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Review Article

Safety and Efficacy of applying strict Protocols during Covid 19 Pandemic at Saudi Dialysis Center, Single Center Experience

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Abstract

Since the declaration that COVID-19 is on-going pandemic the world health care system were under severe stress. The renal services are one of these health services that severely affected. We are presenting our joint work with our colleagues in infectious disease services in controlling the COVID-19 spread in our dialysis services.

Keywords: Coronavirus disease19; Renal services; Haemodialysis; Peritoneal dialysis; Saudi Arabia

1. Introduction

The world health system has been under significant strain and severely stress because of the coronavirus disease (COVID-19) pandemic. Health systems in different countries have had to be rapidly modified based on the

health system models that they follow, as well as their levels of preparedness (Centers for Disease Control and Prevention [CDC], 2020) [1]. COVID-19, which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was declared a pandemic by the World Health Organization (WHO) on 11 March 2020 [2]. To date, it has affected 210 countries and caused almost 1.5 million deaths, with more than 63 million people contracting the virus. In June 2020, the WHO announced through the Director-General of the organization, Dr. Tedros Adhanom Ghebreyesus, that the disease would run a second course, which may be more severe. This is particularly concerning because, on 2 June 2020, the highest number of cases were recorded globally. The pattern of COVID-19 is similar to that of the Spanish flu, which struck the world from 1918 until 1920 [3]. COVID-19 may therefore continue for two years with recurrent waves of infection every 4-6 months. It will then become an endemic seasonal disease similar to influenza and the Middle East respiratory syndrome. The similarity between the Spanish time in 1920 and COVID19 in 2020 is more or less the same except that the news is being rapidly disseminated via internet mobile messaging applications such as WhatsApp and other social media applications that built the stigmatization of the COVID-19 affected population [4]. This news includes epidemiological and virological information about the virus and its method of propagation and dissemination as well as the method of its treatment. The role of different epidemiological theories, such as cybernetic theory, catastrophic theory, complexity theory, chaos theory, space weather, and pandemic worming that comes from cosmic biological theory were also discussed by the public through such media [5-7]. Such news creates more chaos and panic globally. The COVID-19 statistic in Saudi Arabia is more or less the same as elsewhere in the world. However, the number of Covid mortality in the Kingdom is lower than the international figure. Since as of November 2020, the WHO's COVID-19 data showed, that globally there is a total of 1, 385, 218 deaths. Saudi Arabia has 5, 780 or 2% of the total number of deaths if equated to the data of the United States of America and the United Kingdom, whereas they have 253,931 and 54,751 respectively [8]. Moreover, these statistics could be a result of the rapid response of the Saudi Ministry of Health, Saudi Health Council, and other government offices and organizations to produce a number of management guidelines, despite the premature knowledge of Coronavirus disease [9].

Renal services are one of the health care systems that were stressed, since dialysis is a life-saving therapy for patients with end-stage renal disease [10]. In addition, patients on dialysis are more susceptible to COVID-19 infection [11, 12], hence, all dialysis centres - both hospital- and satellite-based - have made specific strategies to reduce the transmission of the disease to patients they serve and to staff who are providing the dialytic therapy, either haemodialysis or peritoneal dialysis [13, 14].

Patients on dialytic therapy need to continue their dialysis regardless of the COVID-19 situation. A preparedness plan in dialysis centres should therefore be activated by health facilities and healthcare providers. In the King Fahad University Hospital Dialysis Centre, for example, a number of preparedness and readiness protocols have been activated to deliver safe and adequate therapy to their patients. These protocols include the provision of high-quality services and the implementation of treatment modifications within the timeframes specified by the treating physicians and in accordance with the Saudi CDC guidelines to ensure the safety of patients and staff and to provide adequate dialytic therapy.

The implementation of these guidelines led to several changes in both the space allocation and treatment doses per session for each patient undergoing haemodialysis or peritoneal dialysis. Spaces have been restructured and staff scheduling and duties rearranged to ensure sufficient and quality health services can be provided with minimal risk to patients, staff, and the environment.

Such risk mitigation was achieved by adapting a protocol that was approved by the infection control committee to reduce the risk of COVID-19 transmission. It identified:

A. Patient-related risks
B. Staff-related risks
C. Environment-related risks
D. Support service-related risks.

The recommendations were based on those of the CDC in the *Coronavirus Disease 2019 (COVID 19) Hospital Preparedness Assessment Tool*, which offers precautionary guidance on the following areas:

1. Infection prevention and control policies and training for healthcare personnel
2. Rapid identifying and isolating patients with confirmed or suspected COVID-19
3. Patient placement and location
4. Transmission-based precautions using standard guidelines including contact, airborne precautions, and eye protection for patients with confirmed or suspected COVID-19
5. The movement of patients with confirmed or suspected COVID-19 within facilities
6. Hand hygiene policy
7. Environmental cleaning and hygiene, including medical waste disposal
8. Monitoring and managing healthcare personnel
9. Social distancing
10. Visitor access and movement within facilities
11. Building rapid communication tools between the appropriate people
12. Heating, ventilation, and air conditioning system standardization.

Special protocols were developed by the hospital's dialysis centre and a formulated checklist designed to monitor the safety status of the facility as well as a daily report that is sent to the infection control committee.

2. Special protocols were adapted by the dialysis centre based on the following objectives:

1. To ensure the continuity of treatment within a safe environment, continuous supply of disposable and timely services.
2. To ensure the safety and well-being of staff, patients, and others.
3. To build a database to trace and track the behavior of the disease within the dialysis center.

To achieve these objectives, the following actions were taken in our dialysis centre that can be classified according to the type of dialytic therapy provided.

A. Haemodialysis Therapy

1. The distribution of patients during set-up and dialysis has been adapted (i.e. increased distancing).
2. The number of patients or treatments has been reduced by 50% in each hall
3. The prescribed dialysis time and frequency has been reduced.

4. Nasal swabs are taken from each staff member and patient every 4-6 weeks to test for COVID-19 infection.
5. Health education and/or communication through social media application groups are provided for patients and staff so that they can support one another and reduce direct communication.
6. Mental health support is provided with the help of the psychiatry department.
7. If a patient is diagnosed with COVID-19, their dialysis treatments are transferred to the night shift so that they can be taken care of during the night shift. After a patient's diagnosis, all staff who have had direct contact with the patient are isolated and fully investigated. They will subsequently be advised to resume working after all the relevant protocols have been followed.

Some studies have shown that home hemodialysis has the advantage of improving the quality of life and reduce mortality compared to in center HD [15-17]. However, it was underutilized, the reasons of underutilization could be beliefs and expectation of patients and healthcare providers, suboptimal patient preparation and infrastructure related issues [18]. The data on the prevalence of covid 19 infections at dialysis centers are scarce ranging from 16.2% to 41% [19, 20]. The incidence at our dialysis center until the writing of current manuscript is 6%, this due to strict follow up of all the preventive measures and strict applying the international and our adaptive protocols.

B. Peritoneal Dialysis Therapy

1. Patient visits to the unit have been replaced by virtual consultations.
2. Patients are given instructions during virtual consultations.
3. Patients are able to communicate with the unit using the WhatsApp group on an ongoing basis.

C. Doctors' hot phones are available for the nephrology division.

D. A reporting system has been developed with the infection control committee to report COVID-19 cases.

E. Urgent COVID-19-related cases are handled by another team using complete protective personal equipment when providing services to patients. They also alternate their duties every two weeks to maintain space in the event of any occurrence of infection.

F. Zoom is used for administrative meetings and urgent consultations.

G. The stratification of the level of protection needed based on the hospital guidelines was adapted to help staff learn the appropriate level of protection required (Table 2). The checklist presented in Table 1 details the risk mitigation practices in place for patients, staff, the environment, and support services. Colour-coded areas indicating the level of protection was formulated and is presented in Table 2.

Our PD unit is one of the biggest PD units at Middle East, as we are serving about 253 PD patients during covid19 pandemic crisis. The overall incidence of cavid19 infection at our peritoneal dialysis unit was 2% which is similar to general population 1.6% at Saudi Arabia according to daily covid 19 report from ministry of health. These due to (PD) patients usually dialyzed at home and rarely reported to dialysis unit unless it is necessarily, the presence of remote monitoring system at our PD unit in form of Home choice Claria APD system has helped in excellent patient outcomes. And significantly reduced the outbreak of

covid19 infection at our dialysis unit during covid19 pandemic; by reducing the chance of contacting to other patients or healthcare providers [21].

Acute kidney injury develop in 31% of hospitalized covid 19 patients, 14% of them will require renal replacement therapy, utilization of acute PD at our unit has significantly reduced the burden on others dialysis modalities [22].

Item	**Patients in General**	**Staff in General**	**Environmental Services**		**Support Services**	
			Human	**Tool**	**Human**	**Tool**
Security checking	Required	Required	Required	Required	Required	Required
Hand hygiene	Required	Required	Required	N/A	Required	N/A
Disinfection	N/A	N/A	N/A	Required	N/A	Required
Nasal swab checking	Required	Required	Required	N/A	Optional	N/A
Mask	Surgical	Surgical/N95	Non-medical	N/A	Non-medical	N/A
Apron	White	White/surgical	White	N/A	White	N/A
Gloves	Surgical	Ordinary/surgical	Ordinary	N/A	Ordinary	N/A
Visor	Optional	Optional	N/A	N/A	N/A	N/A
Visitors	Not allowed	Not allowed	Not allowed	N/A	Not allowed	N/A
Social distancing	Required	Required	N/A	N/A	Required	N/A
Communication tool	WhatsApp	WhatsApp	WhatsApp	N/A	WhatsApp	N/A

Table 1: Risk Mitigation Practices.

Legend	**Level of Protection**	**Hospital Area**
RED	**Personal protective equipment, FFP_3 mask, visor, long-sleeve surgical gown and gloves**	**Intensive care unit** **Haemodialysis unit** **Acute admissions unit**
GREEN	**Haemodialysis/peritoneal dialysis** **Need surgical masks, white apron and gloves. Visor optional.**	**Haemodialysis** **Peritoneal dialysis** **Acute admission unit**
CLEAN AREA	**Office corridor and non-clinical office** No PPE required except as endorsed by hospital administration (i.e. mask, social distancing and hand hygiene)	**Office** **Corridor** **Non-clinical**

Table 2: Colour Coding of the Area and Its Corresponding Level of Protection.

The current pandemic crisis has become a major challenge to patients undergoing haemodialysis, as patients need to visit hospital 2-3 time weekly, spent at least 3-5 hours with healthcare workers, the adherence to social distancing is very difficult to achieve and the inevitable exposure of heath care professionals to infected covid 19 patient during haemodialysis session leading to increase the risk of covid 19 infection to others dialysis patients, health care professionals, family members and to general population [8]. In addition Haemodialysis patient is at particular risk for acquiring covid 19 infection due to multiple comorbid medical conditions including diabetes mellitus, hypertension and cardiovascular disease [19-22]. The mortality rate of covid 19 patient in general population is debatable ranging from (1.4% to 8%) [23]. Data in literature regarding the mortality rate in dialysis patient is scarce. Marian et al, reported in single center observational study the mortality rate of 30.5% to 36 covid19 infected haemodialysis patients [24] whereas, Yiqiong et al. reported mortality rate of 26% from hemodialysis center in Wuhan [19]. In contrary, our mortality rate is 20% this could be attributed to apply a strict measures including upgrading and preventive measures, quarantine, isolation of infected or suspected of infections as proactive and protective measures and also regular covid 19 screening for all dialysis patients. During the early stages of the spread of the disease, several positive cases of COVID-19 among patients and staff were reported in our centre. However, once the protocol was more strictly enforced, the incidence of positive COVID-19 cases became negative and has been in the months since. Based on this direct observation, we highly recommend that such protocols and measures to be adapted by other dialysis centres elsewhere in order to effectively contain the transmission of covid 19 infections at dialysis unit.

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Author Contributions

Sayed Issam, Afnan Al-Muhnna and Nourah Al-Muhanna were responsible about data collections, Ibrahim Saeed, Fahad Abdulaziz Al-Muhan performed literature review and drafted the discussion, Abdullah Al-Hwiesh, Sara al-warthan, Marwan Al Wazzeh contributed in written and reviewing the manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with Respect to the research, authorship, and/or publication of this

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Ethical Approval

Ethical approval was obtained from Imam Abdulrahman bin Faisal University Review Board of Medical Center, and all written Consents were taken from the patients.

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