Institution Name: Directorate General of Specialized Medical Care, MoH

Document Title: Guideline of Management of the SARS-CoV-2 (COVID-19) Coronavirus Epidemic in Hemodialysis

Approval Process

	Name	Title	Institution	Date	Signature
Written by	Dr. Yaqoob Al Maimani	Nephrologist	Bausher RDC,	November /2020	Dr. Yaqoob Al-Maimani
	Dr. Fady Elias	Nephrologist	Ministry of Health	November /2020	Dr. Fady Elias
Reviewed by	Dr. Mohammed Al-Balushi	Director Hospital Affairs	Ministry of Health	November /2020	Dr. Mohammed Al-Balushi
Validated by	Dr. Qamra Al-Sariri	DG of QAC	Ministry of Health	December /2020	Dr. Qamra Al-Sariri
Approved by	Dr. Kadhim Sulaiman	DG of DGSMC	Ministry of Health	December /2020	

Contents Table:

Acknowledgement

On behalf of the Ministry of Health (MOH) and all nephrology and dialysis services in Oman, we would like to thank all health care providers for their valuable contribution and efforts to face the COVID-19 pandemic. We would like to express sincere appreciation to all nephrologists, staff nurses, and all employees and workers in all dialysis units in the sultanate.

In fact, all members of the medical teams in dialysis centers have proven their great commitment to face this novel disease in patients with chronic kidney disease who are considered very high risk indeed to develop various complications. This has not been an easy task and needed great efforts from all individuals in the dialysis facilities.

We really believe that; together we can face COVID-19 pandemic by working as a team to provide high quality care for our dialysis patients. Working guided by International and local guidelines is very important in our plan to face this disease during these unprecedented circumstances.

Acronyms:

SARS-CoV-2	severe acute respiratory syndrome - coronavirus
COVID-19	Coronavirus disease - 2019
PPE	Personal protective equipment
CDC	Center for Disease Control and Prevention
PCR	Polymerase chain reaction
FFP2	Filtering face piece 2
FFP3	Filtering face piece 3
RNA	Ribonucleic acid
RT-PCR	Reverse transcriptase – Polymerase chain reaction
DNA	Deoxyribonucleic Acid

Guideline of Management of the SARS-CoV-2 (COVID-19) Coronavirus Epidemic in Hemodialysis

1. Introduction

On January 31st 2020, the World Health Organization declared the outbreak of SARS-CoV-2 in China, a public health emergency of international dimension. According to the information provided by the China Center for Disease Control and in more recent publications, the majority of cases reported came from the Hubei province and in 80% the disease was mild. The proportion of deaths among confirmed cases has fluctuated between 2 and 3%, being higher in Hubei than in the rest of the country that reported a 0.4%. Most cases detected in China are older than 30 years, and among severe and deceased cases there is a high proportion of patients with comorbidities and advanced age.

To date the hemodialysis cases reported are from a Hubei hemodialysis center, in which 37 out of 230 dialysis patients, tested positive for COVID-19 in addition 4 of the 33 health personnel were also positive. Six patients with COVID-19 die (16.8%) mainly from cardiovascular causes, with less probability of developing pneumonia than the general population.

The contents of this guideline will include all necessary actions and regulations that would be implemented in the hemodialysis facilities to minimize the risk of infection with COVID-19 among chronic kidney disease patients and health care providers.

The implementation of safe work practices to limit exposure to COVID-19 at work requires first assessing the risks. This means putting in place control measures to first eliminate the risk and if this is not possible, minimize worker exposure. Start first with collective measures and, if necessary, supplement them with individual measures, such as personal protective equipment (PPE).

2. Scope

2.1 The scope of this document is applicable to all dialysis units and healthcare institutes in the Sultanate.

3. Purpose

3.1 The purpose of this guideline is to establish standard steps for the management of chronic kidney disease patients on hemodialysis during the COVID-19 pandemic, and to outline the role of health care providers to protect themselves and the patients from disease spread and other complications.

3.2 The guideline also outlines the practical steps to be applied in hemodialysis facilities to minimize the magnitude of such disease.

4. Definitions

4.1 **Personal protective equipment (PPE):** is equipment that will protect the user against health or safety risks at work. It can include items such as gowns, gloves, eye protection (googles), face masks, face shields, and other related items.

4.2 **Incubation period:** is the time elapsed between exposure to a pathogenic organism, and when symptoms and signs are first apparent. In a typical infectious disease, the incubation period signifies the period taken by the multiplying organism to reach a threshold necessary to produce symptoms in the host.

4.3 **Polymerase chain reaction (PCR):** is a process that amplifies a small, well-defined segment of DNA many hundreds of thousands of times, creating enough of it for analysis. Test samples are treated with certain chemicals that allow DNA to be extracted. Reverse transcription converts RNA into DNA. Reverse transcription polymerase chain reaction (RT-PCR) first uses reverse transcription to obtain DNA, followed by PCR to amplify that DNA, creating enough to be analyzed. RT-PCR can thereby detect SARS- CoV-2, which contains only RNA. The RT-PCR process generally requires a few hours.

5. Outcomes:

5.1 Reducing the prevalence of COVID-19 among dialysis patients and medical staff.

5.2 Applying appropriate management plan with patients infected with COVID-19.

5.3 Implementing the necessary isolation steps for infected patients, and following the specific precautions for suspected individuals.

6. Procedures

6.1 Management of the workforce

A crucial challenge; is management of human resources. Reports from areas with high numbers of infected patients describe excessive mental and physical burden on health-care workers. Moreover, reports suggest that in Italy, nearly 10% of people with COVID-19 are health-care personnel Therefore, efficient utilization of the workforce along with appropriate planning for peak disease activity is crucial. Actions that can be taken include surveying health-care workers for specific skill sets, creating alternate schedules, limiting prolonged exposure to clinical areas and arranging social support networks. Most importantly, each unit should plan for an increase in disease activity and a decrease in workforce due to illness by creating a list of back-up staff for all positions.

6.2 Management of resources

The possibility of a prolonged pandemic raises the very real threat of equipment shortage and supply chain deficiencies. Tracking of personal protective equipment (PPE) use and inventory at the level of the facility and the dialysis organization is advisable. Preserving and prioritizing PPE for health-care workers and patients is a challenge. Alternative solutions include recycling protocols, extended use of eye and face protective gear and alternative PPE production methods. The CDC has provided specific guidance for these options:

6.2.1 Patients who have shared a hemodialysis shift with infected patients:

6.2.1.1 Patients who have shared medical transport, have been less than 2m in the waiting room, or have been dialyzed in adjacent positions or beds (<2m or 2 seats) to patient with proven infection, will be considered close contacts and epidemiological surveillance agency must proceed for the screening for SARS-CoV-2 infection.

6.2.1.2 Since the incubation period is of 14 days, should these patients be treated as potentially infectious and during the period of "quarantine", he/she should be alert about symptoms and be isolated at home. He/she will be transported by ambulance individually with surgical gloves and mask. The patient will be dialyzed separated from the rest of the patients, preferably in the last shift of the day (if necessary, in night shifts), taking extreme measures of disinfection and subsequent cleaning of the hemodialysis facility.

6.2.1.3 If during this period symptom become evident (fever or cough or there is high clinical suspicion according to the attending physician), they will perform a respiratory smear to detect the virus by PCR, according to the protocol established for the detection, diagnosis and management of suspected cases.

6.2.1.4 Smear test is not indicated if the patient remains asymptomatic, unless the clinical suspicion is very high. PCR is not recommended in asymptomatic contacts because it is not sensitive for the diagnosis of a latent infection. Therefore, if the result is negative, it really does not rule out that he may become positive and the worse consequence would be an early decision to withdraw isolation measures based on "false security", putting at risk the rest of the patients and staff; if symptoms appear the test and isolation would have to be repeated. There is no test to rule out a latent infection, so the reasonable strategy would be to wait 14 days since the risk contact occurred, being under the basic isolation measures (gloves and masks for all patients), and do the test only if symptoms become apparent.

6.2.1.5 The isolation measures of these patients are the same as if they had the diagnosed infection: contact and drops isolation, so they can be in the same room as the infected, always trying to respect 2m of distance between one patient and another., and all must wear gloves and a surgical mask.

6.3 Management of infected patients.

6.3.1 Currently, many dialysis facilities direct symptomatic or COVID-19-exposed patients to hospitals to minimize exposure of uninfected patients in dialysis facilities; however, hospital resources are likely to rapidly reach capacity, with full emergency departments, inpatient beds, intensive care units and inpatient dialysis facilities.

6.3.2 Outpatient dialysis facilities must anticipate this likelihood and develop protocols and equipment to manage patients with confirmed or suspected COVID-19. Patients with COVID-19 symptoms or illness must wear appropriate face masks on arrival and at all times when in the dialysis facility.

6.3.3 Some dialysis organizations are developing cohort models to localize patients who are symptomatic or COVID-19 positive who might be transferred or admitted to different facilities to separate them from those who are asymptomatic or COVID-19 negative. When such arrangements are not available, patients with COVID-19 symptoms or illness should be grouped together in a specific section of the unit and dialyzed during the same shift, preferably the last of the day. Ideally, they should be dialyzed in a separate room from uninfected patients with the door closed. If a separate room is not available, foot traffic around these patients must be minimized by using corner or end-of-row stations. Symptomatic patients should be spaced at least 6 feet (2 m) apart in all directions. No requirement exists for patients with COVID-19 to be treated in an airborne infection isolation room. Furthermore, hepatitis B isolation rooms should not be used for patients with COVID-19 unless the facility does not have any patients on haemodialysis with hepatitis B infection.

6.3.4 A selected group of health-care workers should be assigned to patients with COVID-19 symptoms or illness and should follow standard contact and droplet precautions with eye protection (goggles or face shields). Routine cleaning and disinfection procedures are appropriate for COVID-19 in dialysis settings. Staff performing these functions should use the same PPE as those delivering dialysis treatments.

7. Specific recommendations of hemodialysis in patients affected by SARS-CoV-2 infection

7.1 Patients who do not require hospital admission will be dialyzed in the individual room designated for this purpose. Patients admitted to the hospital may undergo the hemodialysis session in the individual patient's room using portable hemodialysis monitor, as long as the room fulfill conditions of contact and drops isolation, with the staff using the recommended personal protective equipment (PPE) for COVID-19. If there is more than one patient with COVID-19, they can share the room.

7.2 Hepatitis B isolation rooms used to dialyze patients with hepatitis B positive surface antigen should be used for patients suspected of confirmed COVID-19 only if the patient is positive surface antigen for hepatitis B.

7.3 It is necessary to maintain a list of all health care personnel and patients who have been in contact with the patient. It is important to identify all healthcare personnel taking care of cases under study, probable or confirmed cases of coronavirus infection. The risk must be assessed individually by Occupational Health and the Epidemiological Surveillance Emergency Service. If the safety measures have not been followed, they will be considered close contacts and will be handled as such. To facilitate this task, it is convenient, as previously mentioned, that each nurse always have the same patients assigned in one shift.

7.4 Reusable or non-critical disposable equipment should be used for patient care (e.g., blood pressure cuffs). If the equipment has been used on the patient, the equipment must be cleaned and disinfected before using it on another patient according to the manufacturer's instructions.

8. Personal protective equipment (PPE) to perform hemodialysis on the patient with SARS-CoV-2 infection

In general, the medical care of patients with respiratory infections without a diagnosis should follow standard precautions to prevent contact and eye protection against drops, unless the suspected diagnosis requires precautions for airborne infections.

Evaluate equipment supplies available for individual protection, including masks FFP2 (Eye protection can include a surgical mask with a protective screen.

This includes the use of: ·

8.1 Waterproof gown covering 360 degrees, which should be worn over or instead of pajamas normally used by hemodialysis staff. This is particularly important when accessing a vascular access to connects and disconnects, helping the patient to get in and out of the room and cleaning the room. The same gown should not be used for the care of more than one patient, except if they are isolated together (cohort isolation) ·

8.2 Gloves, long if possible, to cover and close the sleeves of the gown.

8.3 Facial mask: mask FFP2 and surgical mask with screen.

8.4 Only when preparing to generate aerosols (nebulization, mechanical ventilation, bronchoscopy, suction of secretions), it is required the use requires mask FFP3 (with exhalation valve) and integral glasses of full protection.

8.5 The personal glasses and contact lenses are not considered appropriate eye protection. Reusable eye protection (e.g., glasses) must be cleaned and disinfected before reuse according to the manufacturer's instructions. However, it is recommended to use disposable material with the PPE.

8.6 Strict hand hygiene must be followed before and after contact with the patient and removal of the PPE Disinfection in the hemodialysis facility.

9. Environmental disinfection:

9.1 Follow the protocol for decontamination, conservation and residues disposal (including clothing) commonly used for other types of microorganisms with risk of spread through contact and drops.

9.2 The residues are considered Class III or Special Biosanitary waste (Group III, similar to tuberculosis).

9.3 There will be specific containers inside the box/room for the disposal for all patient residues, including the PPE used by healthcare professionals. Once it is full, the cleaning staff will be notified immediately for their removal and replacement.

9.4 To avoid manipulation of urine and feces of the patient, it is necessary to use absorbent bags that will be placed on the wedge and/or in the urine bottle. Subsequently they will be closed and thrown into the group III waste container.

9.5 Surfaces in contact with the patient or their secretions will be cleaned and disinfected (including the chair or stretcher, the waiting room and the elevator that has been used for the transfer; walls, keypads and elevator floor).

9.6 Cleaning and disinfection will be performed with a disinfectant made of sodium hypochlorite solution containing 1000ppm of active chlorine. The viruses are inactivated after 5min of contact with normal disinfectants such as household bleach. Cleaning personnel must be adequately protected with PPE with a FFP2 mask.

10. Devices and medication:

10.1 Devices and materials used in the dialysis session should be used in a single patient and should be cleaned and disinfected on common clean area before being stored. ·

10.2 The materials and medication found in a hemodialysis stations should only be used in the patient dialyzed in that station and should never be returned to the common clean area or used with other patients, without being previously disinfected.

10.3 Ordinary carts should not be used to carry medication to patients.

10.4 If trays are used to carry medication to individual patients, they must be cleaned between patients.

10.5 Clean areas should be clearly separated from contaminated areas where contaminated material is being handled.

10.6 Additional prevention measures carried out in China and Taiwan included not give food to patients during the session of hemodialysis.

11. Monitors and surfaces:

11.1 External surfaces (chairs, beds, tables, monitors) should be cleaned and disinfected.

11.2 The external surfaces of the monitors are the most likely source of contamination. Once the patients are connected and whenever a patient is being attended, the surface of the monitors will be cleaned with soap and water, and then a disinfectant with a sodium

hypochlorite solution containing 1000ppm of active chlorine will be applied. These viruses are inactivated after 5min of contact with normal disinfectants such as household bleach.

11.3 Especial attention should be paid in the cleaning and disinfection of control panels of dialysis monitors and other surfaces that are frequently touched and therefor arepotential contaminants.

12. Key points

12.1 It is essential the early identification of individuals at risk, preferably before being transported to the hemodialysis center. This is crucial for the prevention of transmission in the ambulance, waiting rooms and hemodialysis units.

12.2 It is a priority to provide adequate training to patients and all personnel involved on the prevention and identification of COVID-19 in the different stages of hemodialysis (including transport from home).

12.3 It is advisable to have systems that allow hemodialysis treatment to be performed in conditions of contact and drop isolation. There are different options (single room, portable ambulatory hemodialysis monitors).

12.4 Health workers attending suspected cases or diagnosed with COVID-19 are responsible of maintaining a strict compliance with the standard precautions of contact and drop isolation and adequate personal protection (PPE).

13. Responsibilities:

13.1 Role of the training section:

13.1.1 The members of the training group are responsible for training doctors, nurses, and hemodialysis technicians, who should receive appropriate training regarding COVID-19 epidemic, including the preventive measures and modes of transmission. Also, training should include updated clinical knowledge and new international and local guidelines.

13.1.2 The training group should update their own knowledge regulary guided by international guidelines and new published research papers concerning COVID-19.

13.2 Role of the staff nurses:

13.2.1 The medical staff nurse should notify the infection control team coordinator once he/she or his/her family member(s) develops any symptoms suggesting COVID-19. Any sick individual should be at home, and never be exposed to any patient or other medical staff member.

13.2.2 Implementing all preventive and isolation approaches towards suspected or diagnosed cases, and dealing with them with full care and taking all necessary precautions.

13.2.3 They should be aware of the proper techniques of wearing different types of masks, gowns, gloves, goggles, and all PPE. Proper hand wash is very important in reduction of disease spread and personal protection.

13.3 Role of doctors:

13.3.1 Doctors dealing with a confirmed COVID-19 patient must use full protective measures, including long-sleeved protective waterproof clothes, googles, headcaps, gloves, and wearing masks filtering 95-99% of particles in the inhaled aerosol.

13.3.2 Providing advice for the patients during daily rounds about all necessary facts concerning COVID-19 and answering all patients' questions in this regard.

13.3.3 It is wise to cancel the regular scientific meetings and all gatherings, that may cause spread of the disease among the medical staff. The use of online facilities, such as webinars, is a good option for sharing experiences and medical knowledge during the epidemic. This is organized by the already assigned teaching and scientific group in the dialysis unit.

13.3.4 The role of the medical superintendent:

13.3.5 Follow up and supervision of all the members of the medical staff and making sure that all are following all the necessary steps mentioned in this guideline,

and that they are practically and accurately implemented in the hemodialysis facility.

13.3.6 Provide regular reporting to the MOH regarding any new events or unusual circumstances that may need new or modified approaches.

13.4 The hemodialysis facility is responsible to provide all needful tools for proper disinfection and creating a sanitary working environment as follows:

13.4.1 Place posters that encourage staying home when sick, cough and sneeze etiquette, and hand hygiene at the entrance to the workplace and in other areas where they will be seen.

13.4.2 Instruct workers to clean their hands frequently, using soap and water for at least 20 seconds or with an alcohol-based hand sanitizer that contains at least 60-95% alcohol.

13.4.3 Provide soap and water and alcohol-based hand rubs in the workplace in multiple locations and in common areas to encourage hand hygiene.

14. Document History and Version Control

Document History and Version Control			
Version	**Description of Amendment**	**Author**	**Review Date**
01	Initial Release	Dr. Yaqoob Almaimani Dr. Fady Elias	November 2023
02			
03			
04			
05			

Written by	**Reviewed by**	**Approved by**
Dr. Yaqoob Almaimani Dr. Fady Elias	Dr. Mohammed Al Balushi	Dr. Kadhim Sulaiman

15. Related Document

There is no related document for this guideline.

16. References:

Title of book/ journal/ articles/ Website	Author	Year of publication	Page
World Health Organization. Coronavirus disease (COVID-2019) situation reports. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports			
The epidemiological characteristics of an outbreak of 2019 novel coronavirus disease(COVID-19) – China, 2020. China CDC Weekly, (2020).			
World Health Organization. Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf			
Huang, C., Wang, Y., Li, X. et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020; 395: 497–506.			
Chinese Society of Nephrology. Recommendations for Prevention and Control of New Coronavirus Infection in Blood Purification Center (Room) (First Trial Version). Chinese Society of Nephrology, 2020.			
Centers for Disease Control and Prevention. Interim Additional Guidance for Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed COVID-19 in Outpatient Hemodialysis Facilities, 2020. https: //www.cdc.gov/coronavirus/2019-ncov/healthcare-facilities/dialysis.html			
WHO Statement on the second meeting of the International Health Regulations(2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCov)			
The epidemiological characteristics of an outbreak of 2019 novel corona virus disease(COVID-19) – China, 2020. China CDC Weekly, (2020).			

American Society of Nephrology, Information for screening and management of COVID-19 in the outpatient dialysis facility, Release date: March 4, 2020			
Nefrologia.2020.https://doi.org/10.1016/j.nefro.2020.04.001			
Management of COVID-19 in hemodialysis patients : The Genoa experience-Esposito---Hemodilaysis .Pasquale Esposito, Rodolfo Russo, 1Novella Conti, 1 Valeria Falqui, 1 Fabio Massarino, Enzo Moriero, Giancarlo Peloso, 1 Giovanni Battista Traverso, 1 Giacomo Garibotto, and Francesca Viazzi.			

Appendix 1: Advices to hemodialysis patients

- Receive your seasonal flu vaccine (H. influenza) every year at the outpatient clinic.
- Wash your hands frequently with soap and water for at least 20s, and ideally 60s. If soap and water are not available, use an alcohol-based hand sanitizer.
- Avoid touching your eyes, nose, and mouth with your unwashed hands.
- Avoid close contact with sick people with respiratory symptoms.
- If you are sick stay at home and phone the dialysis center, and they will provide you with appropriate recommendations.
- If after informing you have been authorized to attend the dialysis center, do not use public transportation (contact individual ambulance to be transferred to the Emergency Service of the hospital). If you use your own vehicle, after arrival do not wait with other patients in the general waiting room.
- If you cough or sneeze, cover your mouth and nose with your sleeve or a tissue, then throw it away.
- Objects and surfaces that are frequently touched should be cleaned and disinfected with water and bleach or any household disinfectant.
- If you develop any respiratory symptoms or low degree fever, if you have had close contact (less than 2m) with a probable or confirmed case, or if you or someone close to you has recently been traveling, immediately inform the medical staff of the hemodialysis. Areas of heavy transmission change as the epidemic evolves, so regular updates are required.
- Wash your hands with soap and water for at least 20s before entering the ambulance and before entering the unit. If soap and water are not available, use an alcohol-based hand sanitizer.