

Prevention of the Emerging COVID-19 Infection in Dialysis Centers

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Abstract

COVID-19, a disorder caused by a novel coronavirus, is a major global human threat. Patients with end stage renal disease and those undergoing dialysis constitute a susceptible population because of their less efficient immune system. Hemodialysis wards are considered as a high-risk area in the outbreak of a COVID-19 epidemic, therefore prevention plays a key role which is essential in the mitigation and containment of the COVID-19 outbreak in hemodialysis centers. We try to classify prevention guidelines concisely in this article for easier implementation.

Keywords: COVID-19; Nephropathy; Dialysis; Prevention.

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Introduction

SARS-CoV-2 (COVID-19), a disorder caused by a novel coronavirus, is a major global human threat. The global pandemic COVID-19 quickly affected the delivery of health care worldwide. The epidemic of COVID-19 was declared a pandemic by the World Health Organization in 11 March 2020 (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>) (1). Iran is one of the countries in which the infection has spread rapidly. This virus has a high mortality especially in the elderly and in the presence of comorbid conditions. Patients with end stage renal disease (ESRD) and those undergoing dialysis constitute a susceptible population because of their less efficient immune system, and they are therefore more prone to develop severe viral and bacterial infections than the general population (2,3). Hemodialysis wards are considered as a high-risk area in the outbreak of a COVID-19 epidemic, therefore ESRD patients on hemodialysis who have to attend the ward two to three sessions per week are exposed to a higher contamination risk (4).

At hemodialysis wards in which several patients have to undergo simultaneous dialysis in an enclosed and limited space, our objective must be to ensure the protection of patients, the healthcare team and the dialysis ward.

The lack of valid knowledge about the natural history of the disease, the fact that even asymptomatic or oligo-symptomatic cases may spread the virus, and the possibility of reinfection, further complicate the prevention strategy (5,6,7).

The few data in the literature about the patients with ESRD and COVID-19 suggest that the inflammatory reaction may be less severe and, as a consequence, these group of patients may have mild symptoms and signs, especially in the early stages of the disease, with a higher risk of spreading the virus in the dialysis ward (8).

According to Lombardy experience in Italy, 9.5% of dialysis patients were found to be infected. They started isolation protocol and the rigidly implemented isolation measures were effective and no other patient has developed a clinical picture

thereafter. There was no mortality in their cases and none of the staff was infected (9). A case series from China showed that thirty-seven out of 230 patients were infected with COVID-19 (16%) and of which 6 patients died (mortality rate about 16%) (10). Our study in Mofid Children's Hospital, a referral pediatric hemodialysis center in Tehran, showed a prevalence of 11% for clinical infection with no mortality in our patients and no infection in dialysis staff too.

There are a number of recommendations for prevention of this emerging viral infection (1,11,12,13). We try to classify them concisely in this article for easier implementation. Prevention plays a key role which is essential in the mitigation and containment of the COVID-19 outbreak in hemodialysis centers.

Recommendations for healthcare team

It is very important to involve and inform the healthcare team so that they do not underestimate the risk of this viral infection, considering that patients with ESRD can have subtle manifestations (8). In this case prevention has multiple objectives: avoiding the spread of viral infection from patient to patient; preventing nurses and physicians from contributing to the spread of infection; avoiding the collapse of healthcare services that would result if a high number of healthcare staff had to be quarantined.

"Because healthcare-associated transmission and infection of healthcare workers are a major problem, the Center for Disease Control in the United States recommend that healthcare workers use personal protective equipment (PPE) and implement standard, contact, and airborne precautions including eye protection. The indications are however not fully clear, and may differ across countries (8)".

Updated clinical knowledge of the COVID-19 epidemic, prevention tools and guidelines should be available for dialysis ward healthcare team consisting of dialysis physicians, nursing staff and technicians. A variety of instructions include:

- How to use the different types of face masks
- How to use tissues to cover the nose and mouth during sneezing or coughing

- How to dispose of tissues and contaminated items in waste receptacles
- How to take off personal protective equipment
- How and when to perform hand hygiene
- Self-monitoring of symptoms by the staff members (symptom or symptoms suggestive of COVID-19 infection)
- Sick member or members of the team should stay at home, and should not be in contact with patients or the other staff members
- Protection of personnel and PPE should be strictly undertaken when dealing with symptomatic patients and taking the nasopharyngeal samples and also during dialyzing proved cases of COVID-19, therefore the use of filtering face piece 2 mask (FFP2) which filters 95% of particulate matter, goggles, mobcap, disposable surgical gowns and gloves are very important (1).

Recommendations for dialysis patients

Patients with ESRD should know that clinical manifestations of COVID-19 infection can be subtle (general malaise, fatigue, low fever and cold or flu-like manifestations), especially in the early stages of the disease. Therefore dialysis staff should be knowledgeable about all the related typical medical symptoms before entering the dialysis department. Dialysis facilities should provide patients with instructions about:

- How to maintain good hand hygiene.
- How to maintain respiratory health and cough precautions.
- How to put on and take off facemasks.
- How to use tissues to cover the nose and mouth when coughing or sneezing.
- How to dispose of tissues, disposable paper and contaminated items in sanitary trash can.

Patients must be encouraged and also educated:

- Performing hand hygiene at least on entering and leaving the unit
- Staying at home on their non-dialysis days and when they are off dialysis

- Using private transport to hospital and avoiding public transportation
- Avoiding trips around the country
- Avoiding personal contact and public events of any kind whether be due to the religious or communicative reasons of any kind

Recommendation for dialysis facilities

Dialysis wards should provide the following facilities:

- Dialysis facilities should install dispensers of alcoholic solutions in waiting rooms and all patients should be told to use them.
- Dialysis patients should be informed to wash their hands and fistula arm (if it is available) before starting dialysis and the nurses should carefully disinfect the skin puncture areas.
- Dialysis facilities should have enough space in waiting rooms for ill patients to sit separately by at least two meters from one another.
- Medically stable patients might opt to wait in a personal vehicle or outside the healthcare building.
- Consider a distance of two meters between dialysis stations in dialysis wards
- Provide good air conditioning and ventilation to remove particles and aerosol droplets from the surrounding air
- A short evaluation should be made before a patient is allowed to enter the dialysis ward and body temperature should be systematically measured (systematically measuring the body temperature before and at the end of the dialysis session in all patients).
- It is advisable that each dialysis center organizes an isolated area for allowing sampling, screening and evaluation of these patients.
- Early recognition and isolation of individuals with manifestations of a respiratory problem including cough, fever, conjunctivitis or upper tract symptoms should be undertaken before they are allowed to enter into the dialysis ward.

- All suspected patients even those with subtle manifestations of the disease should be tested, (even with the possible subtle manifestation of the disease).
- Disinfection of the sampling room after sampling (patients should be either in a single-patient room or in a room dedicated to sampling)
- Screening for COVID-19 infection for all patients who need vascular access surgery.
- Operations on patients with confirmed or suspected COVID-19 infection must be carried out in a designated room with standard protection for medical staff.
- In the case of patients who have been in contact with family members or caregivers with suspected or obvious manifestations of COVID-19 infection, testing should be done as soon as possible.
- In patients with fever and signs of airways infection, the patient must be sent to the emergency room, or to a dedicated area, isolated from the dialysis ward, for evaluation and work-up before dialysis.

If the infectious disease specialist decides to carry out a nasopharyngeal swab, there are 3 possible situations:

1. While waiting for the result, the highly suspected patient should be treated for the presumed COVID-19 virus infection. If dialysis cannot be postponed, whenever possible, the patient must be hospitalized and dialyzed in an isolation room. If mobile dialysis water purification devices are available, they should be previously connected in one isolated rooms in the infectious diseases ward or COVID-19 ward (According to the center's experience, a CRRT machine or a portable hemodialysis machine can be considered as alternatives). For the dialysis care of these cases, health professionals should wear the personal protection advised for the care of the infected cases.
2. If the outcome of the swab is positive, the patient must remain in isolation and the dialysis should be continued in an isolation setting.

- Admission of patients with confirmed COVID-19 infection to an airborne infection isolation room (they should not receive dialysis in an outpatient dialysis facility)
 - Provision of complete protection for all personnel involved in the direct care of patients affected by COVID-19, including long-sleeved waterproof isolation clothing, hair caps, goggles, gloves and medical masks (FFP2 or FFP3 mask if available) filtering 95–99% of particulate matter and aerosols in inhaled air.
 - Disinfection of all equipment after dialysis of a confirmed or highly suspected case of novel coronavirus infection. Areas in close contact with these infected patients must not be available to the other patients until disinfected.
 - Dialysis of symptomatic patients in a separate isolation room with a negative pressure atmosphere (Otherwise, they should wait in a separate isolation room and receive dialysis in the last shift of the day until infection is excluded and they should wear a proper (surgical or N95) mask filtering 95% of the particulate matter < 2.5 µm in the aerosol of exhaled air.
3. If the outcome of the swab is negative, the patients can return to the outpatient dialysis facility (for highly suspected patients it is better to obtain two negative nasopharyngeal swab results before referring the patient to the ordinary setting).

Totally Isolation practices can be effective for preventing secondary transmission of viruses closely related to COVID-19 (14).

Conclusion

In conclusion hemodialysis wards are considered as a high-risk area in the outbreak of a COVID-19, therefore isolation and prevention play as key role which is essential in the mitigation and containment of the COVID-19 outbreak in hemodialysis centers.

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Conflict of Interest

The authors declare no conflicts of interest.

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