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The Response of an Orthopedic Department and Specialty Hospital at the Epicenter of a Pandemic: The NYU Langone Health Experience

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ABSTRACT

As the world grapples with the COVID-19 pandemic, we as health care professionals thrive to continue to help our patients, and as orthopedic surgeons, this goal is ever more challenging. As part of a major academic tertiary medical center in New York City, the orthopedic department at New York University (NYU) Langone Health has evolved and adapted to meet the challenges of the COVID pandemic. In our report, we will detail the different aspects and actions taken by NYU Langone Health as well as NYU Langone Orthopedic Hospital and the orthopedic department in particular. Among the steps taken, the department has reconfigured its staff's assignments to help both with the institution's efforts and our patients' needs from reassigning operating room nurses to medical COVID floors to having attending surgeons cover urgent care locations. We have reorganized our residency and fellowship rotations and assignments as well as adapting our educational programs to online learning. While constantly evolving to meet the institution's and our patient demands, our leadership starts planning for the return to a new "normal".

"Ortho and pathologists are being given a leaflet and sent to see patients on non-invasive ventilation. PLEASE STOP, READ THIS AGAIN AND THINK." This tweet and viral email by an anesthesiologist regarding the situation in Lombardy, Italy, served as a warning for the rest of the world about what would be asked of us in the fight against coronavirus. Despite this, it was easy to believe that somehow our situation would be different; that we would learn from Italy's mistakes and it would never reach the same point. Less than three weeks later, NYU Langone Orthopedic Hospital is now a COVID treatment center; we are a department of COVID doctors, and elective surgery seems like a distant memory.

General

The first cases of the current coronavirus pandemic presented in Wuhan, China, in November of 2019 [1]. Chinese authorities first reported this cluster of patients publicly on December 31, and the identification of a novel coronavirus (COVID-19) as the causative organism was confirmed on January 7, 2020. From here, this virus has rapidly spread throughout the world and had a substantial impact on both public health as well as the global economy. Current research point to multiple strands of COVID-19, with research at NYU demonstrating that most of the isolated specimens in NYC made their way from Europe, not from China.

The first case of coronavirus here in New York City was diagnosed on March 1, nearly six weeks after the first case was reported in the United States. Despite the delay in initial cases and being the fourth state to issue a stay at home order, New York has quickly become the epicenter of the nation's battle against coronavirus [2]. As of today, there are approximately 188,694 confirmed cases in the state with over 9385 deaths (as of 4/13/2020). To put this in perspective, New York has more confirmed cases of COVID-19 than any other country in the world and represents over 40% of the current U.S. death toll. Medical centers here in New York have been under enormous stress as they work to create new beds, increase staffing, and provide personalized protective equipment (PPE), while providing care for thousands of admitted patients. We would like to share our experiences here at NYU Langone Health, and more specifically, the response of our Department of Orthopedic

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Surgery and the Division of Adult Reconstructive Surgery as we joined the fight against COVID-19.

Department of Orthopedic Surgery

NYU Langone Health is one of the largest health care systems in the country and, similarly, the Department of Orthopedic Surgery is also one of the largest nationally. Our department includes 187 faculty, 72 residents, and 21 fellows covering 6 hospital sites with over 3000 inpatient beds. All of our sites have seen an influx of COVID patients, including Bellevue hospital which is the flagship hospital for the New York City public hospital system. Our institution has been proactive regarding implementation of COVID protocols and our administration has had open lines of communication with staff which has helped to minimize some of the confusion reported at other hospital systems. Personalized protective equipment (PPE) has been readily available with conservation strategies that involve some restrictions on duration of usage, but are in accordance with CDC guidelines. Administrators have sent frequent video updates from inside hospital facilities which serve to let the staff know that they are in the fight with them, and that their efforts are greatly appreciated. Our leadership has been transparent with data by openly sharing the number of emergency department (ED) visits, admissions, inpatient census, intubated patients, discharges, and deaths related to COVID. This transparency at all levels has helped remove some of the fear of the unknown for our staff.

On March 9, New York City mayor Bill DeBlasio announced that no elective surgery would be allowed at any hospital or surgery center in New York City. The exact definition was not specified, but the guidance put out by NYU defined elective surgery as "a surgical procedure that the physician and patient believe can safely be postponed for at least three months." Each department was then asked to create a list of procedures that would be permitted under these guidelines. Within our department, each division formulated a detailed list of essential surgical procedures. The cases that were initially deemed as nonelective within the Division of Adult Reconstructive Surgery are summarized below:

- Periprosthetic joint infections,
- Periprosthetic fractures,
- Acute postoperative dislocation due to implant malposition,
- Recurrent instability causing disability,
- Implant fracture/failure,
- Total hip replacement for intractable hip pain secondary to femoral head collapse or fracture,
- Disabling hip or knee pain that impairs mobility to a degree that places the patient at risk for additional problems such as recurrent falls, or the ability to be in self quarantine.

As the pandemic evolved and resources became scarcer, we in turn, further restricted the types of surgery permissible. Chronic periprosthetic infections, joint replacements for "intractable pain" and disabling hip or knee pain were postponed. There were concerns regarding performing surgery during this period because of the consumption of PPE, the risk of asymptomatic COVID transmission to patients and staff, inpatient bed and staff availability, and whether our operating rooms and anesthesia staff would be available or instead repurposed for the care of COVID patients. To date, we have been able to perform all required urgent and emergent surgeries without any substantial delays. The patients that we have been able to treat during this time have been extremely grateful for our ability to provide care. We have also accepted patients in transfer from Bellevue Hospital Center, an important part of our department, to provide timely and needed orthopedic care.

Facilities

After the moratorium on elective surgery was enacted, it became clear that the facilities and resources at Langone Orthopedic Hospital (LOH) would be underutilized and could be repurposed in NYU's fight against COVID to help with the substantial number of COVID patients expected at the main campus. For example, our department maintained two free-standing ambulatory surgery centers. Not only were the staff members at these centers repurposed, but so was the equipment. The ASC's represented a total of 11 operating rooms. The anesthesia machines were removed from the ORs and sent to the main campus to be used as ventilators. In addition, all of the hospital floors of LOH were reconfigured to accept up to 110 lower acuity COVID patients from our other front-line institutions (Tisch Hospital/Kimmel Pavilion, NYU Brooklyn, and NYU Winthrop). We formed medical teams consisting of hospitalists, orthopedic surgeons, and advanced practice professionals (APPs—nurse practitioners and physician assistants) to provide 24/7 coverage of these patients using 12-hour shifts. This included advanced practice professionals from our operating room, surgery centers, and private practices. Our operating room and PACU nurses and surgical technologists were also redeployed to the converted medical COVID floors treating patients. Each medical team consisted of one hospitalist, two orthopedic surgeons, and two APPs, caring for 20-30 COVID patients per shift. A multidisciplinary leadership group worked to develop the structure and work flow of the medical teams to help clarify roles and ensure maximum safety for both patients and staff and efficiency for the teams. Selected APPs were trained in PICC line placement, to assist due to decreased availability of the radiology PICC line teams. Proning teams to help care for ventilated patients were also created and deployed. All personnel received updated training, including PPE training, through our online training system.

Faculty

Our department has mandated that all members of the faculty contribute to the institutional efforts to address the COVID pandemic. Although accommodations were made for factors related to age, underlying medical conditions, and personal family issues, all faculty had to be engaged in one component of the institutional response. The faculty participated in the following areas:

- Coverage of the orthopedic urgent care center at LOH allowing emergency room physicians to serve at the main campus,
- Assisting with inpatient COVID care as a member of the medical team working under the guidance of a hospitalist,
- Participating in the Family Connect program to provide frequent updates to families (an essential need because of a no visitor policy that had been instituted),
- Answering COVID phone lines at NYU's employee health service,
- Staffing virtual orthopedic and general urgent care,
- Helping to staff emergency room triage teams.

Many of our faculty are working multiple twelve-hour shifts each week in these areas, in addition to covering any urgent cases, regular assigned orthopedic trauma call, and limited practice office hours for their patients. Surgeons serving on medical teams received training through a virtual boot-camp program designed by the hospital.

All of our orthopedic faculty have converted most, if not all, of their office visits to telemedicine. NYU Langone Health had recently completed a comprehensive initiative to convert select office visits to telemedicine. We are able to use a smart phone application, home computers, and office computers to complete telemedicine

visits. Although some in-person patient visits still occur for post-operative patients or when urgent issues arise, every effort has been made to minimize unnecessary travel for our patients and staff. Our department still has active outpatient office locations that are open for urgent patient visits functioning with a skeleton crew. All of our schedulers and back office staff were instructed to work from home and were equipped with any needed technology, such as laptops, iPads, and phones.

Each surgeon worked with his staff to reach out to their patients who had scheduled surgery dates and discuss the current situation, answer questions, and help decrease anxiety. We offered our patients a few options including rescheduling their surgery to a new future date in the summer, being placed on a waiting list to be scheduled as soon as possible when elective surgery resumes, or to be contacted when we resume activity to discuss options (this was reserved for patients who felt too overwhelmed with the situation and wanted to avoid any decisions at this time). Patients were advised to inform their surgeons of any change in their condition as urgent and emergent orthopedic procedures continue to be performed.

Fellows/Residents

At the graduate medical education level, NYU initially sought to minimize house staff involvement with COVID patients by creating new nonteaching pulmonology and critical care teams in the hospital. As the number of patients began to exponentially grow, it became clear that this was no longer a viable option and NYU began to recruit house staff from all departments to enlist in what is referred to as the "COVID Army". NYU has also taken the extraordinary step of graduating the 4th year medical school class early and offering them positions as interns with full pay and benefits to aid in the institutional response.

In the Department of Orthopedic Surgery, we have reduced orthopedic house staff coverage to the absolute minimum number required for orthopedic responsibilities including taking in house call and operating room coverage at the six hospitals where we provide care. We have worked to minimize cross-contamination between clinical sites by restricting cross-coverage and keeping our orthopedic teams at each location as insular as possible. Of our orthopedic residents and fellows (all of our adult reconstruction fellows are involved in some fashion in COVID care teams), we currently have 33 trainees participating in COVID care teams across our health system on a 4-week rotating basis. All of our orthopedic surgery trainees were given the choice of working on a medicine team, ICU team, or in the ED; the majority electing to work on the medicine floors with some deployed to ICU and ED coverage. Although treating COVID patients was initially out of their comfort zone, our house staff have performed admirably and our medicine colleagues have expressed gratitude for their assistance, level of effort, and contributions.

NYU has expanded its offering for mental health support through webinars, virtual mental health clinics, and direct provider care. Within our department, we have been conducting weekly online faculty and trainee meetings for our residency and fellowship programs. This includes a review of the current hospital and department status as well as an open question and answer discussion between the trainees and department leadership. We have allowed anonymous question submission to help trainees express their fears and anxiety comfortably. We have noticed that these weekly on line meetings where we can see all of our colleagues on video helps keep everyone connected and relieve individual stress. We should not forget that many trainees may be living far from their families and social support with the potential to feel very isolated in these times. In this context, it is essential that we provide all of the support we possibly can.

Education

While the case volume has decreased substantially, we have attempted to minimize the impact on our training programs by enhancing other areas of our educational curriculum. We have maintained our weekly scheduled conferences by converting them all to online formats, as well as taken advantage of a number of unique educational opportunities during this time period including joining conferences with local programs, the exceptional AAHKS FOCAL curriculum and multiple webinars sponsored by other orthopedic organizations and industry. Some subspecialty divisions in our department have arranged for speakers from around the country to provide lectures to our resident and fellows. While there is no equivalent for hands-on operative experience, our residents have been able to rehearse surgical procedures using 10 virtual reality headsets and a surgical simulator program that they can use at home. This is part of our department's on-going virtual reality educational program that has now increased in breadth and scope due to the current circumstances.

Future

As we reach the apex of the curve here in New York City, we have begun to plan for a return to normalcy, over the next 1 to 3 months. The key question is What will this "new" normal look like? Only once the burden on the health care system has been reduced can we discuss relaxing the current restrictions on the general population.

In all likelihood, some type of COVID screening (of both patients and staff) will be a part of our new work flow. Some have promoted the idea that an antibody test may be the best way to screen hospital staff and patients for immunity to COVID-19. Antibody testing will likely play an important role in understanding the epidemiology of this disease; however, there are a number of concerns with antibody testing that may prevent its use as a litmus test for people to resume their individual lives. Questions that must be addressed regarding antibody testing include the true sensitivity and specificity, cross-reactivity with other human coronavirus antibodies, and whether these antibodies confer long-term humoral immunity against COVID-19. Our best chance at minimizing the long-term impact of COVID-19 lies with the development of a vaccine, but widespread vaccination programs are likely a minimum of 12 months away.

The creation of a safe environment for both our patients and staff must be focused on preventing the asymptomatic spread of COVID-19. The vast majority of joint arthroplasty patients are older than 65 years and are at high risk of complications from COVID-19 infections. Once elective surgery does resume, it is anticipated that all patients will be tested for COVID with a rapid result test pre-operatively just as we expect all staff to be tested before returning to our "normal" schedules. Staff must be diligent with mask use as well as hand hygiene. As the stress on our health care system diminishes, we must be able to provide an environment where patients feel safe walking in the door to the hospital and that they are not at any higher risk of exposure to COVID. We look forward to the day when we can return to being orthopedic surgeons and resume elective surgery, but until then we will continue to help our colleagues and our city in the fight against COVID-19.

References

[1] Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus–infected pneumonia. N Engl J Med 2020;382:1199–207.

[2] Haffajee RL, Mello MM. Thinking globally, acting locally — the U.S. Response to Covid-19. N Engl J Med 2020. https://doi.org/10.1056/NEJMp2006740.