

Guidelines for Dialysis with Reference to COVID-19

Note: Most of the parts of the guideline has been accepted by Ministry of Health and Family Welfare (MOHFW), Government of India and has been put on the website of MOHFW <https://www.mohfw.gov.in/pdf/RevisedGuidelinesforDialysisofCOVID19Patients.pdf>. Last accessed on 15 May 2020.

COVID-19, a disease caused by a novel corona virus (SARS CoV-2), is currently a pandemic, which produces high morbidity in the elderly and in patients with associated comorbidities. Chronic kidney disease stage-5 (CKD-5) patients on dialysis [maintenance hemodialysis (MHD) or continuous ambulatory peritoneal dialysis (CAPD)] are also vulnerable group because of their existing comorbidities, repeated unavoidable exposure to the hospital environment, and immunosuppressed state due to CKD-5. These patients are therefore not only more prone to acquire infection but also develop severe diseases as compared to general population.^[1,2]

Patients on regular dialysis should adhere to prescribed schedule and not miss their dialysis sessions to avoid any emergency dialysis.^[2,3]

There will be three situations of patients who require dialysis; patients already on maintenance dialysis, patients requiring dialysis due to acute kidney injury (AKI) and patients critically ill requiring continuous renal replacement therapy (CRRT).

General Guidelines for Administration^[3,4]

1. State/UT should identify and earmark atleast one hemodialysis facility with adequate number of dialysis machines, trained staff, reverse osmosis (RO) water system and other support equipment as preparatory fixed-point dialysis unit in case of rise of COVID-19 epidemic
2. Health departments may issue directives to the district administrations allowing easy movements of these patients (with one attendant) to dialysis facility. Patients who do not have private vehicles, government run transport system should be organized for facilitating transport of these patients. Patients should use their hospital papers as pass to commute to the dialysis unit
3. District administration should ensure that service providers for the dialysis consumables, both for MHD and CAPD should be allowed to deliver the material to the hospital or home as the case may be.

General Guidance for Dialysis Unit^[3-5]

1. Adequate medical supplies such as dialysate, dialyzers and tubing, catheters, fistula needles, disinfectant and medicines, etc., must be ensured in adequate quantity

2. A sign board should be posted prominently in the local understandable language as well as Hindi and English asking patients to report any fever, coughing or breathing problem in dialysis unit and waiting area. The information including images for education can be obtained on the International Society of Nephrology website <https://www.theisn.org/covid-19>
3. All hemodialysis units should educate their personnel in hemodialysis units; including nephrologists, nurses, technicians, other staff and all patients undergoing MHD along with their care givers about COVID 19
4. We recommend that All universal precautions must be strictly followed
5. All staff should strictly follow hand hygiene (seven steps) with soap and water for 20 s before handling any patient and in between two patients. If soap and water are not readily available, use a hand sanitizer that contains at least 60% alcohol. If hands are visibly soiled or dirty, they should be first washed with soap and water and then an alcoholic hand rub used. Avoid touching your eyes, nose, and mouth with unwashed hands
6. Medical and support staff treating infected patients should be monitored for COVID infection at the dialysis facility and should take necessary action if found infected
7. Dialysis units should organize healthcare workers shift duties in a way that work of dialysis unit is not affected
8. All hemodialysis units should be aware of the testing, triage, and notification policy recommended by the local health authorities, regional medical councils and the Union Ministry of health and Family welfare
9. Some of the dialysis unit staff should be trained for donning and doffing of Personal Protective Equipment (PPE) so that they can be used for treatment of COVID-19 positive patients
10. All staff should be trained for cough etiquette, hand hygiene and proper use and disposal of mask, gown, and eye glasses and the need to protect themselves
11. All patients with suspected COVID-19 be tested as per the local health authorities' guidelines
12. Patients with suspected or positive COVID-19 should be referred to COVID-19 care team as per local guidelines.

Guidelines for Hemodialysis

- I. For Patients^[2,4,5]
 - a. Before Arrival to Dialysis Unit
 1. All units should instruct their patients to recognize early symptoms of COVID-19 (Recent onset fever, Sore throat, Cough, recent Shortness of breath/dyspnea, without major interdialytic

weight gain, rhinorrhea, myalgia/bodyache, fatigue, and Diarrhea) and contact dialysis staff before coming to dialysis center. The unit needs to make necessary arrangement for their arrival in the screening area.

2. Patients, who are stable on MHD may be encouraged to come to the unit alone without any attendant
- b. Screening Area
1. We recommend that dialysis unit should have a designated screening area, where patients can be screened for COVID-19 before allowing them to enter inside dialysis area
Where this is not possible, patients may wait away from the dialysis unit until they receive specific instructions from the unit staff
 2. The screening area should have adequate space to implement social distancing between patients and accompanying persons while waiting for dialysis staff. In screening area, every patient should be asked about:
 - Symptoms suspected of COVID-19 as above.
 - History of contact with a diagnosed case of COVID 19
 - History of contact with person who has had recent travel to foreign country or from high COVID-19 prevalence area within our country as notified by the Central and state governments respectively.
 3. Patients with symptoms of a respiratory infection should put on a facemask before entering screening area and keep it on until they leave the dialysis unit. Dialysis unit staff should make sure an adequate stock of masks is available in screening area to provide to the patients and accompanying person if necessary.
- c. Inside Dialysis Unit
1. Suspected or positive COVID-19 patients should properly wear disposable three-layer surgical mask throughout dialysis duration
 2. Patients should wash hands with soap and water for at least 20 s, using proper method of hand washing. If soap and water are not readily available, a hand sanitizer containing at least 60% alcohol can be used
 3. Patients should follow cough etiquettes, like coughing or sneezing using the inside of the elbow or using tissue paper.^[3] This may be displayed in pictures which are available from the CDC website <https://www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/dialysis.html>
 4. Patients should throw used tissues in the trash. The unit should ensure the availability of plastic lined trash cans appropriately labeled for

disposing of used tissues. The trash cans should be foot operated ideally to prevent hand contact with infective material.

II. For Dialysis Staff

a. Screening Area

1. The unit staff should make sure an adequate stock of masks and sanitizers are available in screening area to provide to the patients and accompanying person if necessary.

b. During Dialysis

1. We suggest to ensure that a patient and staff in a unit does not become the source of an outbreak
2. Each dialysis chair/bed should have disposable tissues and waste disposal bins to ensure adherence to hand and respiratory hygiene, and cough etiquette and appropriate alcohol-based hand sanitizer within reach of patients and staff
3. Dialysis personnel, attendants and caregivers should also wear a three-layer surgical facemask while they are inside dialysis unit
4. Ideally all patients with suspected or positive COVID-19 be dialyzed in isolation. The isolation ideally be in a separate room with a closed door, but may not be possible in all units. The next most suitable option is the use of a separate shift, preferably the last of the day for dialyzing all such patients. This offers the advantage of avoiding long waiting periods or the need for extensive additional disinfection in between shifts. The next suitable option is to physically separate areas for proven positive and suspected cases. Where this is also not possible, we suggest that the positive or suspected patient may be dialyzed at a row end within the unit ensuring a separation from all other patients by at least 2 meters
5. Staff caring for suspected or proved cases should not look after other patients during the same shift
6. Dialysis staff should use of all personal protective equipment (PPE) for proven or strongly suspected patients of COVID-19. We suggest that isolation gowns should be worn over or instead of the cover gown (i.e., laboratory coat, gown, or apron with incorporate sleeves) that is normally worn by hemodialysis personnel. If there are shortages of gowns, they should be prioritized for initiating and terminating dialysis treatment, manipulating access needles or catheters, helping the patient into and out of the station, and cleaning and disinfection of patient care equipment and the dialysis station. We suggest that sleeved plastic aprons be used in addition to and not in place of the PPE recommended above
7. We suggest separating equipment like stethoscopes, thermometers, Oxygen saturation

- probes, and blood pressure cuffs between patients with appropriate cleaning and disinfection in between shifts
8. Stethoscope diaphragms and tubing may be cleaned with an alcohol-based disinfectant including hand rubs in between patients. As most NIBP sphygmomanometer cuffs are now made of rexine they may also be cleaned by alcohol or preferably hypochlorite-based solutions however the individual manufacturers manuals may be referred to
 9. Staff using PPE should be careful for following issues:
 - While using PPE, they will not be able to use wash room so prepare accordingly
 - After wearing eye shield, moisture appears after some time and visibility may become an issue. Therefore, machine preparation can be done in non-infected area before shifting to near the patient
 - If dialysis is to be done bed-side in the hospital, portable RO should be properly disinfected with hypochlorite solution between use of two patients.
- As an alternative 10 g of household bleaching powder can be dissolved in a liter of water and used for a period of 24 h.
 - Alcohol-based solutions
 - Ensure solution has at least 60% alcohol. Appropriate commercially available solutions include Aerodosin a mixture of isopropanol, glutaraldehyde, and ethanol or lysoformin a mixture of formaldehyde and glutaraldehyde
 - Wear unsterile but clean disposable gloves when cleaning and disinfecting surfaces. Gloves should be discarded after each cleaning. If reusable gloves are used, those gloves should be dedicated for cleaning and disinfection of surfaces for COVID-19 and should not be used for other purposes. Clean hands by above method immediately after gloves are removed
 - For soft (porous) surfaces such as carpeted floor, rugs, and drapes, remove visible contamination if present and clean with appropriate cleaners indicated for use on these surfaces. After cleaning launder items as appropriate in accordance with the manufacturer's instructions. If possible, launder items using the warmest appropriate water setting for the items and dry items completely
 - Wear disposable gloves when handling dirty laundry from an ill person and then discard after each use. Do not shake dirty laundry. This will minimize the possibility of dispersing virus through the air
 - Clean and disinfect clothes buckets or drums according to guidance above for surfaces. If possible, consider placing a bag liner that is either disposable (can be thrown away) or can be laundered.

Disinfection and Disposal Practices in Dialysis Unit

- We recommend that that bed linen be changed between shifts and used linen and gowns be placed in a dedicated container for waste or linen before leaving the dialysis station. Disposable gowns should be discarded after use. Cloth gowns should be soaked in a 1% hypochlorite solution for 20 min before sluicing and then be transported for laundering after each use
- We recommend that inside unit, clean and disinfect frequently touched surfaces at least thrice daily and after every shift. This includes bedside tables and lockers, dialysis machines, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, and sinks
- We recommend that solutions for disinfection be composed either of hypochlorite, alcohol, formaldehyde, or glutaraldehyde for disinfection of surfaces in accordance with the manufacturer's instructions. A more complete list of all disinfectants approved by the CDC is available on the CDC website <https://www.cdc.gov/coronavirus/2019-ncov/infection-control/control-Recommendations.html>. Almost all common disinfectant solutions are effective in killing the virus on surfaces, the key is effective and frequent cleaning.
- Bleach solution
 - Mix 1 Lof Medichlor with 9 L of water. This solution can be used for upto 24 h after which it should be discarded and a fresh solution prepared

Dialysis Patient with Acute Kidney Injury

A small proportion of patients (~5%) of COVID develops AKI. The disease is usually mild but a small number may require RRT. In addition, even smaller proportion of patients with secondary bacterial infection will have septic shock, drug nephrotoxicity, or worsening of existing CKD severe enough to require RRT^[6,7]

- We suggest that all modalities of RRT may be used for patients with AKI depending on their clinical status
- Patient admitted in other ward of the hospital with AKI should be preferably given bedside dialysis rather than shifting patient in main dialysis unit
- In such situation portable reverse osmosis water in a tank will serve the purpose for the dialysis
- If more dialysis is expected in selected area, dialysis machine may be left in the same area for future dialysis.

Continuous Renal Replacement Therapy (CRRT)

- CRRT machines are free standing and can function

anywhere in the hospital using sterile bagged replacement fluid and dialysate, but operating costs are high.

Other Extracorporeal Therapy for Covid-19

- Use of cytokine removal therapies with Cytosorb, Oxiris, and other similar devices is unproven and is not recommended except in the context of a clinical trial
- Cytokine storm associated with elevated levels of IL-6, IL-18, and IFN gamma are associated with more severe disease and higher mortality. Extracorporeal therapies using high volume hemofiltration or adsorption to decrease cytokine levels may theoretically be expected to confer benefit and 1 study of HVHF at 6 L/h showed cytokine reduction and improvement in SOFA scores in septic patients.^[8-10]

Peritoneal Dialysis

1. Patients already on CAPD
 - Patients who are already receiving peritoneal dialysis (PD) treatment have the relative advantage over patients who are receiving hospital or satellite-based haemodialysis treatment as they will not be exposed to hospital environment. This will reduce their exposure to infection. However, they should arrange their delivery of supply well in time to avoid missing dialysis exchanges
 - Used dialysis bags and tubing should be properly disposed using 1% hypochlorite solution first and disposed in a sealed bag. Used dialysis fluid should be drained in the flush.
2. New patient planned for CAPD
 - It will be difficult to maintain a service that can commence new patients on PD, mainly through a lack of healthcare worker to insert PD catheter and to provide the intensive training required. Therefore, initiation of new patient should be avoided.
3. Acute PD
 - Use of acute peritoneal dialysis can be lifesaving and should be used as and when required and, in the setting, where hemodialysis facility is not available. Healthcare worker should use all precaution while initiating acute PD and discard used consumable properly.

Personal Protective Equipments (PPE)

Personal protective equipment must be used while dialyzing COVID-19 positive patients. These include:

- Shoe covers
- Gown
- Surgical cap or hood
- Goggles or eye shields
- Mask: Ideally all masks should be N95 respirators

with filters. However, as the life of such masks is approximately 6–8 h and they can be uncomfortable over a long term and are also in short supply they should be prioritized for aerosol generating procedures, namely intubation, open suction, and bronchoscopy. Surgical triple layer masks and cloth masks can be used as alternatives for all other procedures

- Surgical gloves.

The correct method of donning and doffing personal protective equipment's (PPE) can be viewed on YouTube at https://www.youtube.com/watch?v=kKz_vNGsNhc. However, it is always better to give hand on training of donning and doffing to staff who is going to handle suspected or positive patients.

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There are no conflicts of interest.

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