

Difficult Times: The Coronavirus Pandemic and Cardiology Residency – The Experience of the Rio Grande do Sul Cardiology Institute

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Medical residency programs were first established in 1889 in Baltimore, Maryland, at John Hopkins University. At the time, Dr. William Healstead realized that seriously ill patients treated by recently certified clinicians had higher mortality rates. In response to this, and in the hopes of increasing the quality and success rates of patient care, Healstead created a new type of training program, in which emerging clinicians would receive their final training in the hospital environment itself. This model, replicated globally, is currently known as medical residency.¹

In Brazil, the Orthopedic Department at Hospital of Clínicas, associated with the University of São Paulo (USP), pioneered the first Brazilian medical residency program in 1945. However, this training model was not officially adopted in the country until September 5, 1977, through decree No. 80281, which instituted residency training as a formal component of medical graduate training.²⁻⁴ Since then, physicians worldwide have been able to train in specialized medical residency programs that not only deepen their theoretical understanding, but also provide a supervised environment for development of the practical skills required by their desired area of expertise.

After being identified on December 1, 2019 in Wuhan, China, with the first cases reported on December 31, a novel infectious disease – coronavirus disease 2019, or COVID-19 – a quickly emerged as a global concern.⁵

Keywords

Betacoronavirus; Pandemics; Information Security; Confidentiality; Containment of Biohazards; Internship and Residency.

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The World Health Organization (WHO) subsequently declared the COVID-19 outbreak a pandemic, and the highly transmissible virus was named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).⁵

The WHO pandemic declaration raised serious concerns in the medical community, as well as in the residency programs themselves. It became necessary to restructure medical services to minimize the risk of contagion and further spread of the disease, while maintaining patient care and providing guidance to the general population. Patients undergoing cardiological treatments are among those facing the highest risk for COVID-19, and at the same time cannot be deprived of ongoing medical care due to elevated risks of decompensation or dangerous cardiovascular events.

Apart from this, new paradigms have emerged considering the best approaches to manage cardiology patients, including the crucially important early and accurate diagnosis of COVID-19. These aspects should be considered in order to implement the best available treatments according to the most updated protocols and valid medical literature.⁶ Throughout the COVID-19 pandemic, corollary cardiological conditions linked to this disease have become evident (including myocarditis and myocardial damage with increased biomarkers), demanding greater attention to patient complexities and the implementation of differential diagnosis.^{6,7}

According to the available data, the mortality rate for COVID-19 in the general population is around 2%, vs. 15% in geriatric patients and those over the age of 80. In addition, considering the high transmissibility of COVID-19, the predicted infection rate for the overall population is 70%.⁸ COVID-19 is transmitted in both



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aerosol and droplet forms, through the air or by means of contact or close proximity with the infected person. The symptoms resemble those of the common cold, including cough, fever, and/or dyspnea, in some cases developing into respiratory failure. The majority of those infected are asymptomatic, and in cases where symptoms are present they generally appear between 2 and 14 days after infection; the average incubation time is 5 days.⁸

Approximately 90% of infected individuals seeking hospitals are able to recover without intensive medical care. Those over the age of 60 or with pre-existing respiratory or cardiovascular conditions, as well as diabetes, present much higher chances of developing a more serious form of COVID-19.⁸

The predicted spread of this disease has positioned it as one of the greatest pandemics of all time, with impact not only on the medical sector, but also the on political and economic arenas. General medicine, specialization, and accreditation programs have been greatly affected by the pandemic, which created unprecedented challenges and led physicians to confront innumerable and unexpected situations on a daily basis. Hence, these programs and every other educational system across the board needed to undergo fundamental changes in order to adapt to the new reality.⁹

The Cardiology Institute-University Foundation of Cardiology (IC-FUC) was founded in Porto Alegre, Brazil in 1966 by Dr. Ruben Rodrigues with the aims of fostering medical education and research, improving medical care, and promoting regional development in cardiology. In the following years, these objectives were attained and the institute sealed a partnership with the state government and the Federal University of Health Sciences of Porto Alegre (UFCSA). In 1969, a new center inaugurated at Princesa Isabel avenue became a new hub for cardiological advancement in the region. Remaining loyal to its three pillars: education, research, and patient care, and to the principles that underpinned its creation, the University Foundation of Cardiology is today recognized nationally and internationally for its excellence, leadership, and advancements in cardiology. It harbors the largest cardiology residency program in southern Brazil, with 341 inpatient hospital beds and an average of 996 hospitalizations per month in this sector; 54 hospital beds for intensive adult therapy (divided between coronary and postoperative intensive care units [ICUs]), 13 pediatric inpatient beds, and 10 pediatric ICU beds. The Institute is also responsible for approximately

10000 urgent and cardiac emergency attendances monthly and 9582 electrophysiological tests, apart from having performed 2515 cardiopulmonary bypass surgeries in 2019 alone.

The medical residency program in cardiology has trained nearly 1000 cardiologists since 1966, which represents 50% of the total number of practicing cardiologists in the state of Rio Grande do Sul. Today, the program accepts 20 residents in the general cardiology program every year, and all residents complete their mandated training hours with hands-on experience in every sector of the hospital. This includes the emergency room, therapy patient care, the hemodynamics lab, cardiac surgery, and training with electrophysiology and a plethora of cardiological exams.

With the onset of COVID-19, it was clear that major structural modifications were needed in the Institute's residency program to minimize the effects on the training of both cardiologists and those pursuing more specialized training (on echocardiograms, electrophysiology, and hemodynamics). A thorough contingency plan was elaborated by means of strategic planning and practical implementation and included the following measures: the creation of a COVID wing (Figure 1), intensive training on the clinical management of all suspected cases (including the use of personal protective equipment [PPE] and orotracheal intubation), the establishment of an intubation room in the emergency ward, fast sequence intubation training with video laryngoscopy, cricothyroidotomy training, the reinforcement of biosecurity measures, alterations in the conduction of class presentations and case discussions (online and video conferencing), the prevention of agglomerations in all hospital areas, selective restriction of outpatient care, and extended use of telephonic communications for all patients under hospital care.

The Cardiology Institute also took measures to reduce the risk of infection throughout the entire hospital grounds and between hospital staff and third-party vendors through continuous training, restrictions of visits to patients, and screening and triage using key symptoms (such as temperature checks) and vital signs on all entrances to the medical center.

It is important to mention that other illnesses do not cease to exist during the pandemic and, sadly, still present high registers. In addition, patients with existing cardiovascular conditions not only have higher chances of developing a more serious form of COVID-19 but are



Figure 1 – Negative pressure room in the emergency sector (COVID wing)

also burdened with a much greater chance of mortality linked to the cardiovascular disease itself. It is now well established that SARS-CoV-2 has the potential to attack the cardiovascular system in various ways and could cause arrhythmic activity (16%), myocardial ischemia (10%), myocarditis (7.2%), and shock (1-2%). Based on this dire scenario, it is extremely important to adopt and codify all of the recommended preventive measures.¹⁰

Since the first cases in 2019, the spread of SARS-CoV-19 has posed an immense challenge to the global population. Nevertheless, the experience of an infectious disease pandemic on a global scale is not without precedent, considering for example the Spanish flu of 1918. Thankfully, medicine has experienced a true revolution since then, and the performance and dissemination of scientific research now happens in real time, promoting the sharing of recent developments and best practices in this unique time.¹¹ Alongside these major changes, unique opportunities emerge in the development and education of the resident doctors who are currently in training. Online-based educational tools also offer unique possibilities.¹² The challenges are inevitable, but sufficient preparation in the renovation and support of residency programs can ensure professional growth, development, and well-being for residents, while also protecting the highest possible quality of patient care. These measures are currently essential to face the pandemic and reduce the

exposure and transmission among medical staff and patients, without failing to provide the best theoretical and practical training for medical residents as they pursue and engage with their specialties in cardiology.

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Ethics Approval and Consent to Participate

This article does not contain any studies with human participants or animals performed by any of the authors

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