As the coronavirus pandemic began to grip Spain, leadership of our hospital – Rey Juan Carlos University Hospital in Madrid – acted swiftly to modify spaces, staffing levels, and responsibilities to treat infected and Covid-free patients safely and to provide the critical resources and information our workforce needed to manage during this unprecedented health crisis.

Introduction

Speed and adaptability are critical for responding to a pandemic. These features are especially important for managing people and their roles because of the rapid pace of change. The ability to swiftly modify spaces is also key when faced with a more intense care burden than normal, and one for which previous experience provides little guidance. This article describes how our hospital, Rey Juan Carlos University Hospital in Madrid, Spain, adjusted our spaces, personnel, and resources to treat patients with and without Covid-19 in the early weeks of the outbreak. This unprecedented situation has also spurred us to strengthen our telemedicine services and commitment to teamwork.

Hospital Universitario Rey Juan Carlos is a public hospital in the town of Móstoles, located in the region of Madrid, Spain. The hospital provides care for patients residing in Móstoles and 18 other municipalities nearby, totaling 178,000 inhabitants. The hospital has 1,794 staff members, 292 single and 18 double rooms, an intensive care unit (ICU) with 27 beds, and a postoperative recovery area for up to 48 patients. There are 12 operating rooms (ORs) and 6 delivery rooms.
**Coronavirus Strikes**

After a group of pneumonia cases was reported in Wuhan City (Hubei Province, China), on January 7, 2020, the Chinese authorities identified the culprit as a new virus of the Coronaviridae family, later naming it SARS-CoV-2.\(^1,2\) As of February 28, 32 cases of coronavirus infection had been reported in Spain. In Madrid, the number of cases began to grow progressively after this time. On March 3, we diagnosed the first cases in our hospital, and by March 13 we had over 100 such patients. The hospital was already at full capacity at the beginning of March.

Once it became clear that Madrid was experiencing a surge, we recognized the need to adapt spaces, staffing levels, and responsibilities. The most vexing component was the uncertainty around when and how to enact these changes. The process was facilitated by several factors: A workforce of young individuals who are quite accustomed to change, a modern physical space that can accommodate expansion, and our technologically advanced approach, which allowed us to respond nimbly to such a situation.

During the Covid-19 pandemic, we have continuously evaluated and adapted to our circumstances. This was initially done on a daily basis, enabling us to quickly adjust staff roles as of the fourth day of the state of alarm declared in Spain. For example, we managed our physician corps by adding or transforming roles, including the addition of reserve personnel, while respecting rest times.\(^3\)

**Juggling Spaces**

The first department that encountered Covid-19 cases was the emergency department (ED).\(^4\) We set up a circuit to diagnose and treat suspicious cases starting with patient intake, though this protocol soon became obsolete. In a matter of two weeks, the unprecedented spike in infections led us to expand the physical areas devoted to these patients within the ED, internal medicine, and intensive care medicine. These services and the pneumology (pulmonology) department became known as “first-line services.” The department formerly used for adult emergency cases was transformed into a Covid-19 ED area, and the pediatric ED was split into a pediatric ED and a non-Covid-19 unit for adults.

As part of the Covid shift, we doubled room occupancy to increase the hospital’s capacity to 493 beds and added ICU beds."

At that time, virtually the entire inpatient ward was dedicated to patients with Covid-19, and three-quarters of the postsurgical recovery area was transformed into an ICU.\(^5\) We gradually fused the ICU and anesthesiology departments. The remaining one-fourth of the postsurgical recovery area was preserved for Covid-negative patients with urgent surgeries and Cesarean sections, or who required ICU care. Additionally, the pneumology department was reorganized as a respiratory intermediate care unit for patients needing noninvasive mechanical ventilation. As part of the Covid shift, we doubled room occupancy to increase the hospital’s capacity to 493 beds and added ICU beds.
**Front-Line Providers**

As of the third week, with the disease spreading and 16% of our clinicians infected, (four of them admitted), a substantial number of our physicians became front-line providers, receiving support from all other medical and surgical units. This was made possible by the cancellation of most elective surgeries and the progressive reduction in outpatient visits.

Every morning, front-line clinicians from different medical specialties meet to discuss care protocols, the health status of patients, and the availability of resources to support patients who are ready to be discharged but need safe places to go to complete their period of isolation, such as makeshift hospitals or residences for patients with coronavirus infection.

To most effectively organize these changes in physician roles, we defined needs (“Covid-19 shifts”), the daily tasks to be carried out under each position, and the person assigned to that activity. This information is contained in a document available to all physicians via the hospital intranet. Updated in real time, it sets out the plan for the following week.

Our nursing staff was also reinforced to treat patients positive for coronavirus infection. Nurse-to-patient ratios were adjusted to provide treatment to all patients requiring care. Operating Room nurses became part of the critical-care unit, and nursing staff previously working with outpatients and other units, such as day-stay and phlebotomy, joined the inpatient ward.

**Support Roles and Teams**

Support roles have also been defined during the pandemic. Tasks include assisting front-line physicians, providing information for families through the patient portal app, and delivering results of Covid-19 PCR testing to either the attending physician or nursing supervisor (for the management of hospital beds and turnover). We also assigned team members to conduct in-home patient follow-ups and coordinate care efforts with primary care and elderly-care residences, and we assembled staff members to support occupational health in monitoring infected staff members. Members of our Covid teams have gradually become opinion leaders and role models of best practices.

One of the first support teams established was devoted to personal protective equipment (PPE). This group was critical to informing staff about proper use, as providers had no experience using PPE with Covid, and there was significant fear about exposure, supply levels, etc. The Covid PPE committee meets every morning with preventive medicine, occupational health, and one of the medical directors to answer staff questions, review protocol incidents, update supply figures and make decisions on how to address scarcities, update and interpret government Ministry of Health norms, and plan clean and contaminated areas on each ward. We built an algorithm to manage PPE resources that is easy to understand and to revise if health regulations change.
Treating Non-Covid Patients

All other care activity of the hospital has been substantially reduced during the crisis, and the care that is delivered has profoundly transformed. Most patients scheduled for outpatient visits have opted to cancel or postpone their appointments. Within the surgical unit, teams of on-call specialists were formed, including members of the OBGYN department. A separate circuit was created for labor and delivery. These patients are discharged 24 hours after delivery and then come back to the hospital the next day for a newborn blood test.

Additionally, the hospital assembled a team of specialists in ENT and maxillofacial surgery for early tracheotomy in patients in the ICU. Patients placed on a priority list, most of them facing cancer, were given priority for surgery within the disease-free circuit.

Expanded Telemedicine

We have also made great effort to inform patients about the advantages of having their appointments via telecare (telemedicine). They can communicate by phone, through our online patient portal (which provides access to their medical records, lab results, informational videos, and chats with providers), or through questionnaires. Virtual care makes it easier to identify which patients need immediate attention and/or face-to-face visits during this exceptional situation. From March 16 to April 6, we scheduled over 23,000 patients in our outpatient clinic and managed over 18,000 of them through this virtual care model. We also established a filter at the ED for admissions and were able to perform phone or video telemedicine follow-up in many cases.

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In addition, we launched a telemedicine app that is used by almost 200 doctors at our hospital. It has been essential for the “new residents” (surgeons helping medical specialists) in updating data, treatments, and requesting tests during ward rounds.

Enhanced Communications

Managing such an unpredictable scenario has led us to realize that the only way to succeed is as a single team, with everyone working together.

We have increased communications on various levels, including regular Covid emails from the CEO to all clinical and non-clinical staff. Every day, a multidisciplinary crisis management team made up of hospital managers, the office of the medical director, the nursing director, preventive medicine, microbiology, and leaders in internal medicine, the ICU, and critical care gather to discuss problems and solutions around spaces and staffing. Meetings like these have helped to build
the ONE TEAM concept, reminding us that we depend on each other to deliver the best possible care.

Access to accurate data has been essential for guiding decision making. Early on the crisis, the hospital’s balanced scorecard system was modified to provide precise data on inpatients infected with the coronavirus, a forecast of beds needed (initially estimating a 12-day average hospital stay that was later lowered), and the like.

**Peak and Current Cases**

Peak activity was reached during the fourth week after the first cases were diagnosed, with a census high of 570 admitted patients, 92% of them Covid-positive. In the ICU, 43 of the 45 patients were Covid-positive. At the time, our hospital was at 93% capacity on inpatient wards and 92% in the ICU. With the arrival of new respirators, we could open up to 6 new ICU beds, and the day hospital was prepared to house 30 new inpatient beds. However, on March 31 the number of new cases remained stable, and the rate of new admissions and discharges improved.

We feel that the crisis is now under control here.

As of May 1, Rey Juan Carlos University Hospital had 225 patients overall, 97 of them Covid-positive (14 in the ICU). Since the pandemic struck, we have admitted a total 1,627 patients with Covid-19, 92 in the ICU. Sadly, 341 of our infected patients have died (25 of them in the ICU). The postsurgical recovery area is back to pre-Covid times, though we have kept some structural changes for future use. Our ICU has grown from 18 to 27 beds. We are trying to split Covid and non-Covid patients in well-defined circuits at the hospital.

We have scaled back working hours in an effort to reduce financial strains. By doing this, apart from cancellation of all elective surgeries during some days, we have been able to balance our annual budget a bit.

**Conclusion**

Looking back over the past two months, we have met the challenges posed by this pandemic thanks to the great capacity for coordination and plasticity shown by our health care professionals and to the leadership of our centralized hospital management team. We are now working to update all the resources we have been using in case there is a new curve.

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