

## Infection Control Measures in Dialysis Units during COVID-19 Pandemic

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The world is passing through a serious pandemic caused by the novel coronavirus (COVID-19). The clinical course of infection is widely variable ranging from asymptomatic presentation to multi-organ system failure and death [1,2]. Comorbidities as hypertension, cardiovascular diseases, acute and chronic kidney diseases in COVID-19 patients portend poor outcome and are associated with high mortality rate [3-5].

Notwithstanding, end-stage renal disease (ESRD) patients on dialysis are often elderly who suffer from multiple comorbidities and hence susceptible to higher risk of severe COVID-19 infection and mortality. A minimum of 12 hours per week are spent by this population in dialysis centers. Strict infection control measures to limit spread of COVID-19 infection in dialysis units need to be implemented.

Frequent hand washing is considered a preventive measure against COVID-19 infection [6]. However, there is some debate about the role of hand hygiene in preventing the transmission of COVID-19 infection [7]. Some authors suggested avoiding frequently repeated hand washing as this may lead to skin damage and create a route of entry for the virus [8].

Dialysis patients should be encouraged to report any suspicious symptoms by phone before they come. Screening for risk factors, symptoms and signs of infection including recording of tempera-

ture in dialysis patients once they arrive to their dialysis unit's triage area is recommended. Common alerting symptoms include fever (98%), dry cough (76%), dyspnea (55%), myalgia or fatigue (44%). Less commonly reported symptoms but of valid importance include sputum production, hemoptysis, headache and diarrhea [9]. Exposure to risk factors including history of travel or residence in areas with high prevalence of COVID-19 infection such as USA, Europe and China, contact with confirmed cases, history of contacting patients with respiratory symptoms or fever within the past 2 weeks merit serious attention [10]. Nevertheless, the absence of the aforementioned risk factors certainly does not rule out COVID-19 infections and regardless, precautions should be taken with any patient with suspicious symptoms.

If a dialysis patient is found to have suspicious symptoms, the infection control team should be contacted. If there is any suspicion of COVID-19 infection, the patient should wear N95 or a surgical mask. If COVID-19 infection is highly suspected further investigations should be done. Surgical masks can reduce or prevent transmission of viral respiratory infections from infected patients including COVID-19. It is essential for dialysis patients having any respiratory symptoms to wear N95 or surgical masks [11]. What about asymptomatic dialysis patients? Generally speaking, unless you are ill, caring for a COVID-19 patient or a health care worker, medical masks are not recommended [12]. However, dialysis pa-

tients are vulnerable patients, and dialysis facilities are high risk areas, so it seems reasonable that wearing masks by all dialysis patients may protect against COVID-19 infection [11]. Another issue to be taken into consideration is the shortage of masks, so we suggest that whether all dialysis patients are instructed to wear masks or not, is to be a decision taken by the health care workers at dialysis facilities based on the availability of masks. Patients need to be educated about wearing masks properly. Hands need to be washed with an alcohol based hand sanitizer or with water and soap before putting on and after removing the mask. The front of the mask and the face should not be touched while putting on or removing the mask [12].

Dialysis patients who are found on screening to have high suspicion of COVID-19 infection, should be further investigated. Complete blood count (CBC) should be done to look for lymphopenia. Lymphopenia is present in around 80% of COVID-19 patients [13]. Chest computerized tomography (CT) also should be done. Typical CT findings include bilateral consolidative and ground glass pulmonary opacities. Ground glass opacities are seen in 86% of CT scans done for COVID-19 patients. Lymphadenopathy, lung cavitation and pleural effusion are usually absent [14]. Swabs should be taken and polymerase chain reaction (PCR) should be done especially if the CBC and the CT chest are suggestive of COVID-19 infection. However, PCR is a good positive, but not a good negative test [15]. Even if the PCR is negative, extreme precautions should be taken with patients whose CBC and CT chest are suggestive of COVID-19 infection.

Dialysis patients who are highly suspected or confirmed to have COVID-19 infection are preferably sent to isolation hospitals with dialysis units. However, this may differ from country to country according to degree of spread of COVID-19 infection. In some countries with very large numbers of COVID-19 cases, dialysis facilities need to have their protocols to deal with patients with confirmed or suspected COVID-19. Apart from wearing N95 or surgical masks as mentioned previously, measures should be implemented to minimize the contact of these patients with other patients and health care workers. These patients should be dialyzed at a separate shift, possibly night shift or in separate room if possible. If this is not possible, these patients should be dialyzed in the same area in the dialysis unit. If there are free dialysis machines available, they should be next to these patients, in order to minimize the

contact between non-infected and infected dialysis patients. Contact between medical personnel and confirmed or suspected COVID-19 cases should be minimized. Medical personnel need to take extreme precautions with these patients. They need to wear N95 mask, googles, shields and gowns while dealing with suspected or confirmed COVID-19 cases. Disinfection practices should be strictly used. Dialysis machine and equipment need to be disinfected including the stethoscopes and blood pressure cuffs.

Regarding COVID-19 confirmed dialysis patients who are sent to isolation hospitals, they can return to their original dialysis units as per centers for disease control and prevention (CDC) recommendations according to symptom-based strategy, time-based strategy and test-based strategy. According to symptom-based strategy, transmission-based precautions can be discontinued if 10 days have passed since symptoms first appeared and at least 3 days have passed since the resolution of fever without use of antipyretics and improvement of respiratory symptoms. According to time-based strategy, precautions can be discontinued in asymptomatic patients, 10 days after the first COVID-19 positive test. According to test-based strategy, precautions can be discontinued after negative results of an FDA Emergency Use Authorized COVID-19 molecular assay for detection of SARS-CoV-2 RNA from at least two consecutive respiratory specimens collected  $\geq 24$  hours apart [16]. We don't recommend following the test-based strategy, since in some patients the test may remain positive for several weeks while they are completely asymptomatic due to prolonged shedding of the virus. We recommend following the time-based and the symptom-based strategies.

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