

Management of Hemodialysis Patients with Suspected or Confirmed COVID-19 Infection: Perspective of Two Nephrologists in Brazil

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Introduction

Brazil is the largest Latin American country with a population of 211.75 million inhabitants as of March 2020. São Paulo, the capital city of São Paulo State, is the most economically developed and populous city (12.25 million inhabitants), and it is located in the southeastern region of the country (1). There is a unified public health system all over Brazil that has been implemented since 1993, and it provides care to about 80% of the population in a relatively well organized, although insufficient, network of basic primary health care units and public hospitals for higher-complexity cases. On the other hand, 20%–25% of the population has private health insurance and may receive care provided in other accredited hospitals.

Local Scenario of the Pandemic in Brazil

The first case of the novel coronavirus disease (coronavirus disease 2019 [COVID-19]) pandemic in Brazil was reported on February 24 in São Paulo. Since then, the outbreak has spread to all states in the country, and the number of cases has been increasing on a geometric scale. To date (April 23), 49,492 confirmed cases and 3313 deaths have been reported (2).

Although the national and state public health authorities provided guidelines and step-by-step orientations and measures to prevent the infection from spreading in the community early in the course of the epidemic, the number of cases has still soared steeply. The outbreak initially affected people from higher social classes and afterward, those living in more vulnerable and poorer metropolitan areas, thus leading to an overburden of the public health system.

Patients with mild flu-like symptoms were advised to stay at home. Physicians in the São Paulo Hospital, a public hospital of the Federal University of São Paulo, were scheduled to work shifts in a recently created ambulatory service separated from the emergency care area of the hospital to assist patients with more severe symptoms. Two wards of this hospital (35 beds) and 35 intensive care unit (ICU) beds were allocated to receive patients with COVID-19 infection. Personal protective

equipment for physicians and other health care workers has fallen short of the needs in this institution.

The Israelita Albert Einstein Hospital (HIAE), a private institution located in the south region of the city, has a total of 700 beds, of which 75 are intensive care beds. There were 110 hospitalized patients in this institution with confirmed ($n=82$) or suspected COVID-19 infection on April 23, 45 of whom were in the adult ICU.

Handling Patients with COVID-19 Infection and AKI Requiring RRT

To date (April 23), 151 critically ill adult patients have been admitted to the ICU of the HIAE presenting acute severe hypoxemic respiratory failure. Sixty of them (40%) required mechanical ventilation. A total of 26 patients (average age, 68 years old) received dialysis due to AKI, all required mechanical ventilation, 25 received vasopressor drug, most had positive fluid balance, 23 used diuretics, and 11 were oliguric. Interestingly, the requiring-dialysis AKI developed early in some of these cases (around 48 hours after ICU admission) and was not clearly associated with septic shock. Continuous venovenous hemodiafiltration at a dose of 25–30 ml/kg per hour (this is lower than our routine dose, with the aim to diminish the use of materials and dialysis solutions) has been the modality of choice, and regional anticoagulation with 4% trisodium citrate has been used. Thus far, 2 patients have died, 2 were discharged from the hospital (1 is in chronic dialysis program), 2 recovered renal function, and 20 continue to be hospitalized and are receiving RRT (16 in the ICU).

A team of ten nephrologists gives support, prescribes for, and follows daily patients with AKI in the hospital. There is a restriction on the number of health care staff members who are allowed to be in the units with patients with COVID-19. The nephrologists do not discuss the cases with the intensive care physicians at the patients' bedside but at a distance through internet and video assistance. Nephrology nurses similarly control the therapy parameters distantly. However, these conditions are very different in public

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hospitals, and physicians and nurses need to be closer to the patients using protective gowns, masks, and goggles.

Recommendations for Handling Patients on Maintenance Hemodialysis with Suspected or Confirmed COVID-19 Infection

Patients should be actively questioned if they present any flu-like symptoms before each dialysis session. Patients and accompanying persons (only if their presence is essential) should wash their hands or use hand sanitizer before entering the dialysis room. All patients should wear face masks during their stay in the unit and avoid meals during dialysis (3–6) (Figure 1).

Physicians, nurses, technicians, and other dialysis personnel should wear face masks (surgical or N95), goggles, caps, and gowns. Patients on hemodialysis with suspected or confirmed COVID-19 infection should be dialyzed in a private isolated room.

If isolation is not possible, patients with COVID-19 and mild or no symptoms should continue hemodialysis at the original hemodialysis center and should not move to another center.

All patients with confirmed or suspected COVID-19 infection should be given dialysis in the last shift of the day in a separate wing of the facility. Patients should be at least 1.82 m away from each other.

It is recommended to have an exclusive dialysis shift for the patients in units with many suspected or confirmed cases. It is recommended to use the dialyzer only once in suspected or confirmed cases.

The specific passing route for entering or leaving the dialysis unit should not be shared with other patients on dialysis. Entering and exiting with other patients at the same time should be avoided.

Thus far, there have been two cases with suspected/confirmed infection at the Federal University of São Paulo among the 230 patients in the hemodialysis maintenance program; of these, one is receiving dialysis in the outpatient center, and one died. There were another four cases with infection among the 90 patients on chronic dialysis at the HIAE; two are hospitalized (one in the ICU), one returned to ambulatory dialysis, and one died. No nephrologists or nurses have been infected, but two dialysis technicians have

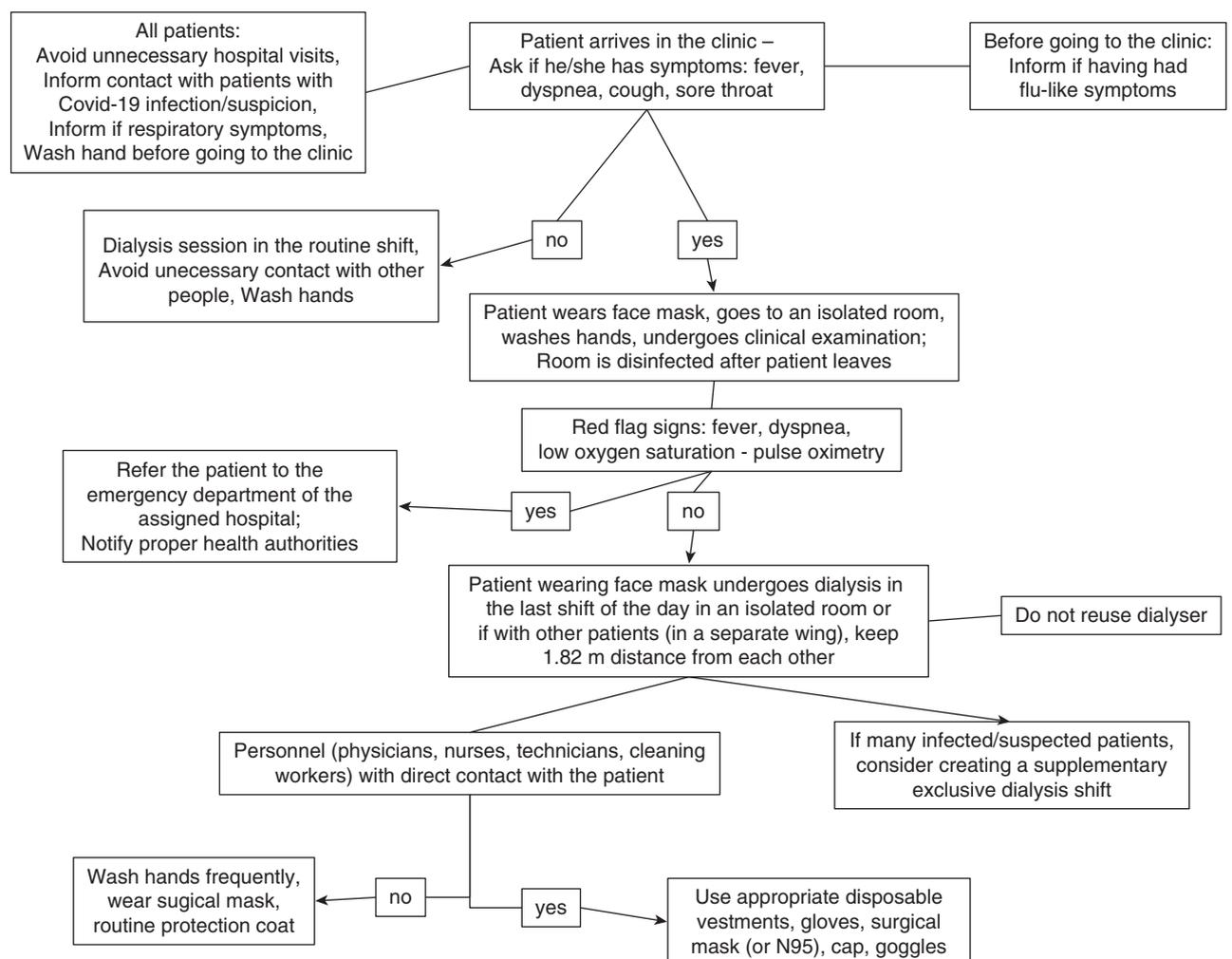


Figure 1. | Scheme for handling patients on hemodialysis with suspected or confirmed coronavirus disease 2019 (COVID-19) infection.

been infected at the Federal University dialysis facility; one dialysis technician and one nurse were infected at the HIAE.

There has been great concern with the increasing costs of the pharmaceutical/medical supplies, dialyzers, and personal protective equipment all over the country, which could lead to the program collapsing. High contamination rates of patients; a lack of adequate dialysis treatment conditions, including a lack of dialysis machines; and shortage of ICU beds have recently been reported in the states of Rio de Janeiro (southeastern region), Ceará (northeastern), Pernambuco (northeastern), and Amazonas (north). High fatality rates have been observed in poor metropolitan areas of these states.

There is a shortage of diagnostic RT-PCR tests for COVID-19 in the country. Even so, the turnaround time for the test in private laboratories in São Paulo city is about 1–2 days, and this time has been around 3 days in public central laboratories when the test is available.

Sterilization of Hemodialysis Machines

There is no modification in the routine recommendations regarding the hemodialysis sterilization after use by an infected patient. Dialysis equipment and furniture should be externally cleaned with hydrogen peroxide solution (Oxivir) after each dialysis session in the HIAE. The machines are sterilized with peracetic acid solution (Puristeril 340).

Return of Patients on Dialysis to the Hemodialysis Outpatient Unit

The return of a patient to an outpatient dialysis unit should ideally be test based and meet the following criteria: resolution of fever without the use of fever-reducing medications, improvement in respiratory symptoms, and negative results of a COVID-19 molecular assay for detection of severe acute respiratory syndrome coronavirus 2 RNA from at least two consecutive nasopharyngeal swab specimens collected ≥ 24 hours apart (7). A more realistic approach in our setting has been the following strategy: at least 3 days have passed since recovery being defined as resolution of fever, improvement in respiratory symptoms, and at least 7 days have passed since symptoms first appeared (7). The decision has ultimately been made on a case-by-case basis taking into account the patient's clinical conditions, the respiratory symptoms, and the detection of COVID-19 in nasopharyngeal specimens (3).

Contingency Plan in Case of a Large Number of Patients Needing Dialysis

Elective surgeries have been suspended in public and private hospitals, and intensive care beds have been reserved for patients who may need them. The HIAE transformed beds that were originally for clinical and surgical patients into intensive care beds. This is in addition to the acquisition of more dialysis machines and material for the extracorporeal dialysis procedures. Nonetheless, as occurs with ventilators, this task has been hampered by a shortage

of machines in the local market. Three campaign hospitals with an overall capacity of 2300 beds were built in the city. One of these is located in a traditional soccer stadium (Pacaembu Stadium). Seven hundred health professionals have been hired to work in these places. There are still concerns about whether we will have enough dialysis machines and trained personnel to meet the needs. As an alternative to continuous RRT, we have prepared a backup program of sustained low-efficiency daily dialysis using conventional hemodialysis machines in 8-hour sessions.

Approximately 75%–80% of the ICU beds in public hospitals have been occupied by patients with COVID-19 in the past 2 weeks, and it has been difficult to meet the increasing demand for hemodialysis of patients with AKI. Because we are still in the ascending curve of the number of new cases, uncertainty remains whether we will succeed in this endeavor.

Author Contributions

M.d.S. Durão and R. Sesso conceptualized the study and were responsible for data curation, investigation, and methodology; R. Sesso wrote the original draft; and M.d.S. Durão reviewed and edited the manuscript.

Disclosures

All authors have nothing to disclose.

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