, but they also did not fare well with coronavirus. So

maybe our prior view and structure for national systems was not well-suited to dealing with this.

Dr. Farmer's Reflections:

By January 12th, Chinese authorities had published the genetic sequence of the virus, a true reflection of the urgency and speed of the early response to the outbreak, as well as a reminder of what tools we do have, if we can marshal them. When we have a vaccine, it will be in part because of the speed with which that genetic sequence was published.

The idea of sovereignty and the nation-state have a history. One of the ironies about what happened after the Treaty of Westphalia to our globe is that the people living on it were really subjects, not citizens. And within a century of this groundbreaking treaty, the world would be carved into colonies. Just to give an example, the place where the largest number of colonial subjects lived in, for at least a couple of centuries, was India. But this spread of colonial rule in the late 19th and 20th century had enormous implications for the discussion we are having. It would take some time, with the continent of Africa the last to fall. And that was largely a late-19th century, 20th century phenomenon. One of the deeper questions that we can ask is, what does it mean when sovereignty is stripped away, not just in terms of the nation state, but in terms of people who are not citizens but subjects?

There has never been a great leveler like COVID-19. It is hard to imagine another pathogen that could come in and say, well, everybody's at risk, because nobody is immune, though it is essential to take into account the gravity of the social disparities that we see in both infection and case fatality rates. We did hear those kind of comments early on, but they were stilled by the gravity of the social disparities that we see in both infection and case fatality rates. And we should be returning to that as well.

Perspectives from the Pandemic Frontlines: Challenges and Innovations in Surgical, Anesthesia, and Obstetric Care Delivery around the World

THE MASSACHUSETTS GENERAL HOSPITAL COVID-19 BUNDLED RESPONSE FOR ACCESS (COBRA) TEAM

Alaska Pendleton, MD

Since COVID has impacted the Massachusetts health care system, I have been involved in clinical care within two primary contexts: first, working in a COVID ICU, and second, working as part of an acute procedures team known as the COVID-19 Bundled Response for Access team, or the COBRA team.

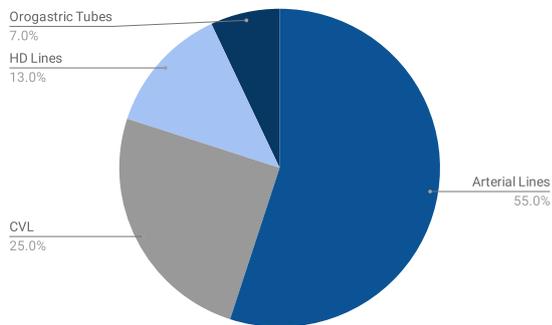
When the COVID surge first hit Boston, I was working in a burn unit, which was converted to a COVID ICU before my eyes. Literally within the course of my shift, burn patients were wheeled out on stretchers as the ICU COVID patients were brought in on travel ventilators, many of whom needed to stay on these portable ventilators given limited ventilator supply. This was illustrative of the fact that over the course of the COVID surge, Massachusetts General Hospital (MGH) had over 12 fully supplied COVID ICUs. Many of these ICUs were previously neuro or cardiac step-down units or, in my case, a burn unit.

At the end of April, MGH had over 165 COVID ICU patients alone, not to mention floor or emergency department patients, creating a need for skilled physicians to place challenging access for these patients. As many of the physicians in this audience may have experienced or realized from their working with COVID patients to date, these patients pose a variety of challenges for vascular access.

They are hypercoagulable - if you ultrasound their upper extremities, you often demonstrate significant clot burden, limiting access sites. Additionally, obesity is a risk factor for severe COVID illness, and body habitus poses another additional challenge to line placement. Finally, as the average ICU stay was on the order of 14 days at MGH, nearly all these patients had prior lines that had thrombosed or other lines that were still in usage, again limiting access site availability.

To address this need, our surgery department created a multidisciplinary team of anesthesia, surgery, and interventional radiology providers. This team was put together largely due to the outstanding effort of Kat Albutt, who was a former PGSSC fellow, as well as Casey Luckhurst, who are both current residents at MGH. The goal of the team was to provide safe, streamlined, and bundled vascular and enteral access. This effort aims to increase patient safety by having a trained team perform these procedures and to protect ICU providers by limiting COVID exposure and preserving our PPE. This was a 24/7 service with four full-time day residents and two night residents with a supervising attending at the peak of the COVID surge in April and early May.

Figure 1 indicates early on the procedure breakdown, with arterial lines being the most common procedure performed. This is not surprising given the recurrent thrombosis arterial lines suffered, often requiring femoral or sheath access. This is followed by central lines and dialysis access.

Figure 1. Procedure breakdown

N=214

The COBRA team represented a combined effort between surgery, anesthesia, and interventional radiology to provide an essential service for medical services stretched extremely thin during the surge. On our institutional scale, the streamlined team manifested how surgeon care could be effectively leveraged to provide support in a pandemic situation. And this provided a reservoir of critical care capacity as previously referenced by Dr. Meara. The team received so much positive feedback that there is interest in continuing the service beyond the initial COVID surge.

Two Months Later:

Massachusetts reached a COVID-19 surge peak at the end of April, and currently has over 118,000 cases of COVID and over 8,600 reported COVID deaths.³ Whereas at the surge peak MGH had over 160 patients with COVID requiring ICU-level care, as of the end of July there were less than 5 patients in a MGH ICU for treatment of COVID. The COBRA team was tapered and disbanded in June given decreasing need for access procedures. There remain ongoing discussions with program directors for how the training model may be integrated into medical and surgical residency programs in the future.

COVID-19 AND SURGERY IN NEW YORK CITY

Alexander W. Peters, MD MPH

The New York-Presbyterian Hospital system is an 11-hospital system which includes Columbia, Cornell, and a number of hospitals in the New York City area. New York was particularly hard hit by COVID-19, with over 222,000 cases, 56,000 hospitalizations, 23,000 deaths by August 1.

At the peak in April, our hospital system, which normally has a capacity of 2100 beds, had approximately 2600 COVID-19 positive inpatients admitted. This was in addition to any other COVID-19 negative patients admitted for care during this time. At the same time, we had approximately 760 COVID patients in ICUs requiring ventilator supports, nearly double our 420 ICU bed baseline capacity. To meet this surging demand and expand hospital bed and ICU capacity, we developed several rapid solutions across the hospital system.

One of the efforts that I worked on was the conversion of many of our operating rooms into ICUs. To do this, we developed a framework for an ICU conversion process that we applied to both recovery rooms, and ORs. We asked: 1) if we can do this at a given hospital; 2) in which operating rooms and recovery rooms is it possible; 3) how many beds we can fit in each space; 4) what equipment will be needed; 5) what will the care team needs be; and finally, 6) what patients should be assigned to these new beds? Our hope was always that the answers to the previous questions, in terms of capacity, would exceed the demand of the last question.

Figure 2. OR core transformation into ICU



Figure 3. Transformation of ORs into negative pressure rooms



We selected several of our OR clusters for conversion. **Figure 2** shows the OR sterile core as it emptied out on the left, and the picture on the right is this space restocked with all the supplies needed for ICU care. Normally this is full of sutures, staplers, and other operating room equipment that is not needed for

ICU patient care. Then we assessed how many patients we could fit into each operating room. We unfortunately had forego isolating individual patients and instead needed to cohort COVID positive patients together to make more space. We marked out on the floor how many beds and ventilators and other equipment we

could fit as we planned this. We then planned which operating rooms could be made into negative pressure rooms. Our facilities team was able to change the ventilation in operating rooms which normally provides positive pressure and install HEPA filters to clean the air. **Figure 3** shows specialized filters that were placed over air ducts, turning all of our operating rooms into negative pressure environments to try and reduce the infectious spread.

We did not have additional ventilator for the ORs. Instead, we converted all of our anesthesia machines during this process and used them as ventilators. Similarly, we used mayo stands, the OR lights, and a number of other things to our advantage to equip our new ICUs. Once we determined if we had all the equipment to do this and how many beds we could allocate for ICU space, we moved on to determine how to staff these new OR ICUs, as they came to be known. CRNAs played a huge role in this because most providers do not know how to use anesthesia machines as ventilators. CRNAs are very familiar with the anesthesia machine function and therefore served as respiratory therapist in the ICU.

Figure 4. Equipment, capabilities, and teams for OR to ICU conversion

<u>Equipment</u>	<u>New Capabilities</u>	<u>Teams Involved</u>
<ul style="list-style-type: none"> • Anesthesia Vents • Monitors • ICU Beds • IV Pumps / Poles • Computers • Central Monitors • Bedside Supply Carts • EPOCs • Trash Cans 	<ul style="list-style-type: none"> • Central monitoring • Negative Pressure Vent. • Intercom System • MICU supply room • ICU Omnicell 	<ul style="list-style-type: none"> • Peri-op • Facilities • Engineering • Biomed • IT • Networking • Telecom • Environmental Services • IP&C • Supply Chain • Pharmacy • CRNA/Anesthesia

This OR to ICU conversion was a very rapid process. We were racing to get ICU beds open, and on the fifth day after initiating this project, we opened our first OR ICU. We opened a total of 34 OR ICU beds, and we expanded the same process across several of the recovery rooms as well, opening up 60 new ICU beds at Cornell alone and replicating this process at Columbia and a number of other hospitals across our system.

Figure 5. Anesthesia & Critical Care COVID-19 surge planning

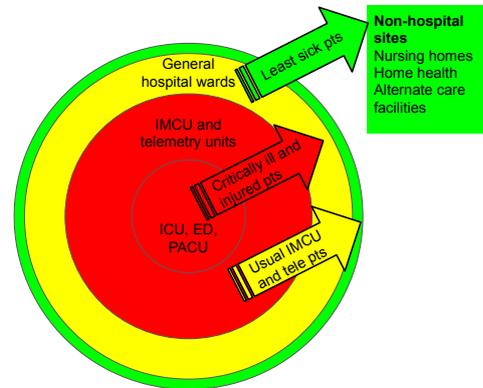


Figure 4 outlines the new equipment, capabilities and teams needed to implement the OR to ICU conversion. It highlights some of the new capabilities that we built into these operating rooms, including the negative pressure system, an intercom system, and central monitoring systems that we don't normally have, as well as a hugely cooperative, multidisciplinary effort needed to make this happen. It was not any single team that drove us forward, but a real group effort.

A couple of takeaways from this rapid process: First, this is possible in ORs. You can surge ICU capacity across many different places using this framework. Second, staffing was absolutely critical and the rate limiting step. Staffing shortages initially prevented us from opening up some the OR ICUs when they were ready. Finally, it takes a hugely multi-disciplinary team to make this happen. But, it is possible, and it helped us meet the surge in New York.

COVID-19 RESPONSE AND OUTCOMES IN LONDON

Vatshalan Santhirapala, MD MPH

St. Thomas is fortunate to be located just across the road from House of Parliament and Big Bend and adjacent to the River Thames. It's as central as you can get for hospitals, and it also had the highest burden of COVID patients in the whole of the UK. We've had 1,500 PCR positive patients, with over 300 ICU admissions and a surge capacity of 188 critical care beds from a normal

baseline of 50. Following a request by the NHS England, we have preparations to expand up to 300 beds, but our surge diminished quite quickly. And we think that's owed a lot to the lockdown.

Interestingly, we had a high number of ECMO beds, a total of 25. When ventilation fails, ECMO is really the only option. We have the largest ECMO center in the whole of Europe, followed by Karolinska Institute. And we believe that for COVID, we have the highest COVID bed status for ECMO for a single institution.

Resources alone will not allow you to meet the care demands created by a pandemic – strat-

egy is essential as well. The framework for our strategic thinking can be seen in **Figure 5**. The red sections that you can see in the circle represent critical care bed needs and ED bed needs, needs to be enhanced within the hospital network. In order to do that, we need to stop the general ward patients, represented by the green sections of the diagram, from coming into hospital. We did that by canceling all elective surgery and all procedural interventions by the third week of March. These, obviously, have secondary health care outcomes, the impact of which is still unclear. Urgent care surgery did occur on an off-site location.

Figure 6. COVID-19 Critical Care Outcomes

Critical care outcomes among patients who have been discharged or died	Patients with COVID-19 and outcome reported (N=6860)	Patients with viral pneumonia (non-COVID-19) 2017-19 (N=5367)
Outcome at end of critical care, n (%)		
Discharged	3721 (54.2)	4184 (78.0)
Died	3139 (45.8)	1183 (22.0)
Length of stay		
Length of stay in critical care (days), median (IQR)		
Survivors	9 (4, 19)	6 (3, 14)
Non-survivors	8 (5, 14)	6 (2, 13.5)
Organ Support (Critical Care Minimum Dataset)		
Receipt of organ support, at any point, n (%)		
Advanced respiratory support	4855 (71.8)	2610 (48.6)
Basic respiratory support	4199 (62.1)	4413 (82.2)
Advanced cardiovascular support	1907 (28.2)	1223 (22.8)
Basic cardiovascular support	6285 (92.9)	4993 (93.0)
Renal support	1659 (24.6)	959 (17.9)

Our strategic meetings occurred in a medical school boardroom, where we had a chalkboard to write up the staff, supply, systems, et cetera. That's how we orientated our strategic meetings every day. We went through our supplies of PPE, staffing ratios, etc on a daily basis.

Figure 6 shows some of the outcomes that were seen in the UK, which has a very robust audit system for critical care outcomes. The yellow box looks at COVID-reported outcomes, and the blue box looks at non-COVID viral pneumonia.

The critical care mortality from the UK population for COVID-19 was 46%, versus the 22% influenza. There's a high burden of patients that need advanced respiratory support, and what we didn't quite expect is that a high proportion of patients also needed renal replacement therapy, with approximately one in four patients needing dialysis of some sort. We had to adopt novel dialysis mechanisms, such as using sustained low-efficiency dialysis, or SLED, instead of continuous hemodialysis. We

also had to stop producing our own dialysis fluid, because stocks were running quite short.

The last thing I want to talk about is the ethnic disparity that we're seeing, which is really grabbing the headlines in the UK. We are already looking at this under our microscope. The Asian cohort of patients had the highest mortality in the UK, at 52.5%. And that's really only half the story. If you compare the outcomes to what you get as an influenza cohort, you see that among African, Caribbean, and mixed ethnicities, there's a fourfold increase in mortality than you would expect from normal viral pneumonias. We don't know the phenotype of this disease. There may be some genetic component, but undoubtedly there are underlying socio-economic disparity in the social infrastructure in the UK. COVID-19 exposes this social disparity that we're seeing.

Dr. Farmer's Reflections:

There is still reference to the special relationship between the UK and the United States. Well, it's clear that we still have that special relationship in terms of the ways in which our social inequalities lead to radically differing risk of infection for people of color, however they are described in the local parlance, and also for increased risk of mortality. There is a lot more to learn about why mortality is lower in some places than others, but it is a very strikingly similar picture to what we're seeing the in United States. It highlights the similarities between social infrastructures in the UK and the United States, ways in which our social inequalities lead to radically differing risk of infection for people of color and increased risk of mortality. And it's not the kind of special relationship we want to share.

COVID & ICU CARE IN PAKISTAN

Nabeel Ashraf, MBBS

I have been working since the end of March on trying to improve the capacity of Pakistan's health system in providing care to the COVID patients and dealing with the pandemic. Pakistan is a country of 200 million people, and I belong to the country's largest city, Karachi, which has a population of 20 million people.

Pakistan's economic challenges and fragmented health system left it unprepared for this pandemic. However, when push came to shove, Pakistan took many commendable initiatives from the federal level as well as different provincial governments took their own measures. These included travel bans, lock downs, and physical distancing. Through district health offices, they initiated screening, contact tracing, community quarantines and isolations. Both private as well as public sector labs were involved to increase testing capacity. We also started seeing the governments working on creating isolation facilities as well as the critical care units for COVID patients.

With three months since the first case was registered, the count of cases is currently 42,000. But as the lockdown is being eased for economic reasons and people are interacting, there is a fear that the number of cases will increase and the death count of around 900, which is not a very high death rate at 2.1%, may also increase.

One of the problems is that Pakistan's ICU capacity is not optimal. It is reported that Karachi, which is the biggest city of Pakistan, has only 480 critical care beds, out of which only 40% to 50% of the beds have ventilators.⁴ Moreover, only 7 to 8% of these beds are manned by dedicated consultant specialists.⁶ We are heavily dependent on nurses for the management of ventilated patients. In case of an increase in complicated cases, we might have a lot of deaths. We hope that the strain is kind and does not lead to complicated cases, so that we do not need a lot of ventilators.

In March, I found myself interacting with a team of volunteers, army personnel, and government doctors who were trying to work together to create an isolation facility. We converted the largest convention center in Karachi to make a 1,200-bed hospital. Within a short period of two weeks of teamwork, we were able to operationalize the isolation center; the army led the infrastructure changes while the government helped in mobilizing the required finances and human resources, and the young medical graduates like myself along with senior doctors developed standard operating procedures.

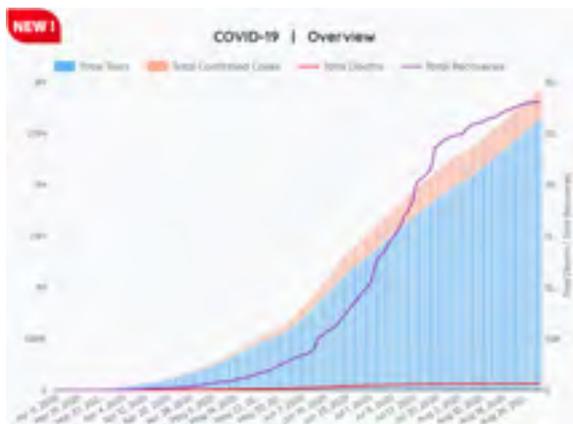
As the pandemic continues, we evolve in our strategies to deal with it in a better way. And we pray that God helps us in this effort.

Two Months Later:

Following the ease in the lockdown and the religious festive occasion of Eid ul Fitr on the 22nd of May, we started seeing a steep increase in the number of COVID cases. Within the last two months we saw count of cases and deaths increase from 42,000 cases and 900 deaths to 249,397 cases and 5,999 deaths as of August 3rd 2020.⁷ Highest number of daily new cases, 6,825 cases, was seen on 13th June 2020.

However, with dedicated awareness campaigns, smart lockdowns, and compliance to standard operating procedures by the people, Pakistan saw a downward trend of cases. The national COVID-19 dashboard website (<http://covid.gov.pk/stats/pakistan>) set up by the Government of Pakistan played an important role in informing the population about the severity of the pandemic. With easy to understand charts, the dashboard kept people updated about the countries progress (**figure 7**). Currently, the curve is flattening; cases have steadily decreased to less than 500 cases with only 330 new cases recorded on the 2nd of August.⁵

Figure 7. Government of Pakistan National COVID-19 Dashboard



Source: <http://covid.gov.pk/stats/pakistan>

With the sudden increase in cases in the start of June, our team at the Field Isolation Center decided to develop High Dependency Unit beds for oxygen dependent COVID patients. A 140-bed unit was created in one of the convention halls. Infrastructural changes, equipment, supplies, human resource and training requirements were listed, and standard operating procedures were developed for providing services to the critical COVID patients who were not able to receive care at the already saturated hospitals of the city. The HDU at the Field Isolation Center was operationalized on the 23rd June 2020.

Now that the curve is flattening, life is returning to normal. However, there is emphasis from the government to make sure basic prevention SOPs are followed by the public. Due to cases of reinfection, there is also awareness about a possible resurgence of COVID. The COVID wards established at hospitals across the country will continue to exist to provide care to patients with COVID. Field hospitals will stay for another month in anticipation of a possible second peak. COVID tests are being done before surgical procedures and travelling while all types of healthcare is being provided with the appropriate personal protective equipment. While there is focus on testing possible vaccines, there is an understanding among the public and healthcare professionals that COVID is here to stay and the appropriate precautions have become part of routine life and healthcare practice.

COVID, SURGERY, AND SURGICAL TRAINING IN BRAZIL

Nivaldo Alonso, MD PhD

The plastic surgery department is located in the central building of the University of São Paulo, where we have 1,000 beds available. Now, that whole building is reserved for COVID patients, and the plastic surgery departments are now working in the orthopedic and cardiac building. We have more than 250 patients hospitalized in ICU and over 300 other patients in the other beds in this central building.

No other procedures are being done in this central building, and very few elective procedures have been done, only the ones that are really necessary. Very few patients with COVID have been operated on — in the last week only three patients needed some kind of plastic surgery procedures to be done. My last surgery was in the third week of March.

We also have the emergency department open. It is a very interesting situation: the number of trauma cases and any other cases in emergency has been very drastically reduced. But even if there is a decreased trauma burden, likely due to decreased traffic or maybe even decreased gunshot wounds, it is hard for surgeons to stay at home, though we have many other tasks as well. We have a medical school, so we are teaching some classes for the students and give some lectures for residents. We also have craniofacial fellows, and nobody is working — only watching videos and lectures.

So we are really waiting for the end of this, but we don't know. There will be a lock down until end of May, and then they are going to decide what is going to happen next. It is not easy for a surgeon to stay out of the operating theater, but that is what is going on. I think São Paulo is a very special city in the country. Maybe in

some other small cities, the situation could be a little different. I also work in Bauru, a small city, and they still have some elective procedures, but their number of patients with COVID is much less. We hope that this situation does not stay much longer.

Two Months Later:

This was a very interesting brainstorm done at the end of May — now two months later, we are facing a totally different situation in São Paulo. All the cities in the countryside are hard-hit with COVID-19 and in the capital the situation is stable, and things are almost back to normal in private specialty clinics. Also opposite to the situation described in May, our Plastic Surgery Department is very busy with COVID-19 patients due to high incidence of pressure sores and others lesions related to long hospital stay for the patients. Elective procedures with very strict rules are now allowed in private Hospitals. The University Hospital is now being prepared to restart consultations and surgeries in August.

Five months later from the beginning of the pandemic, 98% of all Brazilian cities have been affected (5.442) with more than 93.000 deaths. Surgeries in our hospital have decreased more than 50% and rate of mortality has increased over 20%. Surgeons at the Emergency Unit made a new classification for surgeries, not just elective and emergent, but also elective urgencies, such as bowel obstruction for cancer, and essential elective, for time dependent surgeries.

This pandemic is a big challenge for our SUS - Universal Health System, Social Inequality and economic differences among States brought up problems to access good health care for great part of the population. Even if we consider our health system a good model, it still needs new concepts and strategies to deal with workforce and facility challenges.

Dr. Farmer's Reflections:

As we talk about reopening a city like São Paulo or Boston, or any others, you would think that we could get restarted quickly on surgical cases. This is especially the case since surgeons and others in the ER – the surgical, obstetric, and anesthesia supportive staff – are familiar with PPE in a way that is likely not the case for most other sub-specialties, who are not as familiar with protecting themselves from spread from these sorts of pathogens. Given this, surgeons have a special obligation, just like nations do, to share their knowledge of how to protect themselves from pathogens like this.

THE EFFECT OF COVID ON SURGICAL AND OBSTETRIC CARE DELIVERY IN RURAL RWANDA

Sadoscar Hakizimana, MD MMed

At the national level, we have a total 257 cases, with 123 active cases, and we have done a total of 44,245 tests. There had been no deaths to date. The role of the district hospital, like Kirehe, is to screen, isolate, test, and refer positive patients to a national treatment center. A number of measures have been put in place by Kirehe District Hospital and Partners In Health to protect patients and staff.

The pandemic changed our surgical and obstetric practice by affecting our ability to care for patients.

For example, post-operative hospital stays were increased because of transport difficulties for patients to get home. There is a delay in access to care because of the lockdown, and the limited access to transportation means difficulties to get health facilities. The transport problem was observed in the beginning of lockdown but was resolved through a good communication and collaboration between patients, administrative authorities, and the hospital and health centers.

Outreach clinics, which provide, antenatal care have been closed, and mentoring and supervision activities are on hold. There is an increased number of emergency c-sections, which negatively affects the safety of childbirth. Furthermore, hospital resources, such as human resources, were diverted away from surgical and obstetric care delivery to respond

to COVID-19. Elective surgeries have also been delayed, which will be a burden for the coming months. It will increase surgical disease burden, which will need additional resources such as staff, space, and equipment. And even though Rwanda has spent a great deal of time preparing and has done a great job, there are still going to be poor outcomes because of this decrease in prenatal care and lack of elective procedures.

But we have this lesson we learned from the COVID pandemic – nobody is safe until everybody is safe. The world is like a plane. If the plane crashes, everybody crashes, no matter where you are – in economy or business class – or who you are, even if you are the pilot. Thank you.

Two Months Later:

As of August 3, the total number of confirmed cases in Rwanda has risen to 2,099 with only 5 total deaths. The number of testing sites had increased to seven total, with three located in the capital of Kigali and two more each in the Eastern and Western provinces, where hotspots had emerged. Additionally, the number of treatment centers had been expanded to 18, with centers in each province and the eventual goal to have one treatment center in each district.

In Kirehe district, the local government is working with Partners in Health to train employees in infection prevention & control (IPC) measures, with a total of 57 staff members undergoing the training, including health and sanitation officers from different sectors, community environmental health officers, and youth volunteers. Furthermore, IPC materials, such as PPE and cleaning materials, were provided to

quarantine sites and accommodation centers, along with mentorship on IPC measures.

Additional materials have been requested for cesarean sections and other obstetrics and gynecology cases, and a temporary delivery room has been set up in Kirehe District Hospital for COVID-suspected emergency obstetric cases. Regular decontamination of rooms and cars that accommodated suspected COVID patients has been performed.

Well-defined roles and responsibilities have been key to Rwanda's COVID-19 response. Community health workers have undergone education on home-based isolation, care, and IPC measures. The Ministry of Local Government is responsible for reinforcement of isolation and quarantine

measures, monitoring of compliance to set rules, community policing, assessing of food security, and distribution of food and water to those in need. The Ministry of Health in conjunction with the Rwanda Biomedical Center has developed standard operating procedures and guidelines, defined referral procedures and financial mechanisms, monitored implementation & review of these guidelines, and mobilized resources to support implementation of these policies. Finally, development partners have provided technical and financial support for the implementation of the home-based isolation and care guidelines.

COVID-19 and Surgical Care in Africa

Abebe Bekele, MD FCS FACS

As of late May 2020, the total number of COVID patients had reached close to 100,000, with close to 3,000 deaths, yielding a case fatality rate between 3% and 3.5% (see **Figure 8**). The numbers seemed lower as compared to when the first case was reported about seven weeks prior. Is this due to limited testing capacity in the continent? Is it because we are testing a limited number of suspected cases? Is Africa suffering from the milder form of the disease that is considered non severe, and patients don't even report to hospitals? Whatever the case may be, the numbers at that point were still low. But the numbers are definitely increasing, and from the cases reported every day across the region, most patients do not have travel history. There is clear evidence that there is community transmission, and it is, in fact, out of control in some countries. Additionally, some countries are not reporting case numbers

at all. So, one might even question, is modeling applicable in this continent or in this setting?

Access to both elective and emergency surgery is compromised. At the time of this webinar, 15 countries across the East Central and Southern African region had completely cancelled elective surgery. The definition of "elective" probably has shifted significantly over the past few months. The classical definition is not valid anymore. How we used to define "elective" was non-life threatening, and an added component of time has been previously used to specify "urgent" and "emergent." That was what we used when the pandemic hit, when we did not know how to behave as professionals and as care providers. Now that we have the information that the disease will be with us for quite some time, we must redefine what we mean by "elective." Cancer cases, pediatric cases, cases that deteriorate into emergencies and become life-threatening within a short

Figure 8. Current COVID numbers in Africa



Source: COVID-19 in the WHO African Region. [html#/0c9b3a8b68d0437a8cf28581e9c063a](https://www.who.int/news-room/fact-sheets/detail/coronavirus-2019-ncov). Accessed 21 May 2020.

period of time, should not be considered as classical “electives”. Studies that are already out there show more than 50% of the so called elective cases changed into emergencies in a short time.⁶ At the moment, only emergencies and urgent cases are being operated on, and in two or three countries, pediatric and cancer cases are also given priority. Hence, operating waiting lists are quickly getting out of control. There are waiting lists from eight months to a year at the present moment.

A recent publication showed the number of cases that are canceled as a result of the COVID madness over the past 12 weeks.⁶ Close to 28.4 million surgeries worldwide are being canceled, and 2.3 million cancer surgeries are either canceled or delayed.⁶ This is especially true in the developed world, where, for example, cancer patients are being diagnosed at a late stage to begin with. Add cancellations, and we can easily understand what that means. So it would be, in fact, better not to talk about how do we handle emergencies versus “electives” in this era, or what electives mean, but rather how to reintroduce surgical services in a safe and equitable manner. We recently published a guideline in the *Annals of Surgery* about COVID preparedness and surgical care in Africa, how surgeons, anesthetist, and surgical care providers should prepare their services and theaters, about testing of surgical patients, about PPEs and how to gradually go back to normal.⁸

Even if emergency cases are being operated on, some countries have instituted a very strict lockdown, which means travel between the rural setting and the hospitals is compromised. So patients can't even get transportation to come to hospitals for urgent and emergency care. By travel, I also mean travel of health workers. In Africa, it's unusual for health providers, including nurses, lab technicians, and doctors, to drive or to have a

car. Sadly, there are reports of discrimination against health care providers while using public transports. Some are even kicked out of houses they are renting. Most use public transport, which are now completely stopped. So it is not unusual to see health professionals unable to even go to work because of the lockdown. A strict lockdown also means many – in fact, the majority – of Africans who depend on daily wages do not have access to health care. So the restrictions by themselves compromise the access to surgical care.

Regarding COVID and the surgical workforce, to begin with, the region suffers from extremely compromised surgical, anesthesia, and obstetric SAO workforce density. And at the moment, the SAO workforce is made ready for the catastrophe coming soon. Anesthetists and surgeons are being prepared to serve as intensivists. Junior professionals such as residents and interns will be in the emergency rooms, and the entire workforce, then – the very small, limited workforce – will be diverted towards COVID care. And most hospitals, and not only hospitals but also hotels, private apartments, and big meeting halls, are being readied and utilized for patient care.

And it is not only SAO workforce, but also SAO resources, that are being diverted to COVID. Most countries are seeing serious shortages of blood, as blood donation is severely compromised. There is already an existing shortage of oxygen, and we expect serious shortages of ventilators, medications, and workforce. **Figure 9** shows the reported number of ventilators countries have in Africa, as reported by the *New York Times*.⁹ The number ranges between 0 in some countries to close to 550 in some countries. And based on these numbers, one can see that some countries have more ministers, vice presidents and officials than ventilators. And it's questionable whether these ventilators are currently working or not, if they are already occupied by other patients – trauma patients, stroke patients, etc.

Figure 9. Estimated number of ventilators as of Apr. 17

County	Ventilators	Persons per ventilator
Somalia	0	-
DR Congo	5	20,356,053
Mali	3	6,517,799
Madagascar	6	4,492,623
South Sudan	4	2,640,311
Central African Republic	3	1,996,952
Burkina Faso	11	1,894,127
Nigeria	169	1,266,440
Malawi	17	1,246,861
Niger	20	1,138,618
Burundi	12	988,818
Zimbabwe	16	909,145
Mozambique	34	885,241
Senegal	20	786,818
Uganda	55	786,418
Liberia	7	724,757
Sudan	80	569,519
Sierra Leone	13	509,610
Namibia	10	263,007
Kenya	259	206,672
Ethiopia	557	194,099
Ghana	200	146,701
Libya	350	19,687

Source: New York Times reporting; International Rescue Committee; Norwegian Refugee Council; The CIA World Factbook

Source: <https://www.nytimes.com/2020/04/18/world/africa/africa-coronavirus-ventilators.html>. Published April 18, 2020. Accessed July 19, 2020.

The surgical workforce is now terrified, because receiving patients in this surgical setting is really dangerous. All surgical patients are not being tested before surgical procedures. There is a very serious shortage of PPEs, and the shortage is really serious. Anesthesia machines, which can be repurposed to serve as ventilators, do not have viral filters. With regards to operating theaters, most of our theaters are just large rooms converted to theaters, so negative pres-

sure is more or less a luxury. And a shortage of N95 masks is a real issue. We cannot begin to think about sterilization, reusing of N95s, yet.

COVID has completely disrupted undergraduate and medical education in the region. It's only in a few handful of universities, like the University of Global Health Equity, where teaching is converted to e-learning. Internet is a real issue, so e-learning is more of a luxury than a norm. Residencies are suffering significantly because there are limited morning meetings, limited teaching sessions, and elective cases have been cancelled. And there is serious fear among trainees about the spread of the disease. The three surgical colleges in Africa – COSECSA, West African College of Surgeons, and the College of Medicine of South Africa – have all either canceled their exams for the whole year or postponed them significantly, or seriously modified the way exams are being administered.

So in conclusion, COVID really tested our preparedness for this pandemic. It really tested our preparedness. And it seems surgical and anesthesia care preparedness is an indirect indicator for COVID preparedness. Global surgery voices have been silenced, understandably, for the past few months because the immediate need to address is now the pandemic. And it seems there is no question now that strengthening our SAO care and preparedness in the continent is mandatory, not only to address surgical and obstetric problems, but to address issues like pandemics, like COVID. For the past six years, Africa has been engaged in the development national surgical anesthesia plans, but we did not take pandemics like COVID seriously in the process. We probably should. We probably should consider this very seriously.

Dr. Farmer's Reflections:

The numbers that Dr. Bekele started with are impressive. Though it is likely not complete information, 100,000 cases is not anywhere near as many as we feared at this point, and nor are 3,000 deaths. This case fatality rate would compare unfavorably to South Korea, Taiwan, or Germany, perhaps, but it would compare very favorably to the United States, where some states reported a case fatality rate over 5%. So we still have that mystery – is this because of limited testing? Is there a milder form of the disease? Is this before an imminent spike? It has also been mentioned that the difference could be due to the differing age structures in Africa as compared to, for example, Italy and the United States.

Disturbing reports from Kano, Nigeria serve as a reminder that one of the ways to look at how much testing is being done is the fraction of cases that come back positive. Ideally, when testing is ramped up, it's going to be a fraction of the patients who are testing positive for the virus. Going back to Ebola, or HIV, early in those epidemics (one a pandemic, one an epidemic) – when tests started to be used in a rural area in a clinical setting, the majority of tests were often positive because they were done on people who were sick and looked like they had the disease. But once there were larger-scale studies, a very different picture emerged, and the fraction of positive cases decreased. In Kano, based on some reports, the majority of tests done were positive. That is the way it was in the early stages of the Ebola epidemic as well.

And thank you again for reminding us that the word “elective” as in surgery does not mean frivolous, unnecessary, unimportant. It really means, in PGSSC circles, that very important and life-saving procedures are not happening. Another thing that has been brought out is the challenges inside a country once there has been a lockdown because of transportation difficulties. And again, this creates a new challenge to people who are seeking surgical or obstetric care, and it's occurring on a continent, perhaps the only continent, where more than half of people still live in rural areas. That number is going down very rapidly, but it is probably still the most rural continent. These delays caused by interrupted transport are going to be devastating. Thank you also for reminding us that people are very worried, and there is no reason not to be worried regarding fear of their own exposure. We hope that this fear will not be translated to decreased surgical access, and hope even more that it will not be translated into increased risk for care providers.

I also agree that we should be using some of our surgical preparedness metrics as a way of marking preparedness for the pandemic. I know you know the expression “canary in the coal mine” – meaning these could be sensitive indicators, more sensitive than the blunt instruments we sometimes have. It is mandatory that we make a number of these change and get patients back on track for their surgical care.

I just want to go back to some of our discussions about Ebola and surgery, in part because the second meeting of the Lancet Commission was in the medical desert in Sierra Leone. The first time that I set foot in Sierra Leone was in the company of surgeons in June 2014, and at that time, there was not universal enthusiasm among those present for the Lancet Commission to use infectious pathogens as a reminder of the importance of surgical care. But I hear that objection softening today.

Two Months Later:

As of July 29, 2020, the number of cases of COVID in Africa has risen sharply to 871,970 and 18,475 patients have died (African CDC dashboard). In some countries, community spread is close to out of control and hospitals and ICU services are almost full. With regards to access to elective and emergency surgery, little has changed. As countries struggle to open their economies and borders, and as the number of cases continue to increase sharply, surgical services are still struggling to re-open to elective cases. Most elective services remain cancelled.

Despite these guidelines, hospitals in the region rarely test patients for COVID due to the limited testing service. PPEs and other resources are still in short supply, and there are even reports of spread of COVID among clusters of health care providers in some countries. Fear among the surgical workforce remains

a very real thing. There are reports of clustered outbreaks among health care providers in some countries, and Dr Peter Matthew, the first surgical trainee in Sierra Leone died due to COVID a few weeks ago. Shortage of PPEs and testing is still a major issue in most countries.

Finally, very little has changed with regards to the effect of COVID on undergraduate and medical education. Undergraduate education is still shut down in most countries with unclear reopening plans. Surgical residencies are significantly compromised, and college exams are converted to online clinical examinations at COSECSA. Fellowship level exams are also cancelled. Universities like the University of Global Health Equity (UGHE) are managing to continue their training through e-learning.

Surgical Systems Strengthening in the COVID Era: The Way Forward

Kee B. Park, MD MPH

Up until now, we have argued that sufficient treatment capacity during pandemics saves lives, and the goal behind the “flatten the curve” is really to keep the peak demand for medical care from exceeding current health system capacity. But at the same time, it makes sense to find ways to increase supply of medical care, and we have reviewed here some of the strategies that are being used. We are learning that the existing surgical capacity, with a space (such as the ORs, pre- and post-op units, ICUs and surgical wards), stuff (such as PPEs, ventilators, and sterilization equipment), and staff (such as anesthesiologists, whose services are in high demand this time, nurses, and surgeons), represent some of the most valuable assets in being able to rapidly convert into treatment capacity.

If you imagine a health care system as a piece of luggage, the surgical subsystem is like the expandable zipper that, when you open it, gives immediate increase in capacity – according to a report from McKinsey, perhaps as much as a 30% increase.¹⁰ So therefore, as global health practitioners, can we frame surgical capacity-building in low- and middle-income countries (LMICs) as a valuable component of pandemic readiness strategy? We at the PGSSC not only think so, but we argue that investing in surgical capacity building is one of the best buys for pandemic preparedness plans.

So why is this new framing important right now? It's because the amount of donor funding that's going into COVID-19 response is unprecedented. According to the Kaiser Family Foundation, as of April, donors – including governments, development partners, and private foundations – have committed almost \$20 billion for assisting with international COVID-19 response.¹⁰ It is important to remember that this amount is only the assistance in health sector, and does not include the massive sums earmarked for economic stimulus, which is in the trillions.¹² The US \$2 trillion

dollar stimulus bill which was passed actually includes \$157 billion directly allocated to health systems and research.¹³ death and economic loss. Such events push weak health systems to a breaking point, as witnessed during recent outbreaks of cholera, drug-resistant tuberculosis, Ebola virus disease and Zika virus disease.¹⁻⁴ The current COVID-19 pandemic is testing the response and resilience of health systems worldwide, including well-resourced systems in Europe and North America, where health institutions and public health agencies are operating beyond capacity, diagnostics are lacking, triage systems are faltering, personal protective equipment are insufficient, and front-line health workers are facing risks of disease and death.⁵ Building responsive and resilient health systems is an imperative for the global health community. A resilient health system can absorb the shock of an emergency while continuing to provide regular health services.⁶⁻⁸ Most frameworks for building resilient health systems that effectively respond to disease outbreaks focus on enhancing preparedness or response capacity prior to an emergency⁹⁻¹¹ or to strengthen health systems after the emergency, typically during the recovery phase. Indeed, many aspects of outbreak response lay the groundwork for health system strengthening (HSS) This means that the global development assistance for health, which has been hovering around the \$30 billion a year range, will dramatically double or even triple post-COVID.

Knowing this, we aim to lay out a potential roadmap – not the only way, but one way we think we can do this. To convince pandemic donors to invest in surgical capacity-building in LMICs, we must speak in a language that they will easily understand.

Those outside of the global surgery community may not easily grasp the current indicators that we use for surgical care. Decision-makers within the pandemic readiness community may

not easily grasp concepts such as two-hour access, SAO (surgeon, anesthesia, obstetrician) density, and even volume of surgery as measures of surgical capacity. What they do understand is bed counts and number of ventilators. In fact, these are the metrics used by the Institute for Health Metrics and Evaluation when they started their model and then put it up on their website to predict the amount of treatment capacity at the start of the COVID-19 outbreak. They explicitly look at ventilators and beds.

Taking this into account, we, along with some of our collaborators converted the unmet gaps in achieving the Lancet Commission target of 5,000 procedures per 100,000 people into the number of additional surgical beds that are needed for each country in the LMICs. For example, we estimated that Afghanistan will need between 6,000 to 10,000 additional surgical beds to meet the inpatient demands for the target of 5,000 per 100,000 people. We're now working on estimating the additional OR and ICU needs, as well as the staff and staff requirements for a functional surgical bed unit. This will provide us with a burden measure for each country and could feed simply into the allocation formula, similar to what Global Fund uses for their HIV, TB, and malaria funding. We are also working out the cost estimates for a fully functional and staffed bed so that the funding gaps for each country can be calculated.

Some may say this sounds like a global fund for surgery, and they are absolutely right. We

realize there are valid reasons to be wary of yet another global fund for something, but surgical care, with its unique role within the health system and the potential for new resources to be mobilized, could significantly benefit from a pooled fund that oversees sustainable surgical capacity building processes in LMICs. In fact, we already have a global fund for surgery, it is called the Global Surgery Foundation (GSF), and it is housed within the United Nations Institute for Training and Research (UNITAR). Geoff Ibbotson, a trauma surgeon and the executive director of the GSF, led the launch of this Global Surgery Foundation in January 2020 at Davos at the World Economic Forum.

PGSSC, as a World Health Organization collaborating center for surgical system strengthening, has been involved with development of national surgical, obstetric, and anesthesia plans, and as Dr. Abebe mentioned previously, it is important at this point, post-COVID, to embed pandemic readiness strategy within these national surgical plans. If Global Surgery Foundation is successful in raising enough money, they can facilitate the building of surgical capacity in LMICs that leads to overall health systems strengthening as well. Going back to the analogy of the piece of luggage – the whole luggage needs to be built up, and the expandable zipper, the surgical system, is part of that. Surgical system strengthening, done in an integrated way, not only improves pandemic readiness, but also, and, just as importantly, promotes equity in surgical care delivery.

Dr. Farmer's Reflections:

I hope that this audience is going to push for this new framing of surgical capacity building as one of the best investments for pandemic preparedness. Even if it does not stick, even if it does not galvanize those controlling the purse-strings, it is an important exercise nonetheless. And I appreciate the suggestion of going to where the money is. We do need to do this, because the alternative, of course, is to continue with our usual mechanisms of financing surgical care, which are out-of-pocket expenditures, impoverishing for families and the primary barrier for people who need surgical care and never get it.

Panel Discussion

APPROACHES TO SAFE AND ETHICAL REINTRODUCING SURGICAL SERVICES DURING A PANDEMIC

Rwanda: As of May 2020, we are still dealing with the initial surge and our peak is not yet reached. It's expected to be in around three weeks. But recently, the past six days, numbers are steadily increasing-- they're tripling, quadrupling. And countries like Rwanda have controlled it significantly. In fact, zero cases were being reported despite very vigorous contact tracing, testing. But the region in general, countries such as the Sudan, Ethiopia, Djibouti, and Kenya have seen sharp increases in the number of cases. So at the moment, we are in damage control mode.

Unfortunately, the mandatory preconditions are still a serious issue here. Ethiopia does close to 4,000 tests a day - what the country needs is close to 50,000 a day. So even suspected cases are likely not getting tested at the moment, let alone surgical patients being tested before any surgery. PPEs are not available right and left, so professionals are very worried - would they be contaminated? The equipment we use, the ventilators, the theaters are not prepared to handle such issues. So we instead should talk about how to prepare to resume services than define what "electives" and "emergencies" are. The past few months were a learning curve. Now, we understand what we are dealing with and how to prepare.

Brazil: In private hospitals in Brazil, elective procedures are technically allowed to be performed at this time. There are operating rooms are available for all types of cases. The problem is that they are asking for a COVID test 48 hours before, which means that in reality, you cannot schedule just any case. Additionally, patients do not want to undergo surgery, and surgeons are afraid of legal issues that may arise if patients develop surgical complications during this time. Another concern is availability of ICU beds during this time. If a patient under-

goes an elective procedures in a private hospital, and then they require specialized or intensive care we are not sure if, in these special units, the patient is going to be contaminated. Given these concerns, it seems preferable to avoid doing any of these procedures until we can be sure that the pandemic is more under control.

Brazil is dealing with some very difficult issues right now, including differing opinions of political leaders on how to handle the pandemic. While the Brazilian president has pushed for resumption of normal activities, governors and local councils are asking for a more cautious approach. It has led to a very paradoxical situation in Brazil health care - private hospitals are asking surgeons to resume normal activities, while public hospitals are diverting all resources to COVID.

United States: In New York, We have started reopening and doing cases in New York, and we did continue to do cases through the surge - Cornell kept five ORs open for emergent cases and were doing cases throughout the entire crisis. But there were very strict criteria for which cases could move forward. As our COVID census decreases, there may be an opportunity to reintroduce some of these surgical services. How can we start to fill the beds again with the needs that are in the community?

Discussions around reintroducing surgical services are centered around a few different things. The first is really all just a question of resources, which includes factors such as the capacity of intensive care units (ICUs). For example, cardiac surgery patients who are having symptomatic cardiac disease usually need ICU care postoperatively, and if we ICU space is not available, we cannot restart do cardiac surgery. And other specialties such as vascular surgery would be subject to similar concerns. All of this is very tied into reopening of cities as well - for instance, when cities were closed, the number of trauma cases dropped significantly. As we reopen the city and people go out more, especially as the weather gets better, we

are seeing upticks in trauma, and trauma is hugely resource-intensive. Additionally, there are a number of conditions we treat that can be managed both operatively and nonoperatively, and appendicitis is really the best example of this. There has been a long-term debate about appendicitis, about whether the appendix should be taken out or it should be treated medically, as is done in much of Europe.¹⁴ The question turns to what uses the lowest number of hospital resources, putting someone on antibiotics and trying to send them home fairly quickly, or just moving forward with an appendectomy?

There have been a number of articles in the New York area about the drop in the number of patients presenting with acute coronary syndromes.¹⁵ There is a concern that people were afraid to come to hospitals and were actually dying in their homes. But anecdotally, we saw drops in things like appendicitis, and you just cannot explain how the incidence of something like appendicitis would decrease.

Then there is a question of can we start doing elective, urgent, or emergent ambulatory cases, like breast cancer surgeries that are often done in the ambulatory setting. If we do not have the inpatient beds, maybe that is an option. But should these cases be prioritized over those that require inpatient stays?

So all those questions have come into play, and there has been no sure answer. Each hospital in New York has been tasked with doing this figuring that priority out on its own within the government's mandates. But we are slowly reopening and trying to do it in a very thoughtful way.

In Boston, we have had to open a few more ICU beds and a few more operating rooms than New York City, given that we had a different burden. So we have still been doing some of what could be called "elective" cases throughout, such as breast cancer and colon cancer cases, though in very limited number. At one point the number of active operating rooms was down to seven. Now, as we are reopening, patients are being referred to a city north of Boston, to Danvers, where they are opening for elective cases which would not require an ICU, and where they would have minimal exposure to this larger health care system.

United Kingdom: The NHS has said that elective cases can restart on the 1st of June, which meant a break of three months. We have been analyzing the risk on several levels. On the national level, in the UK, the government essentially bought out all the private hospitals where elective surgeries could continue. Patients at these hospitals were required to have a COVID swab seven days pre-op, self-isolated for seven days, had a COVID swab on admission, and then were operated on the next day. So a very stringent protocol was introduced, which allowed all of the elective operating to continue in a clean pathway.

At the regional level, hospitals and providers are constantly assessing the current status of the pandemic in their region. If the pandemic is exponentially increasing, it is likely a better option to delay elective surgeries to preserve the capacity of the regional health system. On an institutional level, the main priority is providing a clean pathway like the one described above. Elective surgery patients must be separated from COVID patients in a safe manner so that risk of nosocomial COVID is avoided.

On the individual level, there is a risk to the individual of perioperative complications from COVID. The COVIDSurg collaboration has reported a 19% perioperative mortality in those who have COVID, an extremely high perioperative mortality in the COVID burden.¹⁶ Secondly, there is the risk of deferring surgery. Those who have conditions such as cancer need to be risk-stratified. All of these risks, from the national to the individual levels, need to be understood to make those decisions.

SURGICAL CARE DELIVERY AND SOCIAL EQUITY IN THE COVID ERA

In terms of social inequity, it is very surprising in the UK. We pat ourselves on the back that we've got a fully "socialist" health care system, that anyone can access health care when they want. But when analyzing the data, we actually saw that the black, Asian, or minority ethnic (BAME) population were younger than the Caucasian population that were dying, despite the fact that older age is one of the stron-

gest risk factors for mortality. Despite being younger, the BAME patient was also dying.

The role of socio-economic deprivation cannot be ignored. Having a lower income and lower educational status means less access to knowledge of health care and health maintenance behaviors like good nutrition. This in turn manifests itself in being obese, or having hypertension, or having cardiac disease. We still don't know this disease, and we don't know its underlying pathways, but, as previously mentioned, the role of socioeconomic disparity in this disease process cannot be ignored.

It is important to recognize that the group of patients who are presenting with COVID are very different than the overall population. Being able to socially distance is a privilege, a privilege of individuals who have money, who have stable jobs, and who have stable housing. So it is no surprise that we are seeing that the hardest hit areas are those of greater social inequity.

This has also brought into very high relief the social inequities that do exist in New York. Many residents of Manhattan, who tend to be of higher socioeconomic status, have left the

city, while those in Brooklyn, Queens, and the Bronx, face a very different situation. And we're only beginning to understand these disparities and the role they have played in the pandemic.

New York has four different types of hospitals in the city – specialty cancer and orthopedic centers, academic medical centers, public hospitals, and private community hospitals. And the case fatality rate in each of those different types of hospitals, both based on the type of hospital and the populations each of those hospitals serves, has varied dramatically.¹⁶ There have been times when these varied the New York hospital systems have worked well together, but times in which they worked independently as well. And because of this, the idea that New York, as a city or as a region, might have a larger, better equipped health system with which to serve its population has not been realized. There has certainly been a lot of coordination by the Department of Health, but it made a difference which hospital patients wound up at and which hospital the ambulance brought them to during this pandemic, in terms of the chances of survival. It is something that needs to be looked at very closely and try to understand better as we move forward.

Dr. Farmer's Reflections:

Those on the frontlines have been alarmed, as we all have, by these high case fatality rates, but also by the fact that they vary so widely. And of course, this is what social medicine has focused on for the last 150 years-- who lives and who dies.

In West Africa, during the Ebola epidemic, the international public health community were clinical nihilists – that is, they argued against worrying about variations in case fatality rates among different populations, saying that all who get infected were likely to die. Just worry about stopping the spread of Ebola. It was the classic prevention versus care, as opposed to the integration of prevention and care. In Massachusetts, and in the United States in general, there was a wave of “prevention nihilism” or “containment nihilism.” People were saying, well, it’s too late now to do contact tracing. This cannot be the case, and the global health and global surgery community must go back again and again to the question of varying case fatality rates, too, and to combat ideas like clinical nihilism and containment nihilism. There will be many attempts to pass off these shocking disparities to either a culturalist explanation or to biological determinism. Those should be diagnoses of exclusion. We know that the social disparities are determining disparate outcomes, but there will be a rush to find some explanations that are either culturally deterministic or biologically deterministic. And the lead social medicine surgeons in the world should be prepared to discuss this very critically.

There another theme that arises throughout today’s talks - failing to be prepared. And yet there is so much information, and it comes through in the richness of these presentations. These health systems and clinical details are reminiscent of the discussions that we had around Ebola. Everything was “new”. If it was not a novel virus, it was certainly new to West Africa. But there is evidence to show that this was not the case. First of all, antibody studies suggest that Ebola had been in upper West Africa prior to the 2014 outbreak, which probably began in 2013. So, too, it is clinically. If you look at the so-called clinical surprises from the Ebola epidemic, you could also look back into the medical literature and find that these surprises had already been described in the literature. And so how can we make that claim when we have an entirely novel virus? Well, it is not the first – it is a SARS virus. And so when we hear about hypercoagulability, cardiac involvement, encephalopathic presentations, it is very likely that this has been described with related viruses, and finding out what’s similar and what’s different is an essential task. The goal of these conference proceedings is to highlight and to preserve these perspectives, so that they can be shared and used to better prepare both HIC and LMIC health systems for the future.

Conclusion

A CALL TO ACTION

The expert perspectives shared during this seminar have highlighted a number of key themes. From the frontlines came accounts of the need for increased critical care capacity, forced reallocation of hospital resources away from surgery leading to postponed or cancelled surgical cases, interruption of medical training, and obstruction of obstetric delivery care. There were also descriptions of innovated solutions to combat these new obstacles, such as repurposing of operating rooms to care for ICU patients, interdisciplinary teamwork to reduce staff exposure to COVID while improving patient outcomes, and strategic planning to be able to meet the sharp increases in patient volume across a hospital system. Then our speakers stepped back to look at SAO care and its role in pandemics on a broader level, not only in terms of health system strengthening and preparedness, but also highlighting the weakness and social inequities that were revealed.

There is a lot of talk about a vaccine, and that will be wonderful. But that will not be good enough. It won't be good enough because of something Mark Twain said: "History never repeats itself, but it rhymes." Even if we do have a vaccine, there will be something else in six, or twelve, or eighteen months that is going to rhyme with coronavirus – maybe not to our ears, but to our systems. And so whether we're talking about the equity issues and the social issues or the role of surgery in coronavirus, how do we think differently about our approaches at every level to such a crisis, whether it is Brazil, or the United States, or Rwanda. How do we structure our hospitals and healthcare systems differently, so that when the next crisis comes up, we are not spinning around in circles trying to reinvent what some of the presenters described today? How do we think differently about not just coronavirus, but the next obstacle that appears? How do we fund things differently so that we're not asking for people for out-of-pocket payments when the next emergency arises?

This is a call to action to make sure that we actually act, not just to address this pandemic, but to prepare health systems for the future, to change the role of surgery in pandemic preparedness and health security, and to eliminate the social inequities laid painfully bare in the height of COVID.

Participants



Nivaldo Alonso, MD PhD is associate professor of plastic surgery at the Department of Surgery and director of the Service of Craniofacial Surgery at the Hospital das Clinicas at the University of São Paulo (USP). Professor Alonso is also Clinical Director of the Craniofacial Unit of the Hospital for Craniofacial Anomalies at the USP and past president of the Brazilian Association of Craniofacial Surgery 2000-2002. He served as Medical Director for Operation Smile Brazil from 2004 to 2011. Dr. Alonso also serves as a board member on the International Board of Smile Train. Since 2008, he has run a comprehensive cleft care clinic in São Paulo, taking care of patients as well as providing education for surgeons and speech therapists from other parts of Brazil funded by Smile Train.



Muhammad Nabeel Ashraf, MBBS is a medical graduate of the Aga Khan University and is an MPH candidate at Harvard TH Chan School of Public Health for the class of 2021. He is currently a research associate at the Harvard Medical School - Program in Global Surgery and Social Change and a research coordinator with the Indus Health Network in Pakistan. To deal with the COVID Pandemic in Pakistan, Nabeel proactively volunteered to help set up and run the Field Isolation Center (FIC) in Karachi. Nabeel continues to play an administrative role at FIC as part of the core team which has the capacity to take care of around 1200 stable COVID positive patients.



Professor Abebe Bekele, MD FCS FACS is Deputy Vice Chancellor of Academic and Research Affairs and Dean at University of Global Health Equity (UGHE) in Rwanda. He is Professor of Surgery and a General and Thoracic surgeon. Professor Abebe has served as CEO of the Black Lion Hospital and Dean of the School of Medicine of Addis Ababa University.

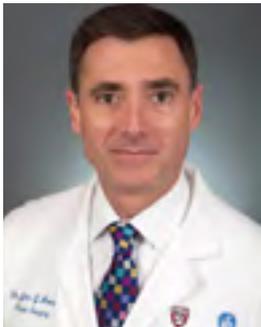
Professor Abebe is a member of the Governing Council and Chairman of the Examinations and Credentials Committee at the college of surgeons of East Central and Southern Africa (COSECSA) and Editor-in Chief of the East and Central Africa Journal of Surgery.



Paul Farmer, MD PhD holds an MD and PhD from Harvard University, where he is the Kolokotronis University Professor and chair of the Department of Global Health and Social Medicine at Harvard Medical School. He is the co-founder and chief strategist of Partners In Health (PIH), an international non-profit organization that since 1987 has provided direct health care services and undertaken research and advocacy activities on behalf of those who are sick and living in poverty. He is professor of medicine and chief of the Division of Global Health Equity at Brigham and Women's Hospital.



Sadoscar Hakizimana, MD MMed is a medical doctor from Burundi with over 15 years' experience in healthcare and research. He holds a medical degree from the University of Burundi. He completed his residency in Gynecology and Obstetrics from the University of Rwanda. He is currently working with Partners in Health/Rwanda as an Obstetrician & Gynecologist based in Kirehe District Hospital in East Province. He has also served as a senior consultant and Chief of Maternity Department at clinics and hospitals across Burundi and Rwanda.



John G. Meara, MD, DMD, MBA is the Kletjian Professor of Global Surgery, Director of the Program in Global Surgery and Social Change, and Professor of Surgery in the Department of Surgery at Harvard Medical School. Dr. Meara serves as the Plastic Surgeon-in-Chief of the Department of Plastic & Oral Surgery at Boston Children's Hospital. He was Co-Chair for the Lancet Commission on Global Surgery and was a commissioner on the Lancet Global Health Commission on High Quality Health Systems in the SDG Era, and the Lancet Oncology Commission. He currently serves as a commissioner on the Lancet Commission on Diagnostics.



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Kee Park, MD MPH — After 10 years of private practice, Dr. Park spent the next decade teaching neurosurgery in Ethiopia, Cambodia, and North Korea. As faculty for the Program in Global Surgery and Social Change, he focuses on advocacy and policy work to achieve universal access to surgical care.



Alaska Pendleton, MD is a Vascular Surgery resident in her fourth year of training at Massachusetts General Hospital. Originally from Wisconsin, she earned a BS from the University of Wisconsin-Madison and her MD from Harvard University. She is currently a first-year MPH candidate at the T.H. Chan School of Public Health and a second year fellow with the Harvard Program in Global Surgery and Social Change.



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Vatshalan Santhirapala, MD MPH received his MD from Imperial College and is an anaesthesiology resident from London. Vatshalan is currently a PGSSC senior fellow, leading on projects in South Asia. Concurrent to this, Vatshalan has undertaken an MPH in Global Health at the Harvard School of Public Health. In early March, Vatshalan returned to clinical duties at Guy's and St Thomas' hospital and co-developed the clinical strategy to deliver surge critical care capacity during the COVID-19 pandemic with clinical directors for Critical Care and Anaesthesia.

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