

Critical preparedness and operational response actions directed for the acute and post-acute COVID-19 pandemic in Brazil: the experience of a nationwide outpatient healthcare group

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Abstract

While the new Coronavirus Disease 2019 (COVID-19) pandemic rapidly spread across the world, South America was reached later in relation to Asia, Europe and the United States of America (USA). Brazil concentrates now the largest number of cases in the continent and, as the disease speedily progressed throughout the country, prompt and challenging operational strategies had to be taken by institutions caring for COVID-19 and non-COVID-19 patients in order to assure optimal workflows, triage, and management. Although hospitals in the USA, Europe and Asia have shared their experience on this subject, little has been discussed about such strategies in South America or by the perspective of outpatient centers, which are paramount in the radiology field. This article shares the guidelines adopted early in the pandemic by a nationwide outpatient healthcare center composed by a network of more than 200 patient service centers and nearly 2,000 radiologists in Brazil, discussing operational and patient management strategies, staff protection, changes adopted in the fellowship program, and the effectiveness of such measures.

Abbreviations: COVID-19 = Coronavirus disease 2019, CT = Computed tomography, HIPAA = Health Insurance Portability and Accountability Act, IgG = Immunoglobulin G, IgM = Immunoglobulin M, MRI = Magnetic resonance imaging, PPE = Personal protection equipment, RIS/PACS = radiology information system/picture archiving and communication system, RT-PCR = Reverse-transcription polymerase chain reaction, SARS-CoV-2 = Severe acute respiratory syndrome coronavirus 2, US = Ultrasound.

Keywords: health policies, coronavirus, cCOVID-19, infection control, radiology

1. Introduction

Coronavirus disease 2019 (COVID-19) has arrived later in South America, and Brazil was the first nation in the region to report the illness, on February 26, 2020.^[1,2] Within weeks, the country had

closed its borders and various states and municipalities have enforced variable degrees of lockdowns.^[1] As of September 28, the 210-million people country has registered more than 4,732,000 cases of COVID-19 (the largest in South America and third in the world thus far) and more than 140,000 deaths.^[3] Following each step of this evolution carefully, until the very recently we had to deal with a massive shortage of diagnostic tests (particularly reverse-transcription polymerase chain reaction, RT-PCR) and to prioritize their use for critically-ill hospitalized patients and deaths. Thus, a considerable under-reporting of cases is highly likely in Brazil, and current projections estimate that the real figures may be several times higher than those indicated in official reports, which would render more than 17.4 million cases as of September 28.^[4]

The pandemic demanded an emergent response from hospitals, clinics and other institutions caring of COVID-19 and non-COVID-19 patients worldwide, with implementation of numerous processes for patient management, treatment and disposition.^[5,6] Radiology departments and diagnostic services are regularly in the forefront of policy-making and guideline development for institutions,^[5,6] especially regarding to planning diagnostic screening and triage. This all comes in a scenario in which imaging examination has become the indispensable means not only in the early detection and diagnosis of COVID-19 but also in monitoring the clinical course and evaluating disease severity.^[7]

In a healthcare center, where continual situations of direct staff exposition to the pathogen exists, and different patients and health care workers from other departments potentially mix,^[4]

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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providing timely diagnostic results while assuring maximal protection for people is essential, which highlights the importance of following strict guidelines.

While some of these guidelines and operational responses have been recently discussed from the perspective of hospitals in the USA, Europe, and Asia,^[5,6,8,9] such guidelines for outpatient service centers have received little attention, the same being true for management policies in Latin America. Moreover, sharing the experience of this segment of the healthcare sector is of paramount importance in a moment that a profound impact of the pandemics on healthcare is anticipated, with decreasing demand for imaging of patients without COVID-19, and the most significant impact being predicted precisely in outpatient healthcare practices.^[10,11] In the present communication, we share the operational response efforts undertaken by one of the largest private outpatient healthcare groups in Brazil and South America, comprising a network of patient service units with nationwide coverage.

Fleury Group (Fleury) is a 94-year-old publicly listed company in the healthcare sector in Brazil, with diagnostic services in different medical specialties (Imaging, Clinical Pathology, Cardiology,

Endoscopy, Pneumology, Women Health, and many others, covering 37 medical specialties). Around 75 million of clinical and anatomic pathology tests, and 5 million imaging exams are performed annually by a team of 2,400 doctors and 10,000 healthcare workers in the 222 clinics scattered around 9 different States of Brazil. There are also several programs of structured fellowship in Diagnostic Imaging (body imaging, abdominal imaging, chest imaging, musculoskeletal imaging, breast imaging, etc.), accredited by the Brazilian College of Radiology.

During the COVID-19 pandemic, Fleury is providing diagnostic services to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and also to those patients without COVID-19 in need of assistance. We worked to adapt our diagnostic services, providing assistance for the ones in need and mitigating the risk of infection dissemination. New procedures were adopted and protocols adjusted. Our actions (Figure 1) were structured with basis on five main pillars (patient protection, review of exam workflows, staff protection, social initiatives and fellowship adjustments), briefly described below. Ethics Committee approval was not necessary for this study, given its descriptive character.

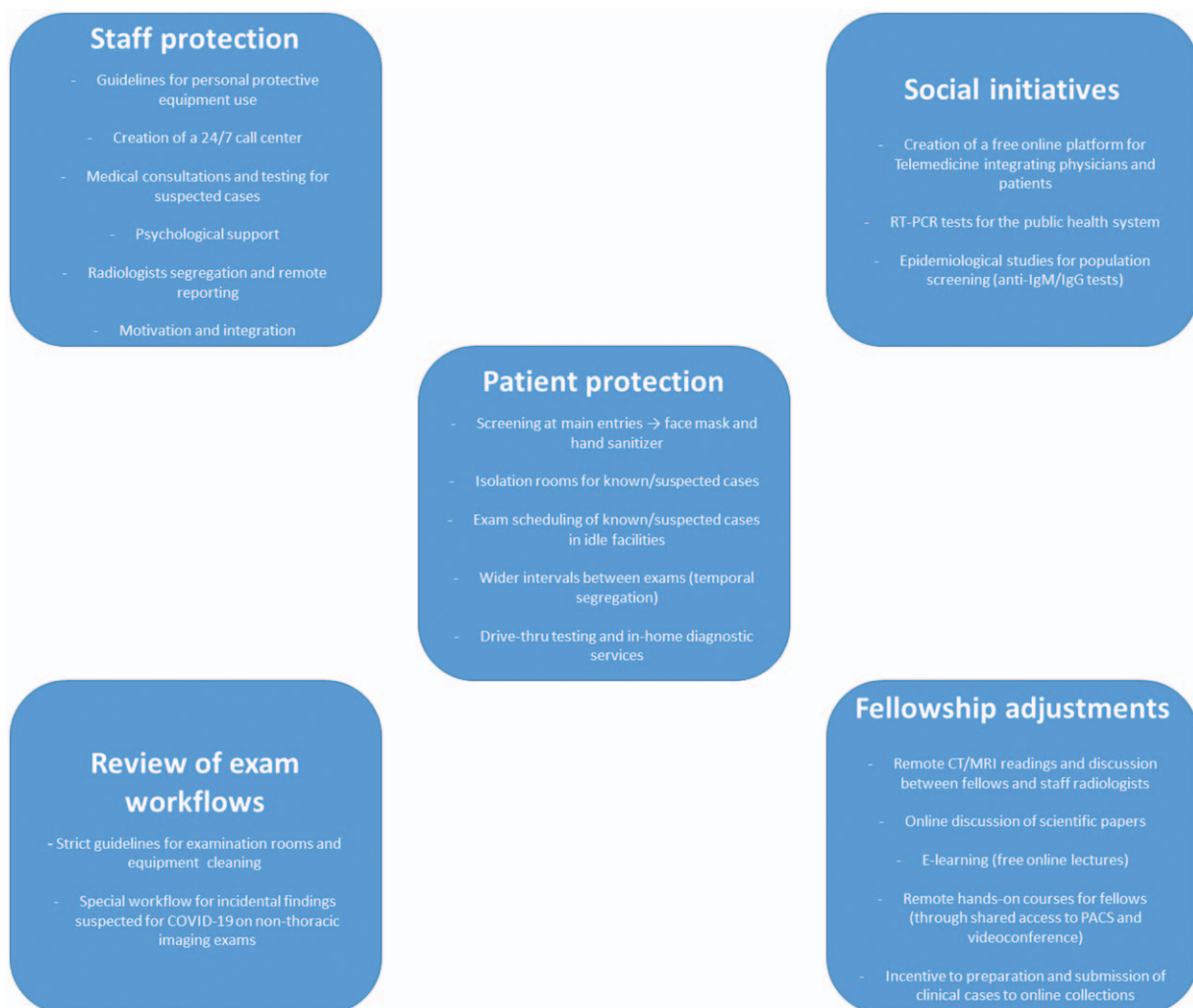


Figure 1. Schematic representation of the five pillars of emergent operational actions adopted by an outpatient healthcare group during the emerging COVID-19 pandemic in Brazil.

2. Patient protection

2.1. Identification of patients at risk for having COVID-19 and development of standard operating procedures for safe care

In order to reduce potential transmission from known or suspected cases of COVID-19 among our patients and staff, we adopted screening strategies in all the main entries of our facilities involving the use of symptom screening. All our sites have implemented screeners at their entrances to check those coming in with symptoms related to SARS-Cov-2 infection, such as fever, dyspnea, and cough. We also screen patients with risk factors and comorbidities. All those patients are immediately face-masked and asked for hygiene their hands with an alcohol solution. Based upon these answers, patients considered suspects or confirmed with COVID-19 are immediately transferred to an isolation room in order to wait for the imaging or laboratory exams. As a rule, accompanying family members are discouraged when unnecessary, as well as from crowding in the waiting areas. Yet, when possible, imaging or laboratory tests are scheduled to be performed at facilities with less foot traffic and with fewer concentration of people to avoid secondary patient and staff exposure. This approach limits the transit of contagious patients and potential exposure of other people. We also managed starting times of imaging exams to be scheduled further apart to ensure temporal segregation.

2.2. Implemented drive-thru testing for patients

We also implemented drive-thru RT-PCR testing for COVID-19 in four of our patient service units in São Paulo. Patients can schedule their tests over the phone or on the internet and are tested without leaving their vehicles with nasopharyngeal swab collection. The result of their RT-PCR tests is available over the internet after 24-48 hours.

2.3. In-home diagnostic services

Our in-home blood collection and specimen pick-up services are available to patients who are not able to come to our units. We have also started a mobile ultrasound service with home assistance during COVID-19 pandemic in the city of São Paulo.

3. Review of exam workflows

3.1. Examination rooms and equipment cleaning

For all diagnostic procedures (imaging and laboratory tests) performed in patients suspected or confirmed with COVID-19, or presenting fever, dyspnea, cough or other respiratory symptoms, the examination room is locked and the cleaning personnel is called to perform a terminal cleaning. For non-aerosol-generating procedures, such as X-rays, ultrasound (US), computed tomography (CT) and magnetic resonance imaging (MRI) performed with patients using mask throughout the examination, terminal cleaning can be performed immediately after the patient leaves the examination room. For aerosol-generating procedures or patients without a mask, the terminal cleaning is performed after 30 minutes. Radiology technical staff is responsible for cleaning examination tables, equipment, and accessories with ammonia quaternary using contact personal protection equipment (PPE).

For X-rays, MR, CT, mammography, US, blood drawing, and all other diagnostic procedures performed in asymptomatic patients, surfaces, equipment and accessories are cleaned with ammonia quaternary after every patient.

3.2. Incidental findings suspected for COVID-19 on non-thoracic imaging exams

During a pandemic situation, is not unusual that asymptomatic patients performing an examination not related to the chest, like a body CT, may display incidental findings suspected for COVID-19, these findings sometimes being the first and only indicators of disease.^[12] In our institution, a direct examination of the whole thorax is not performed in such case.^[13] If necessary, the reporting radiologist may consult the chest imaging group to get assistance on the best way to describe the findings. A comparison with previous exams (if any) is made as well as a phone contact with the referring physician to discuss the likelihood of viral infection. With the suspicion of viral pneumonia confirmed by imaging findings, a surgical mask is offered to the patient, who is questioned about recent respiratory symptoms (last 14 days). The staff member who will remove the patient from the examination room is required to use full contact PPE, the patient is informed of a possible pulmonary viral infection and is instructed to contact the attending physician for further information. The examination report is made available to the patient immediately.

4. Staff protection

4.1. Guidelines for personal protective equipment use

With unprecedented shortages in the global stocks of some PPE items, especially N95 and surgical masks, which are being massively consumed in this pandemic, strict guidelines on their usage in Brazil have been adopted by the Ministry of Health, prioritizing their usage to frontline staff (following a risk-based approach) and rationing their usage to patients/ non-clinical staff. Our healthcare providers who perform the frontline screening and work at the reception area wear a surgical facemask and are instructed to maintain social distancing from all patients. The reception desks were positioned in order to avoid physical contact between patients and workforce. People providing care for suspected or confirmed patients, such as the nurse team, radiologists and radiography technologists, wear full PPE including gloves, surgical mask, gowns, cap and eye-shield. A N95 mask, however, and a face-shield are only required when collecting samples for RT-PCR or when performing other aerosol-generating procedures. Specialized nurses were designated to educate and reinforce appropriate donning and doffing techniques for PPE. Sanitizing hand-rubs were already widely available throughout all facilities, but were especially intensified after the start of the COVID-19 pandemic.

4.2. Creation of a 24/7 call center

Also, given the complexity of our operations and the voluminous workforce, a call center operating 24/7 was created, in which trained doctors answer to queries by our employees on symptoms and other aspects related to the disease, guiding the next most appropriate approach (e.g., referring to a hospital, recommending self-isolation, etc.). In most non-urgent cases the individual is referred to a medical appointment in our own facilities (a special

unit was created for this purpose) for clinical examination and testing. Finally, all personnel doing administrative/ office tasks were relocated to home office.

4.3. Psychological support

The burden of social isolation (many health professionals, for instance, at the end of their work period, have been opting to stay in adapted hotels instead of returning to their homes, for fear of contaminating their most vulnerable relatives) and disrupted work patterns pose significant levels of stress to all health care workers. Prioritizing mental health is crucial at this moment, and support must be provided whenever possible. We created a platform of telepsychology by which video or call appointments can be scheduled with dedicated psychologists. This proved to be a useful measure to help mitigate psychological impacts of the pandemics among our collaborators.

4.4. Radiologists segregation and remote reporting

In line with national policy directions of social distancing, we encouraged home office for most of our radiologists. This is also pivotal from a strategic perspective, in order to avoid disruption in manpower should cross-transmission occur. While this can be a difficult policy to implement in many centers, years before the pandemic we had already structured a private secure network that was normally used for contingency plans. This structure was strengthened with the advent of COVID-19 pandemic, with a new infrastructure that permits cloud access to a centralized datacenter running our Radiology Information System/Picture Archiving and Communication System (RIS/PACS), accessed from any web browser over a wi-fi or 4G network. We also stimulated the anticipation of vacation leaves for some of our physicians, especially those with risk factors or chronic diseases.

4.5. Motivation and integration

In order to help with the stress and anxiety caused by the COVID-19 pandemic, we are offering free yoga and meditation classes to our staff, live music and varied podcasts (“Doctalks”) on the connection of medicine with cinema, literature and art. A 30-minutes web meeting with our medical leaders is performed from Monday to Friday, and a weekly web meeting with all the physicians is held for on Fridays. We also communicate the main daily facts in an e-mail short minute.

5. Social initiatives

5.1. Creation of an online platform for Telemedicine

As telemedicine (previously forbidden) has been officially authorized by regulatory authorities in Brazil during the pandemic period, the company has invested more than US\$ 1 million in structuring an online and freely available platform for patients and physicians, named “Cuidar Digital” (“Digital Care”). Fearing contamination, a large number of patients accompanying for concerning health problems, such as cancer, stroke, cardiovascular and renal conditions, suddenly discontinued their medical treatment. This initiative aims to mitigate the lack of medical assistance during the most critical period of the pandemic. The registration steps are easy and straightforward for doctors and patients, involving a simple profile creation, with

secure login and password, validated after e-mail confirmation. All physician registrations are only cleared after full verification and confirmation of specific data (medical council register number, identification, etc.). After scheduling an appointment and accessing the platform, a videoconference starts, connecting doctor and patient, in a secure and encrypted ambient. The physician may electronically register in the chart all patient data and make prescriptions. Moreover, if this given patient has performed any diagnostic exam in our units, the results (imaging and reports, for example) are automatically displayed in the screen for the doctor in an intuitive manner, fully integrated. Outside examinations can also be easily shared through the platform. All data transitioned through this platform is Health Insurance Portability and Accountability Act (HIPAA) compliant.

5.2. Public-private partnership for population testing

In a conjoint action with São Paulo municipality (capital of São Paulo state, by far the most affected city in the country by the pandemic) and other private companies, we started a program for testing public health system patients with RT-PCR, helping to diminish the stress on the public system. Furthermore, pilot epidemiological studies are now starting to be conducted by employing conventional (chemiluminescence) immunoassays to detect immunoglobulin M (IgM) and immunoglobulin G (IgG) antibodies to SARS-CoV-2 in selected neighborhoods, aiming to estimating the current seroprevalence of COVID-19 in São Paulo.

6. Fellowship adjustments

As of March 24, when measures of social distancing started to be implemented throughout the country, fellows have been kept away from their *in loco* activities. Such activities were immediately replaced by remote ones. By making use of a combination of tools, such as remote access to RIS/PACS and an internal encrypted channel for videoconferences, daily sessions of remote X-rays/CT/MRI readings and discussion of clinical cases between radiology staff and fellows are now a routine, as well as online scientific sessions for discussion of medical papers of interest. Staff radiologists were also instructed to giving regular classes that are being transmitted as open access to the medical community; these classes are being recorded and inserted in the company’s education platform for later consultation. We also created a structure that allows remote hands-on courses to our fellows, using tools of shared access to the institution’s RIS/PACS, supervised by teachers through a videoconference platform. Finally, fellows have also been instructed to elaborate short interesting clinical cases picked up from the routine practice, aiming at publishing them in online platforms of clinical cases such as those from the European Society of Radiology and the Brazilian College of Radiology. Such activities have rendered a warm feedback, and are intended to be kept while the social distance measures endure in Brazil.

7. Effectiveness of the actions

Having completed now approximately six months since the introduction of these measures, our data indicate that 11.5% of our frontline healthcare workers had a diagnosis of COVID-19 to date. Recent studies have been demonstrating that such professionals have a three-time higher risk of infection in

comparison to the general population,^[14] with these figures reaching up to 36% in some series.^[15] Considering that current estimates point that about 8.2% of the Brazilian population may have been infected by now^[4] and the aforementioned higher risks for health workers, we would expect a substantially higher rate of infections among our professionals. It is very likely, therefore, that the adoption of such measures may have somewhat contributed to these rates not being even higher. It is important to point out, moreover, that we have not recorded any case of COVID-19 among our collaborators directly caring for patients known to be COVID-19-positive, demonstrating that such protective measures may have been even stricter and more effective in such settings.

8. Conclusion

As the situation still evolves carrying considerable degrees of uncertainty, it is possible that significant disruptions continue to happen, which will demand from managers and radiologists prompt flexibility to rapidly evolving changes, as well as resiliency to improving and adjusting guidelines, protocols and workflows along the way. While some changes will be hopefully transitory, such as the widespread decline in imaging demand in the outpatient diagnostic sector, other may remain more enduring. The importance of defining and constantly reviewing such guidelines relies on the fact that they probably will need to remain in place even after lifting of lockdown measures.

In the same way that new norms of social distancing and redoubled personal hygiene arise in the population, the imaging field and the outpatient healthcare sector may have seen an anticipation in the adoption of new technologies that would otherwise take years. New patient flows and screening, mobile applications for scheduling, in-home diagnostic services, remote reporting and telemedicine, e-learning and ludic web meetings are all experiences learnt from this crisis that will shed light and probably reshape the future of the healthcare sector.

Learning points

- Outpatient healthcare centers must identify patients at risk for having COVID-19 and develop standard operating procedures for safe care.
- Rigid guidelines for cleaning of equipment and examination rooms must be adopted.
- Elaboration of clear and specific policies aiming at staff protection (radiologists, technicians, nurses, attendants) must be locally designed.

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