

Protocols to be followed for patient undergoing ozone Dialysis with COVID-19 Infection

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Abstract

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a global pandemic, which has affected a variety of medical treatments like patients with ESRD undergo ozone dialysis. End-Stage Renal Disease (ESRD) is a medical condition in which a person's kidneys cease functioning on a permanent basis leading to the need for a regular course of long-term dialysis or a kidney transplant to maintain life. During pandemic, dialysis facilities need to continuously operate to cater to the constant need of patients who undergo dialysis treatment, three times a week. According to the Association for the Advancement of Medical Instrumentation, ozone is the most effective method to destroy microorganisms, and to prevent, reduce or remove the biofilm. This study aims to review the literature on the application of ozone in the disinfection of water treatment systems for hemodialysis. Infection prevention measures are important in dialysis facilities because patients and dialysis staff and waiting rooms. Dialysis patients are more immunocompromised and are therefore at risk for SARS-CoV-2 infection and its direct complications. AKI in this setting is associated with worse outcomes, including the requirement for vasopressors or mechanical ventilation and death. Performing RRT in those with AKI poses challenges, such as limiting exposure of staff, preserving PPE, coagulopathy, and hypoxemia due to acute respiratory distress syndrome. Continuous RRT is the preferred modality, with sustained low-efficiency dialysis also an option, both managed without 1:1 ozonedialysis nursing support.

Key words; Covid 19, End Stage Renal Disease (ESRD), dialysis, ozone dialysis, personal protective equipment,

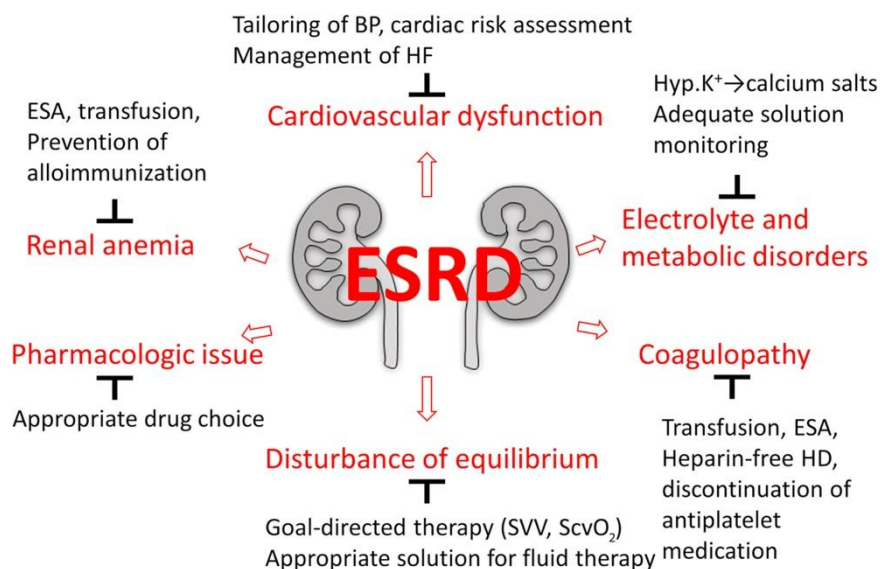
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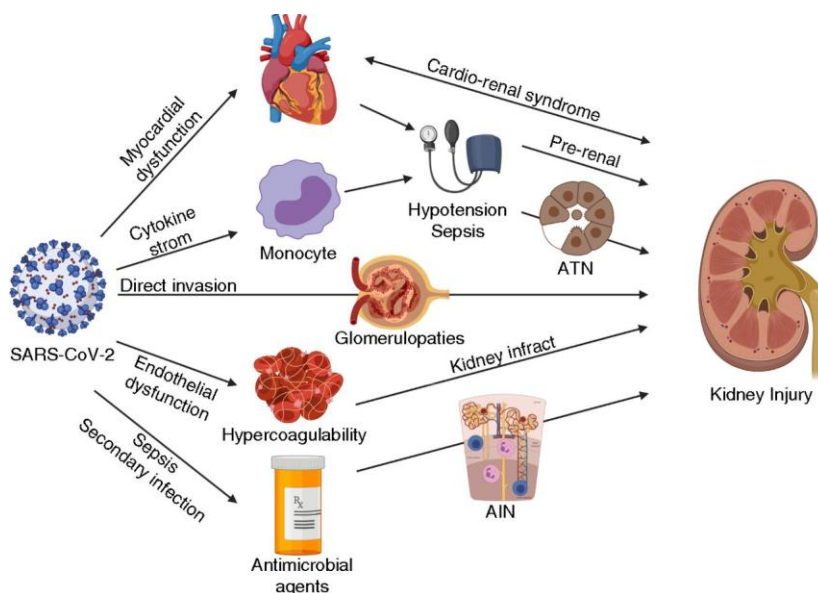
I. Introduction

COVID-19 is a disease caused by a corona virus (SARS CoV-2), and currently it is a pandemic, which produces high mortality and morbidity in the aging and in patients with chronic diseases. End Stage Renal Disease (ESRD) patients on dialysis [maintenance hemodialysis (MHD) with ozone dialysis] are also vulnerable group because of their prevailing comorbidities, frequent inevitable contact to hospital setting and their immunosuppressed state due to ESRD. They are more susceptible to get infection but also develop severe diseases when compared to other people. Ozone therapy consists of the introduction of ozone into the body via various methods, usually involving its mixture with various gases and liquids before injection, with potential routes including the vagina, rectum, intramuscular (in a muscle), subcutaneously (under the skin), or intravenously (directly into veins). Ozone can also be introduced via autohemotherapy, in which blood is drawn from the patient, exposed to ozone and re-injected into the patient

Pathogenesis of ESRD



Mechanism of Covid 19 and renal injury



ESRD Patients on regular hemo dialysis with ozone dialysis should follow a prescribed schedule and not miss their dialysis sessions to avoid any crisis dialysis.











General instructions to be followed in dialysis unit


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 Tamil and English asking patients to report any fever, coughing or breathing problem in dialysis unit and waiting area.
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. All universal precautions must be strictly followed.
5. All staff should strictly follow hand hygiene (seven steps) with soap and water for 20 second 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 Union Ministry of health and Family welfare and those by State/ UT Health Departments as well as District health authorities.
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 them.
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

How can we reduce transmission of COVID-19 in haemodialysis centres?

This review from the Eudial Working Group of ERA–EDTA provides recommendations for the prevention, mitigation and containment of the emerging SARS-CoV-2 (COVID-19) pandemic in haemodialysis centres

Recommendations for the healthcare team	Recommendations for dialysis patients
 Be trained in use of personal protective equipment  Inform your team leader if symptomatic or in contact with a case  Stay home if unwell  Use full personal protective equipment when caring for confirmed cases	 Be provided with clear instructions on appropriate hand and respiratory hygiene  Should perform hand hygiene on arrival and departure from the dialysis unit  Body temperature should be checked before the start and end of dialysis sessions  Should inform staff of symptoms in advance of arrival at the dialysis unit  Should be instructed to self-isolate  Symptomatic patients should be dialyzed in a separate isolation room


Basile, C. et al. NDT (2020) @NDTSocial

Covid 19 screening for dialysis patients and dialysis staff

	For Patients	For dialysis staff
Before Arrival to Dialysis Unit	<p>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 inter- dialytic weight gain, rhinorrhea, myalgia/bodyache, fatigue and Diarrhea)and contact dialysis staff before coming to dialysis center.</p> <p>The unit needs to make necessary arrangement for their arrival in the screening area</p> <p>Patients, who are stable may be encouraged to come to the unit alone without any attendant</p>	Dialysis staffs also recognize the early signs and symptoms of Covid 19, so that they can prevent spread of infection from them.
Screening Area	<p>Patients can be screened for COVID-19 before allowing them to enter inside dialysis area.</p> <p>The screening area should have adequate space to maintain social distancing between patients</p> <p>History of contact with a diagnosed case of COVID 19</p> <p>History of contact with person who has had recent travel to COVID-19 prevalence area within our country.</p> <p>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.</p> <p>Dialysis unit staff should make sure an adequate stock of</p>	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.

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	masks is available in screening area	
	There should be display of adequate IEC material (posters etc.) about COVID – 19 in the screening area.	
Inside dialysis Unit	Suspected or positive COVID-19 patients should properly wear disposable three-layer surgical mask throughout dialysis duration.	It should be ensured that a patient or staff in a unit does not become the source of an outbreak.
	Patients should wash hands with soap and water / hand sanitizer for at least 20 seconds, using proper method of hand washing	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.
	Patients should follow cough etiquettes	Dialysis personnel, attendants and caregivers should also wear a three-layer surgical facemask while they are inside dialysis unit.
	Patients should throw used tissues in the trash. The trash cans should be foot operated ideally to prevent hand contact with infective material	Ideally all patients with suspected or positive COVID-19 are dialyzed in isolation.
	There should be display of adequate IEC material (posters etc.) about COVID – 19 in the dialysis area.	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
		Staff caring for suspected or proved cases should not look after other patients during the same shift.
		Dialysis staff should use of all personal protective equipment (PPE) for proven or strongly suspected patients of COVID-19.
		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.
		Separating equipments like stethoscopes, thermometers, Oxygen saturation probes and blood pressure cuffs between patients with appropriate cleaning and disinfection should be done in between shifts.
		Stethoscope diaphragms and tubing should be cleaned with an alcohol-based disinfectant including hand rubs in between patients.
		As most NIBP sphygmomanometer cuffs are now made of rexine they should also be cleaned by alcohol or preferably hypochlorite- based (1% Sodium Hypochlorite) solutions however the individual manufacturer’s manuals should be referred to.
		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
	Staff using PPE should be careful of the following issues: If dialysis is to be done bed-side in the hospital, portable RO should be properly disinfected with hypochlorite (1% Sodium Hypochlorite) solution between use of two patients	

Role of nurse in disinfection and disposal practices in dialysis unit

1. Bed linen should 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.
2. Cloth gowns should be soaked in a 1% hypochlorite solution for 20 minutes before sluicing and then be transported for laundering after each use.
3. Inside dialysis unit, clean and disinfect frequently touched surfaces at least thrice daily and after every shift. This includes bedside tables and lockers, dialysis machines, door knobs, light switches, counter tops, handles, desks, phones, keyboards, toilets, faucets, and sinks etc.
4. It is recommended that solutions for disinfection be composed either of hypochlorite, alcohol, formaldehyde or glutaraldehyde for disinfection of surfaces in accordance with the manufacturer's instructions. Almost all common disinfectant solutions are effective in killing the virus on surfaces; the key is effective and frequent cleaning.
5. Bleach solution; Mix 1 liter of Medichlor with 9 liters of water. This solution can be used for up to 24 hours after which it should be discarded and a fresh solution prepared. As an alternative 10 Grams of household bleaching powder can be dissolved in a liter of water and used for a period of 24 hours.
6. Alcohol based solutions; Ensure solution has at least 60% alcohol. Appropriate commercially available solutions include Aerodisin a mixture of isopropanol, glutaraldehyde and ethanol or lysoformin a mixture of formaldehyde and glutaraldehyde can be used.
7. Wear unsterile but clean disposable gloves when cleaning and disinfecting surfaces. Gloves should be discarded after each cleaning.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.

Common Personal Protective Equipment (PPE)

The following Personal protective equipment must be used while dialyzing COVID-19 positive patients.



1. Shoe covers
2. Gown
3. Surgical cap or hood
4. Goggles or eye shields
5. Mask: Ideally all masks should be N95 respirators with filters. The life of such masks is approximately 6-8 hours 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.
6. Surgical gloves.

II. Conclusion

The effect of the COVID-19 pandemic has been felt in all facets of Dialysis patient management. There is still much to be learned, including the long-term kidney outcomes in patients with COVID-19-related renal damage. The best strategies for managing immunosuppression in ESRD patients with dialysis is unknown. The correct method of donning and doffing personal protective equipment's (PPE) can be always followed by all staffs working at dialysis unit. Regular plan on training of donning and doffing to staff that is going to handle suspected or positive patients will significantly reduce the transmission of covid 19 infection the health care members working in the dialysis unit. Similarly, strategies on how to best manage patients with ESRD receiving outpatient in-center dialysis or patients hospitalized with COVID-19. As new experiences and data become available, it becomes paramount to continue sharing and publication of evidence, and to be hyper vigilant in adjusting our practice to provide the best clinical care.

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