



Dialysis practices during the COVID-19 pandemic: a survey from India

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ABSTRACT

Introduction: The COVID-19 pandemic has been a challenging time for dialysis units worldwide. Nephrologists are faced with the difficult task of providing renal replacement therapy to COVID-19 patients and simultaneously prevent spread of COVID-19 in dialysis units.**Objectives:** We aimed to study the dialysis practices being followed during the COVID-19 pandemic **Patients and Methods:** A questionnaire assessing treatment and preventive practices being followed in dialysis units during the COVID-19 pandemic was emailed to nephrologists and nephrology trainees practising in India. Responses were recorded electronically.**Results:** We received 173 valid responses. About 83.2% nephrologists were providing dialysis for COVID-19. Hemodialysis/slow low-efficient dialysis was the most common modality (65.2%) of renal replacement therapy (RRT) in COVID-19 acute kidney injury. In dialysis patients with suspicious symptoms, most common test to rule out COVID-19 was RT-PCR (reverse transcriptase polymerase chain reaction) + chest imaging (42.2%) followed by RT-PCR alone (34.1%). Around 80.9% nephrologists sought a negative RT-PCR in patients who had recovered from COVID-19 before discontinuation of isolation measures. Adherence to COVID-19 preventive measures varied between 15.2% (portable reverse osmosis disinfection) to 97.1% (mask wearing). Healthcare worker (HCW) training programme was present in 88.4% cases, paid leaves for COVID-19 in 89% and daily HCW symptom screen in 65.3%. The most frequently identified barrier to chronic kidney disease care was a delay in transplantation (66.5%). Accordingly, 20.8% reported a temporary closure of dialysis unit due to COVID-19 outbreak. Moreover, 63% of nephrologists counseled patients to choose peritoneal dialysis above hemodialysis as permanent RRT.**Conclusion:** Hemodialysis/slow low efficient dialysis is the preferred modality of RRT in COVID 19-AKI. Many nephrologists are counseling for peritoneal dialysis as superior to hemodialysis during COVID-19 for maintenance RRT. Preventive measure adherence is variable across centers. HCW safety has been addressed in most centers.

Implication for health policy/practice/research/medical education:

This study was conducted to evaluate the practices being followed in dialysis units across the country to prevent spread of COVID-19 and to assess the compliance to guidelines for such prevention in dialysis units.

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Introduction

The COVID-19 pandemic has posed a special challenge to nephrologists where they have to provide essential life-saving dialysis to patients with COVID-19 on one hand and safeguard their dialysis patients and healthcare staff against it on the other hand.

Almost 1.75 lakh people in India are on maintenance dialysis (1). Additionally, 11%-37% of hospitalized patients of COVID-19 may develop AKI, 23% of whom may need renal replacement therapy (RRT) (2). A number of extracorporeal non-renal therapies are also facilitated

by the dialysis units in patients of COVID-19. Altogether, dialysis facilities have been catering to a large number of patients in this pandemic and dialysis units have the potential to become COVID-19 “hotspots” if adequate precautions are not taken.

Objectives

We aimed to describe the various treatment and preventive practices being followed in dialysis units across India during this pandemic.

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Patients and Methods

Study design

We designed a survey consisting of 32 questions to assess dialysis practices being followed in various parts of the country during the COVID-19 pandemic. The questionnaire (Supplementary file 1) was designed on Google forms. Apart from the personal details of the nephrologists and the type of facility they are working in, the questionnaire consisted of five parts;

- 1) Dialysis of COVID-19 patients
- 2) Management of suspicious and recovered cases of COVID-19
- 3) Measures to prevent spread of COVID-19 in hemodialysis unit –this included a set of measures derived by combining the guidelines developed by the Indian society of nephrology and the hemodialysis unit preparedness checklist as issued by the George Institute of Global Health (3,4)
- 4) Measures to ensure healthcare worker (HCW) safety
- 5) Barriers to ideal CKD care during the pandemic

Respondents were given the option to reveal their identity/email ID or fill the form anonymously. All other questions were mandatory. Each respondent was given the option to fill multiple responses if associated with more than one dialysis center/hospital.

The questionnaire was sent by email and through social media (Twitter) to nephrologists and nephrology trainees working in India. A reminder email was sent to non-respondents two weeks after the first email. Responses were accepted till one month after the initial email (18th November to 18th December 2020).

Data analysis

Results were expressed as percentages with the denominator being the total number of responses to the question. Data was managed on SPSS version 25.

Results

We received 176 responses overall (123 unique email addresses and 51 anonymous responses). Two responders had filled the form twice (practising in two different centers). Three responses were excluded from the analysis since the location of current practice was not in India.

Nephrologists from 20 states of the country participated in the survey, maximum were from Tamil Nadu (n=32) followed by Maharashtra (n=27). The distribution of respondents from various states is shown in Figure 1. Maximum number (n=138, 79.8%) were practicing in private centers, 17.3% (n=30) in government centers and 2.9% (n=5) in others. 56.1% were working in teaching hospitals, 39.8% in non-teaching hospitals and 4% in stand-alone dialysis centers.

Dialysis and treatment of COVID-19 patients

A majority of nephrologists (n=145, 83.2%) were working in centers providing treatment (including dialysis facility)

State wise distribution of survey respondents

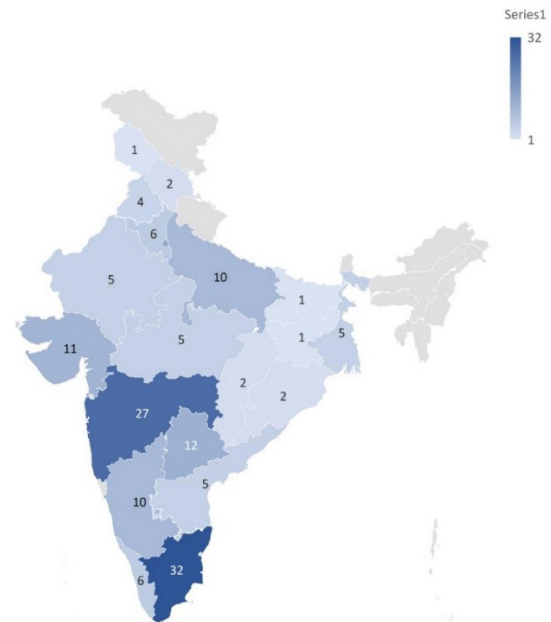


Figure 1. State-wise distribution of respondents of the survey. Maximum number of respondents were from Tamil Nadu followed by Maharashtra. There were no respondents from states shaded in grey.

to COVID-19 patients. Out of the 145 responders, 93.1% (n=135), 86.8% (n=126) and 15.2% (n=22) had facilities for hemodialysis for AKI, maintenance hemodialysis and acute peritoneal dialysis for COVID-19 positive patients respectively.

The most commonly used modality was hemodialysis/slow low efficient dialysis in 65.1% cases, followed by HD/continuous RRT in 20% cases (Figure 2). Moreover, 34.1% (n=50) respondents had facilitated the use of extracorporeal non-renal therapy for COVID-19 in the form of cytokine filters (28.9%), plasmapheresis (11.7%), high volume hemofiltration (3.4%) and polymyxin hemoperfusion (2.7%).

A separate COVID-19 designated dialysis unit was used by 43.4% of the nephrologists, whereas only ICU dialysis was available in 28.9% of cases.

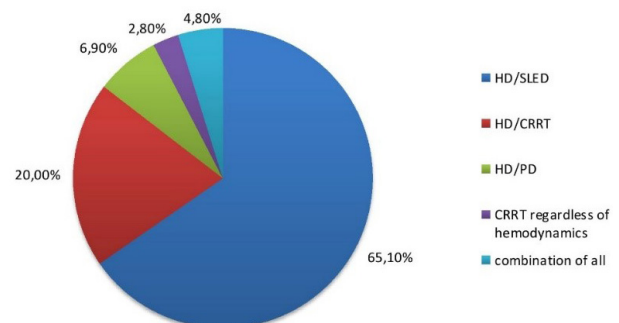


Figure 2. The preferred dialysis modality for COVID-19 AKI (without/hemodynamic compromise).

Other modes of isolation were separate room with closed door 16.6%, separate room without door (1.3%), last shift of the day (9.6%). Furthermore, 77.2% of respondents providing dialysis to COVID-19 patients had a designated staff member per shift to perform dialysis only for COVID-19 cases.

Management of suspicious and recovered cases of COVID-19

For patients with clinical features suspicious of COVID-19, the most commonly done test to rule out COVID-19 was a combination of RT-PCR and chest imaging followed by RT-PCR alone (34.1%) and RT-PCR +antigen testing (8.9%). Only 27.1% respondents allowed suspected COVID-19 cases for dialysis in routine hemodialysis unit while awaiting test results, whereas 71.1% waited for confirmatory tests prior to dialysis (1.7% referred to other centers).

In case of a negative test in a suspicious patient, 82.6% continued isolation measures during dialysis whereas 14.4% dialyzed in the routine hemodialysis unit without isolation (2.8% referred to other center).

The protocol followed for discontinuation of isolation precautions for patients who had recovered from COVID-19 is illustrated in Figure 3. Accordingly, 80.9% of nephrologists asked for a nasopharyngeal swab testing for COVID-19 RT-PCR before allowing patients in routine HD unit.

Measures to prevent spread of COVID-19 in hemodialysis unit (for non-COVID patients)

Percentage adherence to measures to prevent COVID-19 in hemodialysis unit is illustrated in Figure 4.

Mask wearing was mandatory for patients in 97.1% cases (58.4% surgical masks, 17.3% N95 or equivalent masks, 21.4% cloth masks). Whereas 93.6% centers screened their patients for signs and symptoms of COVID-19 at every dialysis unit visit, some respondents had also used measures such as screening of all dialysis patients with a COVID-19 RTPCR (30.6%), COVID-19 antigen (10.4%)

and COVID-19 serology (6.3%) at intervals.

For patients requiring long term RRT, 63% nephrologists counselled patients regarding benefits of peritoneal dialysis over and above hemodialysis during the COVID-19 pandemic.

Measures directed towards healthcare worker safety

HCW had a daily symptom screen in 65.3% (n=113) cases. For those working in the non-COVID-19 hemodialysis unit, provision of masks for dialysis unit staff was 100% (82.1% N 95/equivalent and 17.9% triple layered surgical mask). Regarding provision of other personal protective equipment (PPE): gloves were provided in 95.9%, cap in 90.8%, face shield/goggles in 86.7%, shoe covers in 56.7% and fluid resistant gown in 50.8%.

Although the dialysis unit staff members got a paid leave in 89% cases if they contracted COVID-19 or developed signs/symptoms consistent with it, only 62.4% were given a paid leave if they came in high- risk contact with a COVID-19 case (but were asymptomatic /tested negative).

Barriers to care

The most frequently identified barrier to CKD care was a delay in the transplantation of CKD patients (n=115, 66.5%), followed by missed dialysis sessions due to unavailability of transport (59.5%), delay in urgent dialysis due to suspicion of COVID-19 (57.2%), decrease in the number of dialysis unit staff members (57.2%) and delay in creation of permanent arteriovenous (AV) access (n=94, 54.3%). Accordingly, 20.8% respondents reported a temporary closure of their dialysis unit during the pandemic.

Discussion

The COVID-19 pandemic has brought about restrictions in almost every field of work, including non-essential medical care (5). Dialysis is a life- sustaining procedure for millions across the globe and most dialysis centers have been running throughout the pandemic, even with the strictest lockdowns.

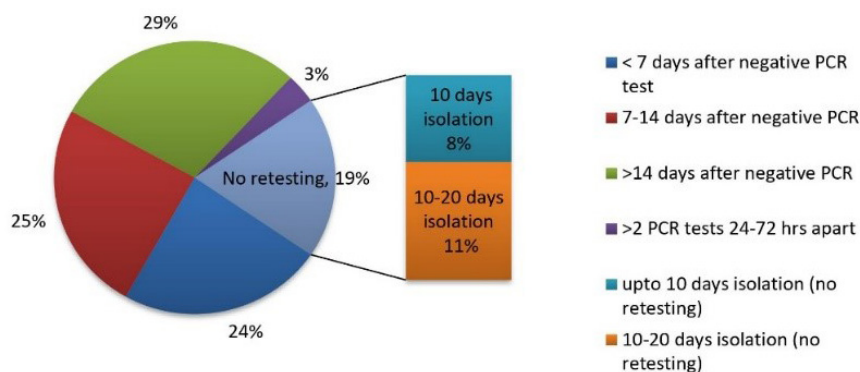


Figure 3. Time duration of isolation precautions in maintenance hemodialysis patients who had contracted COVID-19.

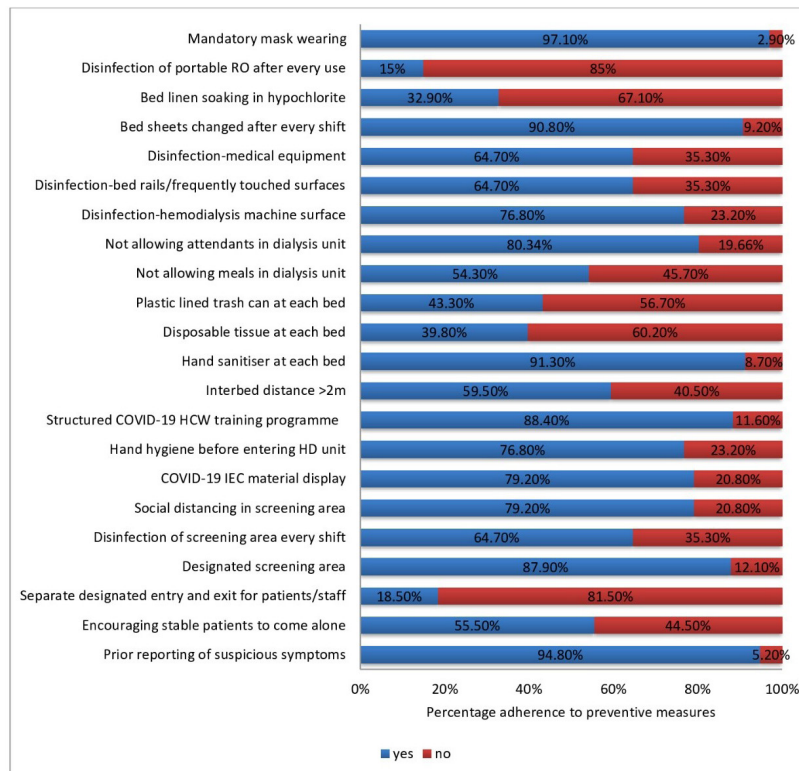


Figure 4. Adherence to preventive measures against COVID-19 in dialysis unit.

We aimed to study dialysis practices being followed in the country during this pandemic. Various countries have issued specific guidelines to be followed in hemodialysis units during this pandemic (3,6,7). Despite the guidelines by various societies and the surge of published data on COVID-19, there are many unanswered questions regarding safe and ethical dialysis practices in this pandemic. Often physician judgement and logistics are the deciding factors when faced with such unaddressed issues.

At the time of the study, 83.8% of nephrologists were providing RRT to COVID-19 patients. This included 86.7% government run centers and 84.1% of private centers. It is interesting to note that more nephrologists were providing hemodialysis to COVID-19 AKI patients than to maintenance hemodialysis COVID-19 patients and up to 30% had only ICU facility available for COVID-19 dialysis. This highlights the difficulty of isolating patients of COVID-19 in an out-patient based hemodialysis unit. Although chronic peritoneal dialysis is not widely practised in India (8), it was noted that 15.2% of participating nephrologists were providing acute peritoneal dialysis in COVID-19 patients with AKI, this number being higher in government hospitals(26%) as compared to private hospitals(10%). Besides, 63% of nephrologists counseled patients regarding benefit of peritoneal dialysis above hemodialysis as a permanent mode of RRT. Given the advantage of lesser contact with healthcare setup and lesser need to travel, peritoneal dialysis has been suggested

as a safer option for maintenance therapy during the pandemic (9,10). Whether this pandemic will become the driving force for the much needed boost to peritoneal dialysis services in India is yet to be seen.

There are various areas of uncertainty as to how to manage patients with suspicious symptoms without proven COVID in dialysis units. Maintenance dialysis patients often present with cough or shortness of breath due to non-infective causes like fluid overload, cardiac complications or anemia. A combination of RT-PCR + imaging (CT chest/X-ray) was the most commonly done investigation (42.2%) for allowing dialysis patients with suspicious symptoms in routine hemodialysis unit and almost 71.1% of nephrologists preferred to wait for the final results of the test before permission to get routine hemodialysis.

Keeping in mind the false negative rates of such testing, 82.6% of nephrologists continued dialysis in isolation for patients with suspected COVID-19 even if they tested negative by the unit protocol.

The time-period of isolation required for patients who have recovered from COVID-19 is not yet clear. Viral shedding may be prolonged in immunosuppressed patients (11) and in CKD (12,13). The CDC (Centers for Disease Control and Prevention) advises to continue transmission based precautions for patients with COVID-19 for 10 days (mild illness) to 20 days (severe illness) after symptom onset (14). The Canadian society of nephrology, on the other hand, recommends that

isolation should be continued until the patient has been symptomatic for a minimum of 14 days along with two negative RT-PCR tests separated by at least 24 hours (7). In our study, 80.9% of nephrologists asked for a retesting to exclude COVID-19 viral shedding before isolation discontinuation and 3.5% asked for two such negative tests. The time-period of isolation after a negative test varied between <7 days to >21 days.

Studies from renal registries show that between 10-20% patients getting in center hemodialysis may contract COVID-19 infection. Mortality rates are much higher in this population than in the general population (15-17). Therefore, measures to prevent spread of COVID-19 in hemodialysis units are of utmost importance. We found a high overall compliance rate for use of masks, surface disinfection and hand washing practices. However, compliance to disinfection of reverse osmosis units, bed sheets disinfection prior to laundry, having a separate designated entry/exit for social distancing, providing trash can/tissue at dialysis bed and adequate bed distancing protocols were followed by only a few nephrologists (15%-43%). In addition, patient behaviors like not eating in dialysis unit and coming alone for hemodialysis when stable were often not being followed. These are small easily enforceable measures which may go a long way in preventing outbreaks in the HD unit.

Dialysis HCW come in close contact with a large number of patients daily and hence were provided with N 95 or equivalent masks in most units (82.1%). Provision of other PPE components varied from one unit to another. Dialysis HCW were given a fully paid leave in case of contracting COVID-19 infection in 89.1% cases but only in 62.1% cases if significant contact with a person with COVID-19.

A study which assessed CKD care delivery in the first few weeks of lockdown in the country highlighted how 28.2% patients had missed their dialysis sessions at that time, some of whom subsequently required emergency dialysis and some died. Other issues identified at that time included almost complete discontinuation of kidney transplantation programmes and marked drop in the outpatient and inpatient attendance (18). The current study was conducted almost 8 months after this study and although restrictions have been eased, there continue to be several hurdles to CKD care. The delay in kidney transplantation was the most frequently recognized barrier to CKD care as per our survey (66%). A recent international survey from 16 countries showed that living kidney donation was on hold in 75% centers across five continents (19). Since live kidney donation is the backbone of transplantation programmes in India, this delay in transplantation together with a decrease in the dialysis unit HCW strength, increased the burden on dialysis units in the country manifold. The resumption of live kidney donor renal transplantation will probably help to ease this burden.

Conclusion

This was a survey-based study to analyze practice patterns during the COVID-19 pandemic. A large number of nephrologists are providing dialysis-based care to COVID-19 patients in India. Although hemodialysis is the most favoured mode of RRT in India, acute peritoneal dialysis has become an important option in COVID-19 cases and nephrologists are also counseling patients requiring maintenance dialysis for use of peritoneal dialysis over hemodialysis during these trying times. Compliance to measures to prevent COVID-19 has been overall fair and dialysis HCW safety has been addressed in most dialysis units.

Limitations of the study

This study has few limitations. Participation in the survey was voluntary and hence the study is liable to the limitations of sampling errors consistent with any survey-based study. Although we were able to capture data from nephrologists practicing in 20 states, there was an over representation of the southern and western states compared to the northern and eastern states.

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Authors' contribution

Conceptualization: Pallavi Prasad, Elumalai Ramprasad, Matcha Jayakumar.

Data curation: Pallavi Prasad.

Formal analysis: Pallavi Prasad, Matcha Jayakumar.

Investigation: Pallavi Prasad, Elumalai Ramprasad, Matcha Jayakumar.

Methodology: Pallavi Prasad, Elumalai Ramprasad, Matcha Jayakumar.

Project administration: Pallavi Prasad, Elumalai Ramprasad, Matcha Jayakumar.

Resources: Pallavi Prasad, Elumalai Ramprasad, Matcha Jayakumar.

Software: Pallavi Prasad.

Supervision: Elumalai Ramprasad, Matcha Jayakumar

Visualization: Pallavi Prasad, Elumalai Ramprasad, Matcha Jayakumar.

Writing—original draft: Pallavi Prasad

Writing—review & editing: Pallavi Prasad, Elumalai Ramprasad, Matcha Jayakumar.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical issues

The research followed the tenets of the Declaration of Helsinki. The Ethics Committee of Sri Ramachandra Institute of Higher Education and Research (SRIHER)

approved this study (IEC-NI/21/FEB/77/08-COVID 19). Informed consent was taken from all participants before their participation in the survey. Besides, ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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Supplementary file 1

Questionnaire. Dialysis practice patterns during the covid-19 pandemic.

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