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Nephrologists' perspectives on the impact of COVID-19 on caring for patients receiving dialysis in Latin America

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Nephrologists' perspectives on the impact of COVID-19 on caring for patients receiving dialysis in Latin America

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For peer review only

Abstract

Objectives: To describe the experiences of nephrologists on caring for patients receiving in-center hemodialysis during the COVID-19 pandemic in Latin America.

Design: Twenty-five semi-structured interviews; thematic analysis.

Setting: 25 centers across 9 Latin American countries.

Participants: Twenty-five nephrologists.

Results: We identified five themes: shock and immediate mobilization for preparedness (overwhelmed and distressed, expanding responsibilities to manage COVID-19 infection, united for workforce resilience); personal vulnerability (being infected with COVID-19, fear of transmitting COVID-19 to family); infrastructural susceptibility of dialysis units (lacking resources and facilities for quarantine, struggling to prevent cross-contamination, depletion of personal protective equipment and cleaning supplies); helplessness and moral distress (forced to ration life-sustaining equipment and care, concerned about delayed and shortened dialysis sessions, patient hesitancy to attend to dialysis sessions, grieved by socio-economic disparities, deterioration of patients with COVID-19, harms of isolation, inability to provide kidney replacement therapy) and fostering innovative delivery of care (expanding use of telehealth, increasing uptake of peritoneal dialysis, shifting focus on preventing syndemics).

Conclusions: Nephrologists felt personally and professionally vulnerable and reported feeling helpless and morally distressed because they doubted their capacity to provide safe care for patients receiving dialysis. Better availability, mobilization of resources, and capacities to adapt models of care, including telehealth and home-based dialysis, are urgently needed.

Keywords: Covid-19, dialysis therapy, qualitative, Latin America.

Strengths and limitations of the study

- Semi-structured interviews were conducted with nephrologists purposively sampled across nine countries to obtain in-depth and diverse data on their perspectives on the impact of COVID-19 on caring for patients receiving dialysis in Latin America.
- The range of perspectives and challenges obtained will inform the need to improve access to care during the COVID-19 pandemic.
- The participants did not mention the impact of COVID-19 on caregivers.
- All participants were from Latin America, and thus the transferability of the findings beyond this region is uncertain.

INTRODUCTION

The SARS-CoV-2 related disease (COVID-19) pandemic has disrupted, delayed, and impeded access to treatment among individuals with chronic illness, including patients with kidney failure receiving maintenance dialysis¹. For patients receiving long-term dialysis, their risk of acquiring COVID-19 is estimated to be five times higher, and they are four times more likely to die than the general population².

The pandemic has seen major reconfiguration of care in many health institutions to manage the increased demand to care for people with COVID-19. Unfortunately, this has inadvertently shifted resources away from the care of patients with other medical conditions, including kidney disease.

Dialysis units have been faced with unprecedented challenges. For patients receiving in center hemodialysis (HD), physical distancing within the unit and during transportation can be difficult³.

Clinicians caring for patients receiving dialysis have encountered a shortage of personal protective equipment (PPE) and unable to access quarantine facilities for patients with infection⁴. Preventing infection in dialysis facilities is particularly challenging in resource-limited settings. For example, guidelines recommend that the reuse of dialysis filters should be ceased⁵, which had been common practice in some resource-limited settings, including in Latin America. Such regions, also contend with an increased risk of SARS-CoV-2⁶ because of high-density housing and large socioeconomically disadvantaged communities.

However, little is known about nephrologists' experiences providing care to patients receiving dialysis; particularly in low-resource settings with high rates of COVID-19 infection, including Latin America.

This study aims to describe nephrologists' perspectives on providing care to patients receiving dialysis during the COVID-19 pandemic to inform strategies for improving the quality and safety of care for patients receiving dialysis.

METHODS

We used the Consolidated Criteria for Reporting Qualitative Health Research (COREQ)⁷ (Supplementary File 1).

Patient and public involvement

Patients were not involved in this study as this study aimed to describe the perspectives of clinicians.

Participant selection

Nephrologists caring for adults receiving dialysis, including hemodialysis and peritoneal dialysis, in Latin America were eligible to participate. We used purposive sampling to include participants across a diverse range of ages, gender, years of clinical experience, and countries. Nephrologists were identified through our professional networks (SLANH- Sociedad latinoamericana de nefrología e hipertensión) and invited by email to participate. Participants could nominate other colleagues to participate. All the participants were given a consent form to participate. This study was approved by the Ethics Committee of the University of Sydney (2019-899).

Data collection

The interview guide was developed based on the literature and discussion among the investigators (Supplementary File 2). Two authors (A.M.G, A.H) conducted semi-structured interviews in English or Spanish language (as preferred by the participant) by zoom videoconference from June 2020 to

1 November 2020 until data saturation. The interviews were recorded and transcribed in English and
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 3 Spanish.
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8 **Data analysis**

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 13 Using a thematic analysis, author A.M.G performed line-by-line coding of the transcripts and
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 15 inductively identified preliminary concepts. Similar concepts were grouped into themes and subthemes,
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 17 and patterns were identified among themes. The interview transcripts were imported into
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 19 HyperRESEARCH (version 4.0.1 ResearchWare Inc. Randolph MA). Investigators A.H., E.L., S.C.,
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 21 A.T., reviewed the themes to ensure that the analysis captured the full range and depth of the data
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 23 obtained. We conducted a member checking whereby the preliminary findings were sent to participants
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 25 for comment and integrated any additional insights into the final analysis.
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31 **RESULTS**

32 **Participant characteristics**

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 36 All 25 invited nephrologists participated, from 25 centers across 9 countries (Chile, Colombia, Uruguay,
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 38 Guatemala, Peru, Bolivia, Brazil, Argentina, Mexico) (Table 1). Of the participants, 8 (55%) were
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 40 women; 17 (59%) were from countries where English was not an official language, and 9 (18%) were
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 42 from low- and middle-income countries. The average duration of the interviews was 35 minutes.
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50 **Table 1. Participant characteristics (N=25)**

51 Characteristic	52 N	53 %
54 Sex		
55 Female	8	32
56 Male	17	68
57 Age group (years)		
58 30-39	1	4
59 40-49	8	32

1	50-59	10	40
2	60 and over	6	24
3	Center volume (number of patients receiving dialysis)		
4	1-20	3	12
5	21-40	1	4
6	41-60	2	8
7	More than 60	19	76
8	Care for patients with confirmed COVID-19		
9	Yes	21	84
10	No	4	16
11	Tested for COVID-19		
12	Yes	12	48
13	No	13	52
14	COVID-19 test result		
15	Positive	1	4
16	Negative	24	96
17	Country*		
18	Chile	13	52
19	Colombia	3	12
20	Uruguay	2	8
21	Guatemala	2	8
22	Peru	1	4
23	Bolivia	1	4
24	Brazil	1	4
25	Argentina	1	4
26	Mexico	1	4

Themes

We identified five themes: shock and immediate mobilization for preparation, personal vulnerability, infrastructure susceptibility of the dialysis unit, helplessness, and moral anguish, promotion of innovative provision of care. The respective subthemes are described below with illustrative quotations provided in Table 2.

Table 2. Selected illustrative quotations to support each theme

Theme	Quotations
Shock and immediate mobilization for preparedness	
Overwhelmed and distressed	<p>"We become in little machines to make decisions, with a high emotional cost" (Male 40-49 age group, Chile).</p> <p>"200 dead in one day, dam! there is a stab in the back. The distress of colleagues and the health professionals is enormous" (Male 60-69 age group, Chile).</p> <p>"It is shocking to see all the mortality. It has been painful for our patients and us. Every week they inform us: [patient A, B, C] did not survive and died" (Female 50-59 age group, Chile).</p>
Expanding responsibilities to manage COVID 19 infection	<p>"We went as a team, gaining experience, but at first, it was like a hit in my head. We did not know what we were up against" (Female 50-59 age group, Chile).</p> <p>"I have had to learn a lot about COVID, about acute kidney failure, about mechanical ventilation, because of this emergency" (Male 40-49 age group, Chile).</p> <p>"So, we have to adapt, study and collect others' experiences since nothing was known about this virus. Everything has been new" (Female 30-39 age group, Chile).</p>
United for workforce resilience	<p>"Everything has changed in my life. I was focused on being well to collaborate and being useful in the pandemic, putting aside personal projects because this is my vocation. I could not subtract myself, there was a spirit to serve, help, and resist" (Female 30-39 age group, Chile).</p> <p>"We had a very nice movement, lovely behaviour of the health workers, students. They proactively asked to help because they are young, and low risk" (Male 47-49 age group, Brazil)</p> <p>"During this COVID period, we have learned to work as a team, everyone giving his best" (Male 40-43 age group Chile).</p>
Personal vulnerability	
Being infected with COVID-19	<p>"It was very uncertain, waiting to get sick, exposing oneself, or hiding. I was scared" (Male 40-49 age group, Chile).</p> <p>"How to combat the fear of getting ill, first as a human being, and then as a member of a health team. How to prevent the infection from your patients, and it does not affect you" (Male 60-69 age group, Chile).</p> <p>When the patients got infected, I checked their symptoms when I got home. "This hurts me, it hurts there" (Female 60-60 age group, Chile).</p>
Fear of transmitting COVID-19 to family	<p>"I am most concerned about spreading the virus to my family rather than getting sick myself." (Female 50-59 age group, Chile)</p> <p>"Old and young people have died, and you can be responsible for infecting your family members by bringing the virus home." (Male 50-59 age group, Colombia)</p> <p>"Health personnel with risk factors, or who fear infecting their family members, were absent"(Female 30-39 age group, Chile).</p>
Infrastructural susceptibility of dialysis unit	
Lacking resources and facilities for quarantine	<p>"Having no control during the pandemic has made it impossible for patients to access medicine. We are running out of space in the units because they have not been followed up on, have stage 5 and need dialysis urgently." (Male 40-49 age group, Bolivia).</p> <p>"Patients cannot eat anymore during the dialysis session, we have had to adapt the dialysis centres 24x7 with separations, so they have the minor contact possible." (Male 40-49 age group, Chile).</p> <p>"The dialysis access has been cut off. "We are trying to make our stage five patients endure as long as possible, medically and nutritionally, to prevent complications." (Female 50-59 age group, Chile).</p>

1 2 3 4 5 6	Struggling to prevent cross-contamination	<i>"Dialysis patients do not have a quarantine; it is an armchair and a different shift than usual." (Female 50-59 age group, Chile).</i> <i>"some patients must take public transportation to go home.. This is exactly the opposite of what we are trying to prevent cross-contamination in the units, to take care of them." (Male 40-49 age group, Brazil).</i> <i>"Some patients have bought biosecurity suits and wear them while walking in the street or while putting on gloves without washing their hands." (Male 40-49 age group, Bolivia).</i>
7 8 9 10 11	Depletion of PPT and cleaning supplies	<i>"We wore shoe covers that, after a short time, were no longer available due to a lack of resources. So you place quaternary ammonium rubbers on the floor to clean feet" (Male 60-69 age group, Chile).</i> <i>"As opposed to using alcohol on hands, they put a hand wash at the entrance. "We were doing it due to lack of supplies, to protect them and ourselves." (Female, 40-49 age group, Chile).</i> <i>"Our protections were not sufficient, so it was very scary." (Female, 30-39 age group, Chile).</i>
12	Helplessness and moral distress	
13 14 15 16 17	Forced to ration life-sustaining equipment and care	<i>"The most severe problem is access to respirator treatment. There have been many such cases, and we have seen many deaths at home" (Male, 50-59 age group, Chile).</i> <i>"They do not seem to take the patients into account much. They treat them like high-risk patients without recovery and don't put them on a ventilator." (Female, 60-69 group of age, Chile).</i> <i>"I understood that the patient died from a lack of dialysis, not from severe organ failure. However, the patient died because of the lack of access to dialysis" (Male, 40-49 age group, Chile).</i>
18 19 20 21 22 23	Concerned about delayed and shortened dialysis sessions	<i>"Patients did not receive an accurate dialysis because of all covid protocol measures you have to take." (Female, 50-59 age group, Chile).</i> <i>"We reduced dialysis time because the hospitals and private units were overstretched. So dialysis is sometimes started late, or the dose is not adequate". (Male, 40-49 age group, Chile).</i> <i>"We do not provide the best quality dialysis because we have less staff to dialyze people, and I have to dialyze people shorter" (Male, 40-49 age group, Chile).</i>
24 25 26 27 28 29	Patient refusal to attend dialysis sessions	<i>"Some patients are afraid of going to the hospital. Other patients take medications on their own, to avoid going to the institution." (Male, 50-59 age group, Peru).</i> <i>"Due to COVID, a patient decided to come only twice a week. A revolver cannot be held to his head to make him attend all three sessions." (Female, 60-69 age group, Uruguay).</i> <i>"A fourth shift of dialyzing COVID-positive patients was started this morning at the largest public hospital. Therefore, patients staged a hunger strike at the entrance door. They were refusing to let patients in because they believed they would infect them."(Male, 40-49 age group, Bolivia)</i>
30 31 32 33 34 35	Grieved by socio-economic disparities	<i>"It is very difficult to realize that people who undergo dialysis are really sick and have no other alternatives." (Male, 40-49 age group, Chile).</i> <i>"Many patients do not work and receive miserable pensions. They are also unable to go out and cannot afford food." (Male, 60-69 age group, Chile).</i> <i>"The lack of access to hospital beds in sectors where the poorest are dialyzed is quite shocking. Consequently, many of them die." (Male, 40-49 age group, Chile).</i>
36 37 38 39 40 41	Deterioration of patients with COVID-19	<i>"We have seen that people, both the staff and patients with positive covid, are very physically impaired." (Male, 60-69 age group, Chile).</i> <i>"After the worst moment, we were left with many chronic patients, and what we deeply owed was rehabilitation. Sadly, these patients were wasted after spending two, three, or four weeks in the intensive care unit (ICU). " (Male, 40-49 age group Chile).</i> <i>The medical community does not give much thought to rehabilitation. With the second wave, we must prepare for what is coming next, so we have little vision for the future." (Male, 40-49 age group, Chile).</i>
42 43 44 45 46 47 48 49	Harms of isolation	<i>"Patients and professionals had to wear masks and glasses, so the patient didn't know who he was talking to. No one visited them at any time, and every day was the same for them. They felt very alone." (Male, 40-49 age group, Chile).</i> <i>"There is much fear and uncertainty in the patients' faces about what is going to happen. Some of them are delivered to death, and they know they are going to die. Because some wanted to be accompanied, share with families, or talk, it was distressing." (Male, 40-49 age group, Chile).</i> <i>"Many doctors bring in screens to help patients communicate, but the most important thing is that you arrive at the emergency room without knowing if you have covid positive relatives until a week or ten days later. The isolation is horrifying." (Female, 50-59 age group, Chile).</i>
50 51 52 53 54 55 56 57	Inability to provide kidney replacement therapy	<i>"As a precaution, the living donor transplant was halted. The cadaver donor transplant was also stopped shortly after. By the time we realized we could resolve the issue, we no longer had beds because all of them were being used by COVID patients" (Male, 40-49 age group, Chile).</i> <i>"Some transplant patients were infected with COVID, and one of them died. Thus, when someone appears to have a fever, we call them, monitor them, and hospitalize them if needed." (Male, 40-49 age group, Chile).</i> <i>"CKD patients disappeared overnight. COVID ate them up. One does not know where they are, how they are. I am frightened of what will happen to them." (Male, 40-49 age group, Chile).</i>
58	Fostering innovative delivery of care	

Expanding use of telehealth	<p>Getting used to the fact that no by person consultation is required, getting used to telehealth" (Male, 40-49 age group, Bolivia).</p> <p>"We have a chat group where our patients ask questions, and if something happens, I send a message and come right away." (Female, 60-69 age group, Uruguay).</p> <p>"The prescription was sent to them via message, and they stay at home, sheltered, and come to the hospital as little as possible." (Male, 40-49 age group, Chile).</p>
Increasing uptake of PD	<p>"COVID patients undergoing PD are managed as outpatients. It is better to leave them at home. PD patients do telehealth unless they have a special clinical situation." (Male, 40-49 age group, Colombia).</p> <p>"We have much fewer complications in PD" (Female, 50-59 age group, Chile).</p> <p>"Patients on PD dialyze at home without risk to other patients nearby." (Male, 40-49 age, Colombia).</p>
Shifting focus on preventing syndemics	<p>"Two young patients with COVID are hospitalized, one of whom is obese. Obese patients have a lower chance of recovery than those with an abnormal BMI " (Female, 40-49 age group, Mexico).</p> <p>"Chronic people are often at risk of developing complications from COVID. Unfortunately, no matter what the vaccine does, there may still be another virus next year. The world is treating the symptoms of this pandemic, but not the causes of this syndemic" (Male, 60-69 age group, Chile).</p> <p>"The world has lost a considerable number of people. We have to lead a healthy lifestyle as we are more vulnerable than we think". (Male, 50-59 age group, Chile).</p>

The conceptual links are shown in Figure 1.

Shock and immediate mobilization for preparedness

Overwhelmed and distressed: Participants were overwhelmed and unprepared for the sudden and severe consequences of COVID-19 and were distressed by the high mortality rates in patients receiving dialysis. They faced “chaos” and a “tsunami of demands” in making rapid changes to minimize the risks of infection in the dialysis setting, and to accommodate an unexpected increased “demand” in the number of patients requiring acute dialysis. It was stressful and exhausting having to constantly remain “alert” in facing such a medical emergency.

Expanding responsibilities to manage COVID 19 infection: Some took on additional responsibilities and cared for non-dialysis patients with COVID-19 and thus felt pressure to high-level skills for treatment they were less familiar with, for example, oxygen therapy and mechanical ventilation – “In hospitals, they throw you to the wolves without you knowing how to provide oxygen; they tell you: just do it.” For some, having to administer treatments for managing COVID-19 was “new” and challenged their “comfort zone.”

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4 *United for workforce resilience:* Dialysis centers faced a critical shortage of staff; some nephrologists
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6 were unable to work because their older age placed them at increased risk for worse outcomes if infected
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8 with COVID-19 and other nephrologists were unavailable because they strived to work on “the front
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10 line”. Younger participants were committed to help because they believed they had a lower risk of
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12 developing severe disease. Confronting the pandemic together, strengthened them as a team, cultivating
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14 solidarity, and they were conscious of supporting each other – “Every day we would discuss, talk, and
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16 approach the health staff, with questions like how you are doing, how are you, or what you need?”.
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18 Some chose to prioritize their clinical responsibility to patients - "I put aside crucial personal things
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20 temporarily because this is my job.”
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26 **Personal vulnerability**

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31 *Being infected with COVID-19:* Participants were terrified about their own risk of being infected with
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33 COVID-19 and tried to stay healthy and said they were “fighting and resisting” the virus. They stated,
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35 “it was very uncertain, we are waiting to get sick, we don’t want to expose ourselves.”
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41 *Fear of transmitting COVID-19 to their family:* Some were worried about bringing the virus home and
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43 infecting family members. That was their “primary concern” because they could not predict if their
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45 family would be exposed to severe illness and even death from COVID-19. Some noted their colleagues
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47 suspended clinic work because they had vulnerable family members, or those who continued to work
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49 chose to isolate themselves from their family – “I sent my family away from Santiago these five months,
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51 because it was very intense.”
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56 **Infrastructural susceptibility of the dialysis unit**

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4 *Lacking resources and facilities for quarantine:* Participants despaired for patients who had COVID-19
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6 as there were insufficient quarantine facilities in the dialysis unit to meet the demand. They could not
7
8 isolate patients with COVID-19 from their family members. In some countries, participants felt helpless
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10 as dialysis units were “running out of space and collapsed.” It was devastating for participants to be
11
12 aware that patients could not access dialysis and their patients instead stayed home to die. Some
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14 participants emphasized more intense medical and lifestyle management to slow disease progression in
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16 patients with chronic kidney disease to delay the need for dialysis.
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22 *Struggling to prevent cross-contamination:* At the onset of the pandemic, participants turned much of
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24 their attention and resources to preventing exposure to COVID-19. It was challenging to enforce social
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26 distancing, avoid “crowds in the waiting room,” and for staff and patients to wear personal protective
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28 equipment. Participants noted that patients took their masks off in the vehicle in which they were
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30 transported to and from the dialysis unit – “if one patient becomes infected, he or she will infect the
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32 entire van because they spend more than an hour and a half or two hours being transported by the van in
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34 a closed space”. In some countries, reusing dialysis filters were no longer permitted– “here we reuse the
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36 dialysis filters. That procedure had to be suspended also when patients had coronavirus.”
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43 *Depletion of personal protective equipment and cleaning supplies:* Some faced an insufficient supply of
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45 personal protective equipment for patients and clinicians – “you cannot give everything to everyone
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47 because there is a lack of resources.” It was stressful to ration supplies between patients and clinicians –
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49 “we wanted to put masks on our patients but initially our hospital did not give us permission to do so
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51 because they were very afraid that they did not have enough supplies for everyone.”
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56 **Helplessness and moral distress**

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4 *Forced to ration life-sustaining equipment and care:* Some had to make harrowing decisions about
5 rationing life-sustaining treatments, in particular dialysis and mechanical ventilation. One participant
6 explained, “I would have made the effort to offer dialysis to two critically ill patients with COVID, but I
7 gave up on offering dialysis. They had no chance of receiving dialysis because there was no dialysis
8 machine.” They were also forced to allocate ventilation to patients they judged to have a better
9 prognosis. They had to do “war medicine” and “tried to distribute the few resources that were available
10 as best as they could.” Some felt judged by others and the dire consequences on patients caused anguish
11 and guilt – “The tremendous challenge of playing God, in the sense of who lives and who does not live,
12 who has the right to be connected or not.”
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26 *Concerned about delayed and shortened dialysis sessions:* Participants were concerned about having to
27 reduce the dialysis prescription for patients to account for the increased time taken to implement strict
28 cleaning protocols due to COVID-19, also to ensure that other patients could receive dialysis – “I had
29 six patients who had to dialyze, and you had only one machine, and there you had to cut dialysis time.”
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Dialysis units were understaffed because staff members had contracted COVID-19 or were unable to
work – “I have less staff to dialyze people, and I have to dialyze shorter.” Some tried to refer patients to
private dialysis units, but those units could not accommodate additional patients.

61 *Patient hesitancy to attend dialysis sessions:* Participants explained about some hesitancy by patients to
62 attend in-center dialysis because of fear of being infected with COVID-19, which caused worry,
63 helplessness, and frustration – “This morning, the largest public hospital adapted an area to dialyze
64 COVID-positive patients on a fourth shift. Therefore, this morning patients went on a hunger strike at
65 the entrance door. They were not letting patients enter because they said they were going to infect
66 them.” They stated that patients were afraid of the possibility of dialyzing near patients with COVID-19.

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4 *Grieved by socio-economic disparities:* Participants were saddened that, patients from low socio-
5
6 economic backgrounds were more disadvantaged because of COVID-19 – “many patients do not
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8 work and receive miserable pensions. They cannot leave their home and they face difficulties accessing
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10 food.” They explained that “where the poorest patients are dialyzed, it is shocking to see how patients
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12 arrive at the emergency room and cannot access a hospital bed, and many of them end up dying.”
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17 *Deterioration of patients with COVID-19:* Some participants did not expect COVID-19 would have
18
19 severe and ongoing symptoms and complications and observed how dialysis patients were in a severely
20
21 weakened state after being infected, "with much sarcopenia that caught my attention". However,
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23 participants commented that “rehabilitation is what we least think about now because we have to prepare
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25 for the waves that come next.”
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31 *Harms of isolation:* Due to the COVID-19 protocols, the dialysis sessions were described as "a bit
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33 depersonalized". Health professionals had to wear a mask and glasses and participants mentioned that
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35 patients "had no idea with whom they were talking to". Participants sought to provide emotional support
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37 because the "patients were very alone"; and for patients with COVID-19, "there were no visits at any
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39 time, and every day for them was the same of others". They noticed that patients were "quite depressed"
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41 and that some patients, “knew they were going to die”.
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47 *Inability to provide transplantation therapy:* In some countries, participants explained that their kidney
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49 transplantation programs were suspended during the COVID-19 pandemic. Participants reported they
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51 did not have beds for transplantation because "they were all used by COVID patients" and "there is a
52
53 long list of dialysis patients waiting for a transplant". Likewise, patients with kidney transplantation who
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55 come to be monitored with some frequency stopped attending hospitals or clinics. They noticed that
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1 patients stopped their following up – “COVID-19 devoured them”. Participants highlighted having no
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4 idea about where their transplant patients, how they are doing or if they have controlled their immune
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6 response – “I have a considerable fear of what will happen to them”.
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10 **Fostering innovative delivery of care**

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15 *Expanding the use of telehealth:* Participants remarked that telehealth "had to be implemented rapidly"
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17 because of the pandemic. Participants described how telehealth “has allowed us to continue working
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19 remotely in hemodialysis’s units. This is good because we can conduct nephrology consults during the
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21 COVID-19 pandemic”. Telemedicine provided them a safe, effective, and efficient way of
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23 communication – "patients send us messages when something happens, and don’t have to travel more
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25 than 800 kilometers to see the doctor".
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32 *Increasing uptake of Peritoneal dialysis (PD):* Some participants expected that there would be an
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34 increase in the number of patients who choose peritoneal dialysis over hemodialysis during the
35
36 pandemic – "We see less complications with peritoneal dialysis than with hemodialysis “. They
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38 recognized that for patients receiving PD "the risk is minimal" and could be managed through
39
40 telemedicine.
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46 *Shifting focus on preventing syndemics:* Participants explained that patients with comorbidities were at
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48 an increased risk of severe infection – "patients with chronic disease, including those with kidney
49
50 disease, suffer the most when developing complications from COVID-19 infection", and that these
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52 clustered within socially disadvantaged and vulnerable groups, and thus had concerns about inequity.
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54 They stated that, "a relatively large number of dialysis patients have died in the world, particularly in our
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56 Latino communities". They urged for a focus on addressing the “syndemic”; "this world is treating the
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1 pandemic's symptoms, and they are not looking for the causes of this as a syndemic"; and called for a
2 more comprehensive approach, encompassing education, employment, housing, food, and the
3 environment – "a comprehensive vision is needed if we are to protect the health of our communities."
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10 CONCLUSION

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15 Nephrologists caring for patients receiving in-centre HD in Latin America during the COVID-19
16 pandemic felt overwhelmed. They had to suddenly mobilize resources to prevent the dialysis patients'
17 and others' exposure to COVID-19 and simultaneously manage individuals who were COVID-19
18 positive. A major challenge was contending with the susceptibility of dialysis units to cross-infection,
19 particularly with the lack of resources for quarantine and PPE supplies. They felt personally vulnerable
20 in being exposed to COVID-19 infection, and the flow on risks to their own families. Having to ration
21 life-sustaining treatment and being unable to provide adequate dialysis and witnessing the trauma of
22 patients being isolated compounded a sense of helplessness and moral distress among nephrologists. The
23 challenges provided an impetus for nephrologists to change the delivery of care with a focus on
24 increasing the use of telehealth, home-based modalities, and preventing syndemics.
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40 The findings were broadly consistent across participants. Nephrologists were concerned about the
41 susceptibility of dialysis units including the lack of PPE, resources for quarantine, and cross-
42 contamination. There appeared to be some differences in the availability of resources at the clinic in
43 which they worked, which was determined by the resources, and the roles in which they had to take on.
44 Due to the risk of infection, some participants reported suspending some procedures such as the reuse of
45 filters, a common practice in dialysis centres in Latin America. They felt helpless about the
46 socioeconomic disparities as patients in low resource areas faced substantial barriers to accessing
47 healthcare and had worse outcomes.
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4 Whilst there are very few studies on nephrologists' perspectives on the care of patients receiving dialysis
5 during the COVID-19 pandemic, similar challenges have been identified across other medical
6 disciplines. Clinicians have described the angst of having to ration⁸ and withhold treatment and
7 experienced tremendous physical and psychological burden. In studies conducted across China, the
8 USA, and Europe, clinicians have reported increased anxiety, depression, and symptoms of post-
9 traumatic stress disorder⁹. Studies in the United States have also identified that Latinx communities are
10 severely disadvantaged in terms of accessing healthcare, and patients were afraid of unemployment,
11 eviction, and inability to protect themselves from COVID-19 as they lived in high-density housing¹⁰.
12 However, specific to the context of dialysis, nephrologists were particularly concerned about patients
13 receiving inadequate dialysis due to the shortened sessions, patient hesitancy to attend dialysis,
14 preventing infection in dialysis units, and suspension of transplantation programs, further increasing the
15 waiting lists in some Latin American countries.
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33 Our study generated comprehensive insights about nephrologists' perspectives on caring for patients
34 receiving dialysis during the COVID-19 pandemic. We conducted interviews until data saturation and
35 used member checking and investigator triangulation to ensure that the findings captured the data
36 collected. However, there are some potential limitations. The participants did not mention the impact on
37 caregivers. Some findings suggest that family caregivers of patients undergoing in-centre HD should be
38 considered by the dialysis team to develop educational and supportive interventions to meet family
39 caregivers' needs, mitigate emotional distress, fears, and concerns, and prevent caregiver burden during
40 the COVID-19 pandemic¹¹. All participants were from Latin America, and thus the transferability of the
41 findings beyond this region is uncertain.
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1 The findings highlight the need to improve access to care during the COVID-19 pandemic. A recent
2 systematic review of data across 20 countries showed that health care utilization decreased by a median
3 of 37% of services overall, 42% for visits, 31% for diagnostics, 30% for therapeutics, and 28% for
4 admissions¹². At the peak of the first wave of infections, several countries scaled back delivery of non-
5 COVID-19 related health services to increase hospital and health system capacity. For example, in
6 Australia, all non-urgent elective surgeries were cancelled to free up space in hospitals (until the end of
7 April 2020)¹³. Similar policies have been implemented in Chile, the United States, and Portugal¹⁴. In
8 France, ambulatory surgery has dropped by nearly 80% during the lockdown period (15 March – 11
9 May 2020) compared to the same period in 2019¹⁵. In Germany, hospitals were encouraged to gradually
10 return to “normal activity” (i.e., end the postponement of elective surgeries) in early May 2020, but
11 continued to reserve between 25-30% of ICU capacity for COVID-19 patients¹⁶. However, there has
12 been an increasing focus on using telemedicine in COVID-19, including in nephrology. Using
13 technology and telehealth, for example, to provide virtual education on CKD and dialysis modalities,
14 transplant evaluations, and training for patients and caregivers to do dialysis, are suggested to potentially
15 improve quality of care and patient outcomes¹⁷.

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38 The prevention of "syndemics," defined as a synergistic interaction between socioecological and
39 biological, resulting in adverse health outcomes, was also identified as a priority. Nephrologists
40 recognized that the impact of the pandemic on patients with CKD and receiving dialysis was intensified
41 because of its diverse nexus of intertwined biological (including comorbidities) and socioecological
42 factors. Therefore, they advocated the need for the health system not to have a single-disease focus but
43 to ensure comprehensive whole-person care. It has been argued that the COVID-19 pandemic has
44 escalated into a syndemic due to several driving factors: overcrowding, loneliness, uncertainty, poor
45 nutrition, and lack of access to health services; and consequently, depression, suicide, domestic violence,
46 and psychiatric illnesses have significantly increased¹⁸. Social determinants of health, such as poverty,
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1 social inequality, social stigma, and the environment where people live and work, significantly affect the
2 intensity of the syndemic¹⁹; which is apparent in the dialysis population particularly in resource-poor
3 settings.
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10 Nephrologists felt vulnerable, helpless, and moral anguish because they were unable to provide access to
11 quality and safe care for patients receiving dialysis. In particular, they were concerned that patients were
12 not receiving an adequate prescription of dialysis with many patients also refusing to attend dialysis
13 sessions. They struggled with infection control measures due to the lack of resources for quarantine and
14 PPE. They also encountered anguish and guilt from having to ration treatment. Better availability and
15 mobilization of resources, and capacities to adapt models of care (i.e. telehealth, home-based dialysis)
16 are urgently needed. This may also help to prepare for future pandemics beyond COVID-19, to
17 minimize the consequences on the care and outcomes of patients receiving dialysis.
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35 during this COVID-19 pandemic and specially to the nephrologist Dr. Andrés Boltansky Brenner who
36 participated in this study and died because of COVID-19 during the preparation of this article.
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43 **Contributions**

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46 AMG participated in the design of the study, conducted the interviews, analysed the data, and drafted the
47 manuscript. AMG, EL, SC, AH, CZ-SM, LS, LM, AFF, LC, MM, ATP, GW, JCC, AT participated in
48 the design of the study, contributed to the analysis, and provided critical intellectual input on the
49 manuscript revisions. All authors approved the manuscript.
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56 **Ethics approval**

1 All participants provided written informed and voluntary consent.. This study was approved by the
2
3
4 Ethics Committee of the University of Sydney (2019-899).
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7 **Data sharing**

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10 No additional data are available.
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16

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18
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24 **Competing interests statement**

25

26 The authors do not have any competing interests or conflicts of interest to declare.
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Figure Legends

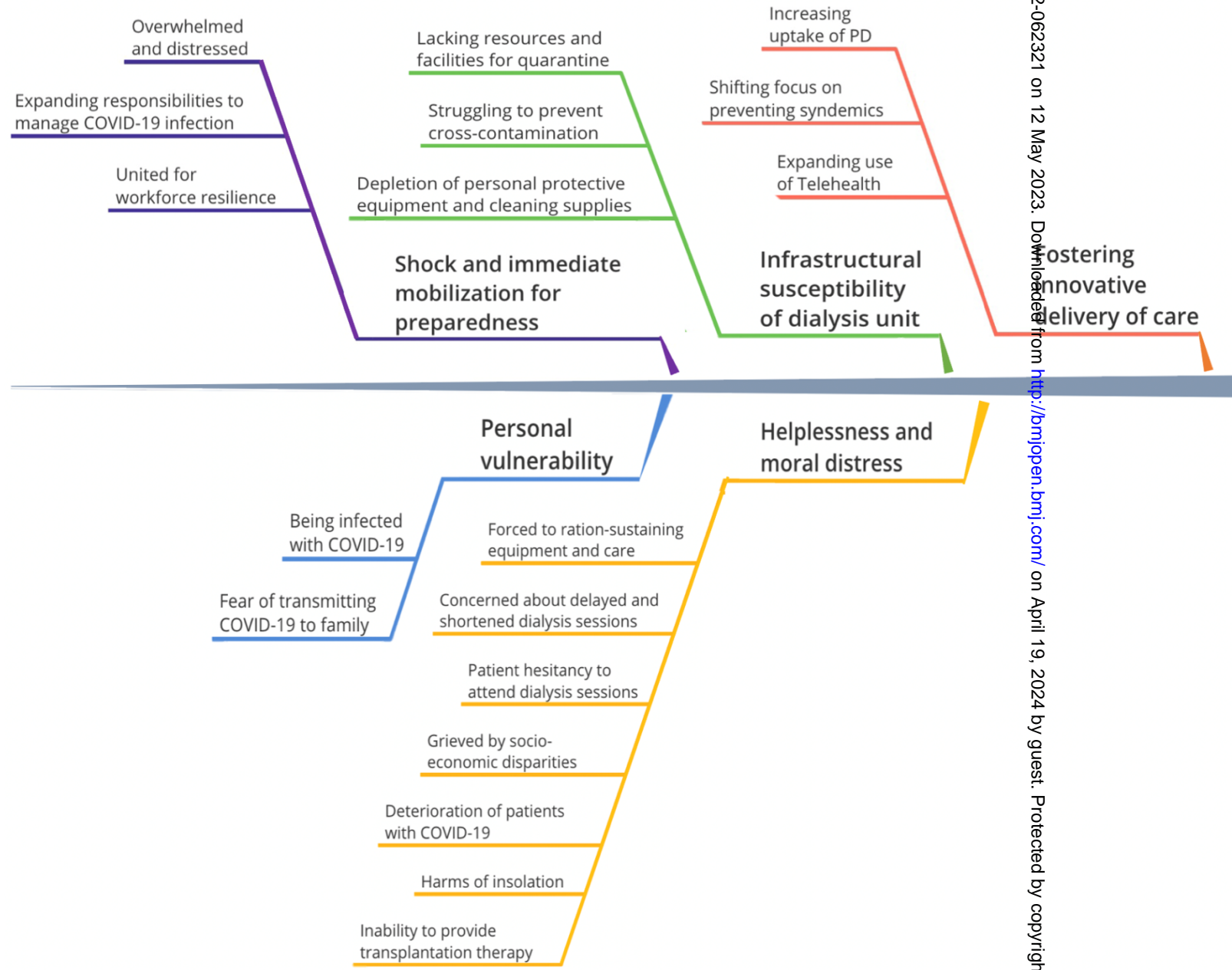
The five themes from the study were shock and immediate mobilization for preparedness (overwhelmed and distressed, expanding responsibilities to manage COVID-19 infection, united for workforce resilience); personal vulnerability (being infected with COVID-19, fear of transmitting COVID-19 to family); infrastructural susceptibility of dialysis units (lacking resources and facilities for quarantine, struggling to prevent cross-contamination, depletion of personal protective equipment and cleaning supplies); helplessness and moral distress (forced to ration life-sustaining equipment and care, concerned about delayed and shortened dialysis sessions, patient hesitancy to attend to dialysis sessions, grieved by socio-economic disparities, deterioration of patients with COVID-19, harms of isolation, inability to provide kidney replacement therapy) and fostering innovative delivery of care (expanding use of telehealth, increasing uptake of peritoneal dialysis, shifting focus on preventing syndemics).

Figure 1. Thematic schema

Supplementary File 1. COREQ Checklist

Supplementary File 2. Interview guide

Figure 1. Thematic schema



Supplementary File 1. COREQ Checklist

No.	Item	Comment	Pages of the manuscript
Domain 1: Research team and reflexivity.			
1	Interview/facilitator	A.M.G	6
2	Credentials	A.M.G (BNtrSc1)	1
3	Occupation	A.M.G, Research Assistant, Dietitian	1
4	Gender	A.M.G (Female)	-
5	Experience and training	A.M.G has conducted and published qualitative research	-
6	Relationship established	2 interviewees were known colleagues	-
7	Participant knowledge of the interviewer	A.M.G is conducting a study to elicit nephrologists' perspectives on providing care to patients receiving dialysis during the COVID-19 pandemic to inform strategies for improving the quality and safety of care for patients receiving dialysis.	-
8	Interviewer characteristics	A.M.G is a PhD Candidate with qualifications in Dietetics and Nutrition	-
Study design			
9	Theoretical framework	Qualitative study (using techniques from grounded theory)	6
10	Sampling	Purposive and snowballing	6
11	Method of approach	Email	6
12	Sample size	N=25 See table 1	23
13	Non-participation	One did not participate because of conflicting schedules.	-
14	Setting of data collection	Zoom	6
15	Presence of non-participants	None	-
16	Description of sample	Refer to Table 1	23
17	Interview guide	Provided in Supplementary File 1	-
18	Repeat interviews	Single interview conducted	-
19	Audio/visual recording	Interviews were audio recorded	6
20	Field notes	A.M.G recorded field notes	6
21	Duration	The mean duration of the interviews was 20 minutes.	-
22	Data saturation	Yes	7
23	Transcripts returned	No	-
Analysis and findings			
24	Number of data coders	4 (A.H., E.L., S.C., A.T.)	7
25	Description of the coding tree	No – see themes	-
26	Derivation of themes	Inductively derived from data	7
27	Software	HyperRESEARCH	7
28	Participant checking	Yes	23
29	Quotations presented	Refer to Table 2	24-25
30	Data and findings consistent	Quotations provided to illustrate each theme.	24-25
31	Clarity of major themes	Yes – themes	7
32	Clarity of minor themes	Yes – see subthemes and description of the themes	7

Supplementary File 2. Interview guide

Introduction

We are interested in the nephrologists' perspectives on the impact of COVID-19 on the care of patients receiving haemodialysis. We would like to know your opinion about whether you think there are differences in the care of patients on haemodialysis therapy infected by the SARS-CoV-2 virus. What are the first reactions to prepare for the Covid pandemic, the consequences of COVID-19 on the care of patients receiving dialysis, and the expectations and suggestions for post-Covid care?

Part 1: Initial reactions and preparation for Covid-19:

1. When did you initially hear about COVID 19? What was your response to caring for patients on dialysis?
2. What were your main concerns – for patients, for yourself, for the staff?
3. What sorts of things did you have to do to prepare for the COVID-19 in terms of managing dialysis? What were the challenges, and how did you resolve these?

Part 2: Impact of COVID-19 on the care of the patient receiving dialysis

4. What was the most significant impact of COVID-19 on the care of patients receiving dialysis – why? (Access to dialysis, health outcomes, quality of life etc.)
5. Were you able to address these – why, how?
6. What were the biggest challenges for you and the staff, the dialysis unit?
7. What were the most significant changes you have made, and how did you feel about these changes? Did you have patients receiving dialysis who had COVID-19 – what were the biggest challenges for the patient/for you?

Part 3: Expectations and Suggestions for Post-Covid care:

8. What are/what do you expect maybe the challenges or changes patients will face as things improve?
9. What do you expect will happen after COVID-19 with the care of patients receiving dialysis? (Medium to long-term changes?)
10. Are there any changes you should implement or should continue through the post -COVID 19 - why?
11. What are the key learnings you have gained during this pandemic in terms of patient care? Could those apply now and in the future?

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2 **Close**
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4 Is there anything else you would like to add?
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6 Thank you.
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BMJ Open

Nephrologists' perspectives on the impact of COVID-19 on caring for patients receiving dialysis in Latin America: a qualitative study

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1 **Nephrologists' perspectives on the impact of COVID-19 on caring for patients**
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4 **receiving dialysis in Latin America: a qualitative study**
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For peer review only

Abstract

Objectives: To describe the experiences of nephrologists on caring for patients receiving in-center hemodialysis during the COVID-19 pandemic in Latin America.

Design: Twenty-five semi-structured interviews were conducted by zoom videoconference in English and Spanish languages during 2020 until data saturation. Using thematic analysis, we conducted line-by-line coding to inductively identify themes.”

Setting: 25 centers across 9 Latin American countries.

Participants: Nephrologists (17 male, 8 female) were purposively sampled to include diverse demographic characteristics and clinical experience.

Results: We identified five themes: shock and immediate mobilization for preparedness (overwhelmed and distressed, expanding responsibilities to manage COVID-19 infection, united for workforce resilience); personal vulnerability (being infected with COVID-19, fear of transmitting COVID-19 to family); infrastructural susceptibility of dialysis units (lacking resources and facilities for quarantine, struggling to prevent cross-contamination, depletion of personal protective equipment and cleaning supplies); helplessness and moral distress (forced to ration life-sustaining equipment and care, concerned about delayed and shortened dialysis sessions, patient hesitancy to attend to dialysis sessions, grieved by socio-economic disparities, deterioration of patients with COVID-19, harms of isolation, inability to provide kidney replacement therapy) and fostering innovative delivery of care (expanding use of telehealth, increasing uptake of peritoneal dialysis, shifting focus on preventing syndemics).

Conclusions: Nephrologists felt personally and professionally vulnerable and reported feeling helpless and morally distressed because they doubted their capacity to provide safe care for patients receiving dialysis. Better availability, mobilization of resources, and capacities to adapt models of care, including telehealth and home-based dialysis, are urgently needed.

1 **Keywords:** Covid-19, dialysis therapy, interviews, nephrologists' experience, pandemic, qualitative,
2 Latin America.
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9 **Strengths and limitations of the study**

- 10 • Semi-structured interviews were conducted with nephrologists purposively sampled across nine
11 countries to obtain in-depth and diverse data on their perspectives on the impact of COVID-19
12 on caring for patients receiving dialysis in Latin America.
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- 15 • The range of perspectives and challenges obtained will inform the need to improve access to care
16 during the COVID-19 pandemic.
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18
- 19 • All participants were from Latin America, and thus the transferability of the findings beyond this
20 region is uncertain.
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INTRODUCTION

The SARS-CoV-2 related disease (COVID-19) pandemic has disrupted, delayed, and impeded access to treatment among individuals with chronic illness, including patients with kidney failure receiving maintenance dialysis¹. For patients receiving long-term dialysis, their risk of acquiring COVID-19 is estimated to be five times higher, and they are four times more likely to die than the general population².

The pandemic has seen major reconfiguration of care in many health institutions to manage the increased demand to care for people with COVID-19. Unfortunately, this has inadvertently shifted resources away from the care of patients with other medical conditions, including kidney disease.

Dialysis units have been faced with unprecedented challenges. For patients receiving in center hemodialysis (HD), physical distancing within the unit and during transportation can be difficult³.

Clinicians caring for patients receiving dialysis have encountered a shortage of personal protective equipment (PPE) and unable to access quarantine facilities for patients with infection⁴. Preventing infection in dialysis facilities is particularly challenging in resource-limited settings. For example, guidelines recommend that the reuse of dialysis filters should be ceased⁵, which had been common practice in some resource-limited settings, including in Latin America. Such regions, also contend with an increased risk of SARS-CoV-2⁶ because of high-density housing and large socioeconomically disadvantaged communities.

However, little is known about nephrologists' experiences providing care to patients receiving dialysis; particularly in low-resource settings with high rates of COVID-19 infection, including Latin America.

This study aims to describe nephrologists' perspectives on providing care to patients receiving dialysis during the COVID-19 pandemic to inform strategies for improving the quality and safety of care for patients receiving dialysis.

METHODS

We used the Consolidated Criteria for Reporting Qualitative Health Research (COREQ)⁷ (Supplementary File 1).

Patient and public involvement

Patients were not involved in this study as this study aimed to describe the perspectives of clinicians.

Participant selection

Nephrologists caring for adults receiving dialysis, including hemodialysis and peritoneal dialysis, in Latin America, irrespective of years of clinical experience in dialysis settings, were eligible to participate. We used purposive sampling to include participants across a diverse range of ages, gender, years of clinical experience, and countries. Nephrologists were identified through our professional networks (SLANH- Sociedad latinoamericana de nefrología e hipertensión) and invited by email to participate. Participants could nominate other colleagues to participate. All the participants were given a consent form to participate. This study was approved by the Ethics Committee of the University of Sydney (2019-899).

Data collection

The interview guide was developed based on the literature and discussion among the investigators (Supplementary File 2). Two authors (A.M.G, A.H) conducted semi-structured interviews in English or Spanish language (as preferred by the participant) by zoom videoconference from June 2020 to

1 November 2020 until data saturation. Author A.M.G, a PhD candidate with experience in qualitative
2 studies, had practiced as a dietitian, in dialysis units in Chile. Her interest in the impact of COVID-19
3 and knowledge of the health system informed to the conceptualization of the research, design, data
4 collection and analysis. The interviews were recorded and transcribed in English and Spanish.
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10 11 12 **Data analysis**

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17 Using inductive thematic analysis and drawing from the principles of grounded theory, author A.M.G
18 performed line-by-line coding of the transcripts, used constant comparison within and across transcripts,
19 and inductively identified preliminary concepts. Similar concepts were grouped into themes and
20 subthemes, and patterns were identified among themes. The interview transcripts were imported into
21 HyperRESEARCH (version 4.0.1 ResearchWare Inc. Randolph MA). Investigators A.H., E.L., S.C.,
22 A.J., reviewed the themes to ensure that the analysis captured the full range and depth of the data
23 obtained. We conducted a member checking whereby the preliminary findings were sent to participants
24 for comment and integrated any additional insights into the final analysis.
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38 **RESULTS**

39 **Participant characteristics**

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43 All 25 invited nephrologists (100% response rate) participated, from 25 centers across 9 countries
44 (Chile, Colombia, Uruguay, Guatemala, Peru, Bolivia, Brazil, Argentina, Mexico) (Table 1). Of the
45 participants, 8 (55%) were women; 17 (59%) were from countries where English was not an official
46 language, and 9 (18%) were from low- and middle-income countries. The average duration of the
47 interviews was 35 minutes (ranging from 30 to 42 minutes). Nine participants responded to the
48 preliminary findings and confirmed that the findings captured their perspectives.
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Table 1. Participant characteristics (N=25)

Sex		
Female	8	32
Male	17	68
Age group (years)		
30-39	1	4
40-49	8	32
50-59	10	40
60 and over	6	24
Center volume (number of patients receiving dialysis)		
1-20	3	12
21-40	1	4
41-60	2	8
More than 60	19	76
Dialysis setting*		
Outpatient dialysis units	14	56
Hospital	16	64
Care for patients with confirmed COVID-19		
Yes	21	84
No	4	16
Tested for COVID-19		
Yes	12	48
No	13	52
COVID-19 test result		
Positive	1	4
Negative	24	96
Country*		
Chile	13	52
Colombia	3	12
Uruguay	2	8
Guatemala	2	8
Peru	1	4
Bolivia	1	4
Brazil	1	4
Argentina	1	4
Mexico	1	4

*Percentage may not equal to 100% as participants could have experience in multiple settings

Themes

We identified five themes: shock and immediate mobilization for preparation, personal vulnerability, infrastructure susceptibility of the dialysis unit, helplessness, and moral anguish, promotion of innovative provision of care. The respective subthemes are described below with illustrative quotations provided in Table 2.

Table 2. Selected illustrative quotations to support each theme

Theme	Quotations
Shock and immediate mobilization for preparedness	
Overwhelmed and distressed	<p>"We become in little machines to make decisions, with a high emotional cost" (Male 40-49 age group, Chile).</p> <p>"200 dead in one day, dam! there is a stab in the back. The distress of colleagues and the health professionals is enormous" (Male 60-69 age group, Chile).</p> <p>"It is shocking to see all the mortality. It has been painful for our patients and us. Every week they inform us: [patient A, B, C] did not survive and died" (Female 50-59 age group, Chile).</p>
Expanding responsibilities to manage COVID 19 infection	<p>"We went as a team, gaining experience, but at first, it was like a hit in my head. We did not know what we were up against" (Female 50-59 age group, Chile).</p> <p>"I have had to learn a lot about COVID, about acute kidney failure, about mechanical ventilation, because of this emergency" (Male 40-49 age group, Chile).</p> <p>"So, we have to adapt, study and collect others' experiences since nothing was known about this virus. Everything has been new" (Female 30-39 age group, Chile).</p>
United for workforce resilience	<p>"Everything has changed in my life. I was focused on being well to collaborate and being useful in the pandemic, putting aside personal projects because this is my vocation. I could not subtract myself, there was a spirit to serve, help, and resist" (Female 30-39 age group, Chile).</p> <p>"We had a very nice movement, lovely behaviour of the health workers, students. They proactively asked to help because they are young, and low risk" (Male 47-49 age group, Brazil)</p> <p>"During this COVID period, we have learned to work as a team, everyone giving his best" (Male 40-43 age group Chile).</p>
Personal vulnerability	
Being infected with COVID-19	<p>"It was very uncertain, waiting to get sick, exposing oneself, or hiding. I was scared" (Male 40-49 age group, Chile).</p> <p>"How to combat the fear of getting ill, first as a human being, and then as a member of a health team. How to prevent the infection from your patients, and it does not affect you" (Male 60-69 age group, Chile).</p> <p>When the patients got infected, I checked their symptoms when I got home. "This hurts me, it hurts there" (Female 60-60 age group, Chile).</p>
Fear of transmitting COVID-19 to family	<p>"I am most concerned about spreading the virus to my family rather than getting sick myself." (Female 50-59 age group, Chile)</p> <p>"Old and young people have died, and you can be responsible for infecting your family members by bringing the virus home." (Male 50-59 age group, Colombia)</p> <p>"Health personnel with risk factors, or who fear infecting their family members, were absent"(Female 30-39 age group, Chile).</p>
Infrastructural susceptibility of dialysis unit	
Lacking resources and facilities for quarantine	<p>"Having no control during the pandemic has made it impossible for patients to access medicine. We are running out of space in the units because they have not been followed up on, have stage 5 and need dialysis urgently." (Male 40-49 age group, Bolivia).</p> <p>"Patients cannot eat anymore during the dialysis session, we have had to adapt the dialysis centres 24x7 with separations, so they have the minor contact possible." (Male 40-49 age group, Chile).</p> <p>"The dialysis access has been cut off. "We are trying to make our stage five patients endure as long as possible, medically and nutritionally, to prevent complications." (Female 50-59 age group, Chile).</p>

Struggling to prevent cross-contamination	<p><i>"Dialysis patients do not have a quarantine; it is an armchair and a different shift than usual." (Female 50-59 age group, Chile).</i></p> <p><i>"some patients must take public transportation to go home.. This is exactly the opposite of what we are trying to prevent cross-contamination in the units, to take care of them." (Male 40-49 age group, Brazil).</i></p> <p><i>"Some patients have bought biosecurity suits and wear them while walking in the street or while putting on gloves without washing their hands." (Male 40-49 age group, Bolivia).</i></p>
Depletion of PPT and cleaning supplies	<p><i>"We wore shoe covers that, after a short time, were no longer available due to a lack of resources. So you place quaternary ammonium rubbers on the floor to clean feet" (Male 60-69 age group, Chile).</i></p> <p><i>"As opposed to using alcohol on hands, they put a hand wash at the entrance. "We were doing it due to lack of supplies, to protect them and ourselves." (Female, 40-49 age group, Chile).</i></p> <p><i>"Our protections were not sufficient, so it was very scary." (Female, 30-39 age group, Chile).</i></p>
Helplessness and moral distress	
Forced to ration life-sustaining equipment and care	<p><i>"The most severe problem is access to respirator treatment. There have been many such cases, and we have seen many deaths at home" (Male, 50-59 age group, Chile).</i></p> <p><i>"They do not seem to take the patients into account much. They treat them like high-risk patients without recovery and don't put them on a ventilator." (Female, 60-69 group of age, Chile).</i></p> <p><i>"I understood that the patient died from a lack of dialysis, not from severe organ failure. However, the patient died because of the lack of access to dialysis" (Male, 40-49 age group, Chile).</i></p>
Concerned about delayed and shortened dialysis sessions	<p><i>"Patients did not receive an accurate dialysis because of all covid protocol measures you have to take." (Female, 50-59 age group, Chile).</i></p> <p><i>"We reduced dialysis time because the hospitals and private units were overstretched. So dialysis is sometimes started late, or the dose is not adequate". (Male, 40-49 age group, Chile).</i></p> <p><i>"We do not provide the best quality dialysis because we have less staff to dialyze people, and I have to dialyze people shorter" (Male, 40-49 age group, Chile).</i></p>
Patient refusal to attend dialysis sessions	<p><i>"Some patients are afraid of going to the hospital. Other patients take medications on their own, to avoid going to the institution." (Male, 50-59 age group, Peru).</i></p> <p><i>"Due to COVID, a patient decided to come only twice a week. A revolver cannot be held to his head to make him attend all three sessions." (Female, 60-69 age group, Uruguay).</i></p> <p><i>"A fourth shift of dialyzing COVID-positive patients was started this morning at the largest public hospital. Therefore, patients staged a hunger strike at the entrance door. They were refusing to let patients in because they believed they would infect them."(Male, 40-49 age group, Bolivia)</i></p>
Grieved by socio-economic disparities	<p><i>"It is very difficult to realize that people who undergo dialysis are really sick and have no other alternatives." (Male, 40-49 age group, Chile).</i></p> <p><i>"Many patients do not work and receive miserable pensions. They are also unable to go out and cannot afford food." (Male, 60-69 age group, Chile).</i></p> <p><i>"The lack of access to hospital beds in sectors where the poorest are dialyzed is quite shocking. Consequently, many of them die." (Male, 40-49 age group, Chile).</i></p>
Deterioration of patients with COVID-19	<p><i>"We have seen that people, both the staff and patients with positive covid, are very physically impaired." (Male, 60-69 age group, Chile).</i></p> <p><i>"After the worst moment, we were left with many chronic patients, and what we deeply owed was rehabilitation. Sadly, these patients were wasted after spending two, three, or four weeks in the intensive care unit (ICU). " (Male, 40-49 age group Chile).</i></p> <p><i>The medical community does not give much thought to rehabilitation. With the second wave, we must prepare for what is coming next, so we have little vision for the future." (Male, 40-49 age group, Chile).</i></p>
Harms of isolation	<p><i>"Patients and professionals had to wear masks and glasses, so the patient didn't know who he was talking to. No one visited them at any time, and every day was the same for them. They felt very alone." (Male, 40-49 age group, Chile).</i></p> <p><i>"There is much fear and uncertainty in the patients' faces about what is going to happen. Some of them are delivered to death, and they know they are going to die. Because some wanted to be accompanied, share with families, or talk, it was distressing." (Male, 40-49 age group, Chile).</i></p> <p><i>"Many doctors bring in screens to help patients communicate, but the most important thing is that you arrive at the emergency room without knowing if you have covid positive relatives until a week or ten days later. The isolation is horrifying." (Female, 50-59 age group, Chile).</i></p>
Inability to provide kidney replacement therapy	<p><i>"As a precaution, the living donor transplant was halted. The cadaver donor transplant was also stopped shortly after. By the time we realized we could resolve the issue, we no longer had beds because all of them were being used by COVID patients" (Male, 40-49 age group, Chile).</i></p> <p><i>"Some transplant patients were infected with COVID, and one of them died. Thus, when someone appears to have a fever, we call them, monitor them, and hospitalize them if needed." (Male, 40-49 age group, Chile).</i></p> <p><i>"CKD patients disappeared overnight. COVID ate them up. One does not know where they are, how they are. I am frightened of what will happen to them." (Male, 40-49 age group, Chile).</i></p>
Fostering innovative delivery of care	

1	Expanding use of telehealth	<i>Getting used to the fact that no by person consultation is required, getting used to telehealth" (Male, 40-49 age group, Bolivia).</i>
2		<i>"We have a chat group where our patients ask questions, and if something happens, I send a message and come right away." (Female, 60-69 age group, Uruguay).</i>
3		<i>"The prescription was sent to them via message, and they stay at home, sheltered, and come to the hospital as little as possible." (Male, 40-49 age group, Chile).</i>
4	Increasing uptake of PD	<i>"COVID patients undergoing PD are managed as outpatients. It is better to leave them at home. PD patients do telehealth unless they have a special clinical situation." (Male, 40-49 age group, Colombia).</i>
5		<i>"We have much fewer complications in PD" (Female, 50-59 age group, Chile).</i>
6		<i>"Patients on PD dialyze at home without risk to other patients nearby." (Male, 40-49 age, Colombia).</i>
7	Shifting focus on preventing syndemics	<i>"Two young patients with COVID are hospitalized, one of whom is obese. Obese patients have a lower chance of recovery than those with an abnormal BMI " (Female, 40-49 age group, Mexico).</i>
8		<i>"Chronic people are often at risk of developing complications from COVID. Unfortunately, no matter what the vaccine does, there may still be another virus next year. The world is treating the symptoms of this pandemic, but not the causes of this syndemic" (Male, 60-69 age group, Chile).</i>
9		<i>"The world has lost a considerable number of people. We have to lead a healthy lifestyle as we are more vulnerable than we think". (Male, 50-59 age group, Chile).</i>

The conceptual links are shown in Figure 1.

Shock and immediate mobilization for preparedness

Overwhelmed and distressed: Participants were overwhelmed and unprepared for the sudden and severe consequences of COVID-19 and were distressed by the high mortality rates in patients receiving dialysis. They faced “chaos” and a “tsunami of demands” in making rapid changes to minimize the risks of infection in the dialysis setting, and to accommodate an unexpected increased “demand” in the number of patients requiring acute dialysis. It was stressful and exhausting having to constantly remain “alert” in facing such a medical emergency.

Expanding responsibilities to manage COVID 19 infection: Some took on additional responsibilities and cared for non-dialysis patients with COVID-19 and thus felt pressure to high-level skills for treatment they were less familiar with, for example, oxygen therapy and mechanical ventilation – “In hospitals, they throw you to the wolves without you knowing how to provide oxygen; they tell you: just do it.” For some, having to administer treatments for managing COVID-19 was “new” and challenged their “comfort zone.”

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4 *United for workforce resilience:* Dialysis centers faced a critical shortage of staff; some nephrologists
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6 were unable to work because their older age placed them at increased risk for worse outcomes if infected
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8 with COVID-19 and other nephrologists were unavailable because they strived to work on “the front
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10 line”. Younger participants were committed to help because they believed they had a lower risk of
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12 developing severe disease. Confronting the pandemic together, strengthened them as a team, cultivating
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14 solidarity, and they were conscious of supporting each other – “Every day we would discuss, talk, and
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16 approach the health staff, with questions like how you are doing, how are you, or what you need?”.
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18 Some chose to prioritize their clinical responsibility to patients - "I put aside crucial personal things
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20 temporarily because this is my job.”
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26 **Personal vulnerability**

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31 *Being infected with COVID-19:* Participants were terrified about their own risk of being infected with
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33 COVID-19 and tried to stay healthy and said they were “fighting and resisting” the virus. They stated,
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35 “it was very uncertain, we are waiting to get sick, we don’t want to expose ourselves.”
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41 *Fear of transmitting COVID-19 to their family:* Some were worried about bringing the virus home and
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43 infecting family members. That was their “primary concern” because they could not predict if their
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45 family would be exposed to severe illness and even death from COVID-19. Some noted their colleagues
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47 suspended clinic work because they had vulnerable family members, or those who continued to work
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49 chose to isolate themselves from their family – “I sent my family away from Santiago these five months,
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51 because it was very intense.”
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56 **Infrastructural susceptibility of the dialysis unit**

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4 *Lacking resources and facilities for quarantine:* Participants despaired for patients who had COVID-19
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6 as there were insufficient quarantine facilities in the dialysis unit to meet the demand. They could not
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8 isolate patients with COVID-19 from their family members. In some countries, participants felt helpless
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10 as dialysis units were “running out of space and collapsed.” It was devastating for participants to be
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12 aware that patients could not access dialysis and their patients instead stayed home to die.
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17 *Struggling to prevent cross-contamination:* At the onset of the pandemic, participants turned much of
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19 their attention and resources to preventing exposure to COVID-19. It was challenging to enforce social
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21 distancing, avoid “crowds in the waiting room,” and for staff and patients to wear personal protective
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23 equipment. Participants noted that patients took their masks off in the vehicle in which they were
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25 transported to and from the dialysis unit – “if one patient becomes infected, he or she will infect the
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27 entire van because they spend more than an hour and a half or two hours being transported by the van in
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29 a closed space”. In some countries, reusing dialysis filters were no longer permitted– “here we reuse the
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31 dialysis filters. That procedure had to be suspended also when patients had coronavirus.”
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38 *Depletion of personal protective equipment and cleaning supplies:* Some faced an insufficient supply of
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40 personal protective equipment for patients and clinicians – “you cannot give everything to everyone
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42 because there is a lack of resources.” It was stressful to ration supplies between patients and clinicians –
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44 “we wanted to put masks on our patients but initially our hospital did not give us permission to do so
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46 because they were very afraid that they did not have enough supplies for everyone.”
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52 **Helplessness and moral distress**

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Forced to ration life-sustaining equipment and care: Some had to make harrowing decisions about rationing life-sustaining treatments, in particular dialysis and mechanical ventilation. One participant explained, “I would have made the effort to offer dialysis to two critically ill patients with COVID, but I gave up on offering dialysis. They had no chance of receiving dialysis because there was no dialysis machine.” They were also forced to allocate ventilation to patients receiving dialysis in the hospital setting, who they judged to have a better prognosis. They had to do “war medicine” and “tried to distribute the few resources that were available as best as they could.” Some felt judged by others and the dire consequences on patients caused anguish and guilt – “The tremendous challenge of playing God, in the sense of who lives and who does not live, who has the right to be connected or not.”

Concerned about delayed and shortened dialysis sessions: Participants were concerned about having to reduce the dialysis prescription for patients to account for the increased time taken to implement strict cleaning protocols due to COVID-19, also to ensure that other patients could receive dialysis – “I had six patients who had to dialyze, and you had only one machine, and there you had to cut dialysis time.” Dialysis units were understaffed because staff members had contracted COVID-19 or were unable to work – “I have less staff to dialyze people, and I have to dialyze shorter.” Some tried to refer patients to private dialysis units, but those units could not accommodate additional patients.

Patient hesitancy to attend dialysis sessions: Participants explained about some hesitancy by patients to attend in-center dialysis because of fear of being infected with COVID-19, which caused worry, helplessness, and frustration – “This morning, the largest public hospital adapted an area to dialyze COVID-positive patients on a fourth shift. Therefore, this morning patients went on a hunger strike at the entrance door. They were not letting patients enter because they said they were going to infect them.” They stated that patients were afraid of the possibility of dialyzing near patients with COVID-19.

1 *Grieved by socio-economic disparities:* Participants were saddened that, patients from low socio-
2 economic backgrounds were more disadvantaged because of COVID-19 – “many patients are do not
3 work and receive miserable pensions. They cannot leave their home and they face difficulties accessing
4 food.” They explained that “where the poorest patients are dialyzed, it is shocking to see how patients
5 arrive at the emergency room and cannot access a hospital bed, and many of them end up dying.”
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15 *Deterioration of patients with COVID-19:* Some participants did not expect COVID-19 would have
16 severe and ongoing symptoms and complications and observed how dialysis patients were in a severely
17 weakened state after being infected, "with much sarcopenia that caught my attention". However,
18 participants commented that “rehabilitation is what we least think about now because we have to prepare
19 for the waves that come next.”
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29 *Harms of isolation:* Due to the COVID-19 protocols, the dialysis sessions were described as "a bit
30 depersonalized". Health professionals had to wear a mask and glasses and participants mentioned that
31 patients "had no idea with whom they were talking to". Participants sought to provide emotional support
32 because the "patients were very alone"; and for patients with COVID-19, "there were no visits at any
33 time, and every day for them was the same of others". They noticed that patients were "quite depressed"
34 and that some patients, “knew they were going to die”.
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45 *Inability to provide transplantation therapy:* In some countries, participants explained that their kidney
46 transplantation programs were suspended during the COVID-19 pandemic. Participants reported they
47 did not have beds for transplantation because "they were all used by COVID patients" and "there is a
48 long list of dialysis patients waiting for a transplant". Likewise, patients with kidney transplantation who
49 come to be monitored with some frequency stopped attending hospitals or clinics. They noticed that
50 patients stopped their following up – “COVID-19 devoured them”. Participants highlighted having no
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1 idea about where their transplant patients, how they are doing or if they have controlled their immune
2 response – “I have a considerable fear of what will happen to them”.
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8 **Fostering innovative delivery of care**

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13 *Expanding the use of telehealth:* Participants remarked that telehealth "had to be implemented rapidly"
14 because of the pandemic. Participants described how telehealth “has allowed us to continue working
15 remotely in hemodialysis’s units. This is good because we can conduct nephrology consults during the
16 COVID-19 pandemic”. Telemedicine provided them a safe, effective, and efficient way of
17 communication – “patients send us messages when something happens, and don’t have to travel more
18 than 800 kilometers to see the doctor”.
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29 *Increasing uptake of Peritoneal dialysis (PD):* Some participants expected that there would be an
30 increase in the number of patients who choose peritoneal dialysis over hemodialysis during the
31 pandemic – “We see less complications with peritoneal dialysis than with hemodialysis “. They
32 recognized that for patients receiving PD "the risk is minimal" and could be managed through
33 telemedicine.
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43 *Shifting focus on preventing syndemics:* Participants explained that patients with comorbidities were at
44 an increased risk of severe infection – “patients with chronic disease, including those with kidney
45 disease, suffer the most when developing complications from COVID-19 infection”, and that these
46 clustered within socially disadvantaged and vulnerable groups, and thus had concerns about inequity.
47 They stated that, "a relatively large number of dialysis patients have died in the world, particularly in our
48 Latino communities". They urged for a focus on addressing the “syndemic”; "this world is treating the
49 pandemic's symptoms, and they are not looking for the causes of this as a syndemic"; and called for a
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1 more comprehensive approach, encompassing education, employment, housing, food, and the
2 environment – "a comprehensive vision is needed if we are to protect the health of our communities."
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8 **DISCUSSION**

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12 Nephrologists caring for patients receiving in-centre HD in Latin America during the COVID-19
13 pandemic felt overwhelmed. They had to suddenly mobilize resources to prevent the dialysis patients'
14 and others' exposure to COVID-19 and simultaneously manage individuals who were COVID-19
15 positive. A major challenge was contending with the susceptibility of dialysis units to cross-infection,
16 particularly with the lack of resources for quarantine and PPE supplies. They felt personally vulnerable
17 in being exposed to COVID-19 infection, and the flow on risks to their own families. Having to ration
18 life-sustaining treatment and being unable to provide adequate dialysis and witnessing the trauma of
19 patients being isolated compounded a sense of helplessness and moral distress among nephrologists. The
20 challenges provided an impetus for nephrologists to change the delivery of care with a focus on
21 increasing the use of telehealth, home-based modalities, and preventing syndemics.
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38 The findings were broadly consistent across participants. Nephrologists were concerned about the
39 susceptibility of dialysis units including the lack of PPE, resources for quarantine, and cross-
40 contamination. There appeared to be some differences in the availability of resources at the clinic in
41 which they worked, which was determined by the resources, and the roles in which they had to take on.
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43 Due to the risk of infection, some participants reported suspending some procedures such as the reuse of
44 filters, a common practice in dialysis centres in Latin America. They felt helpless about the
45 socioeconomic disparities as patients in low resource areas faced substantial barriers to accessing
46 healthcare and had worse outcomes.
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1 Whilst there are very few studies on nephrologists' perspectives on the care of patients receiving dialysis
2 during the COVID-19 pandemic, similar challenges have been identified across other medical
3 disciplines. Clinicians have described the angst of having to ration⁸ and withhold treatment and
4 experienced tremendous physical and psychological burden. In studies conducted across China, the
5 USA, and Europe, clinicians have reported increased anxiety, depression, and symptoms of post-
6 traumatic stress disorder⁹. Studies in the United States have also identified that Latinx communities are
7 severely disadvantaged in terms of accessing healthcare, and patients were afraid of unemployment,
8 eviction, and inability to protect themselves from COVID-19 as they lived in high-density housing¹⁰.
9 However, specific to the context of dialysis, nephrologists were particularly concerned about patients
10 receiving inadequate dialysis due to the shortened sessions, patient hesitancy to attend dialysis,
11 preventing infection in dialysis units, and suspension of transplantation programs, further increasing the
12 waiting lists in some Latin American countries.
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31 Patients receiving dialysis and caregivers have also reported feeling distressed and vulnerable in dialysis
32 settings during the COVID-19 pandemic, particularly if they observed inadequacies and inconsistencies
33 in infection control practices¹¹. Patients receiving dialysis reported that they were concerned about the
34 cancellation of follow up appointments as they could not monitor their blood results, missed dialysis
35 sessions, and were anxious about risk of complications such as hyperkalaemia^{12, 13}. However, patients
36 have emphasized concerns about the potential loss of or delay in receiving a kidney transplant¹⁴.
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47 Our study generated comprehensive insights about nephrologists' perspectives on caring for patients
48 receiving dialysis during the COVID-19 pandemic. We conducted interviews until data saturation and
49 used member checking and investigator triangulation to ensure that the findings captured the data
50 collected. However, there are some potential limitations. The participants did not mention the impact on
51 caregivers. Some findings suggest that family caregivers of patients undergoing in-centre HD should be
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1 considered by the dialysis team to develop educational and supportive interventions to meet family
2 caregivers' needs, mitigate emotional distress, fears, and concerns, and prevent caregiver burden during
3 the COVID-19 pandemic¹⁵. All participants were from Latin America, and thus the transferability of the
4 findings beyond this region is uncertain.
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15 The prevention of "syndemics," defined as a synergistic interaction between socioecological and
16 biological, resulting in adverse health outcomes, was also identified as a priority. Nephrologists
17 recognized that the impact of the pandemic on patients with CKD and receiving dialysis was intensified
18 because of its diverse nexus of intertwined biological (including comorbidities) and socioecological
19 factors. Therefore, they advocated the need for the health system not to have a single-disease focus but
20 to ensure comprehensive whole-person care. It has been argued that the COVID-19 pandemic has
21 escalated into a syndemic due to several driving factors: overcrowding, loneliness, uncertainty, poor
22 nutrition, and lack of access to health services; and consequently, depression, suicide, domestic violence,
23 and psychiatric illnesses have significantly increased¹⁶. Social determinants of health, such as poverty,
24 social inequality, social stigma, and the environment where people live and work, significantly affect the
25 intensity of the syndemic¹⁷; which is apparent in the dialysis population particularly in resource-poor
26 settings.
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45 Nephrologists felt vulnerable, helpless, and moral anguish because they were unable to provide access to
46 quality and safe care for patients receiving dialysis. In particular, they were concerned that patients were
47 not receiving an adequate prescription of dialysis with many patients also refusing to attend dialysis
48 sessions. They struggled with infection control measures due to the lack of resources for quarantine and
49 PPE. They also encountered anguish and guilt from having to ration treatment. Better availability and
50 mobilization of resources, and capacities to adapt models of care (i.e. telehealth, home-based dialysis)
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1 are urgently needed. This may also help to prepare for future pandemics beyond COVID-19, to
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4 minimizes the consequences on the care and outcomes of patients receiving dialysis.
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9

10
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12 during this COVID-19 pandemic and specially to the nephrologist Dr. Andrés Boltansky Brenner who
13 participated in this study and died because of COVID-19 during the preparation of this article.
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19 **Contributions**

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22
23 AMG participated in the design of the study, conducted the interviews, analysed the data, and drafted the
24 manuscript. AMG, EL, SC, AH, CZ-SM, LS, LM, AFF, LC, MM, ATP, GW, JCC, AJ participated in
25 the design of the study, contributed to the analysis, and provided critical intellectual input on the
26 manuscript revisions. All authors approved the manuscript.
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32 **Ethics approval**

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34 All participants provided written informed and voluntary consent.. This study was approved by the
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39 Ethics Committee of the University of Sydney (2019-899).
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42 **Data sharing**

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46 No additional data are available.
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Competing interests statement

The authors do not have any competing interests or conflicts of interest to declare.

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Figure Legends

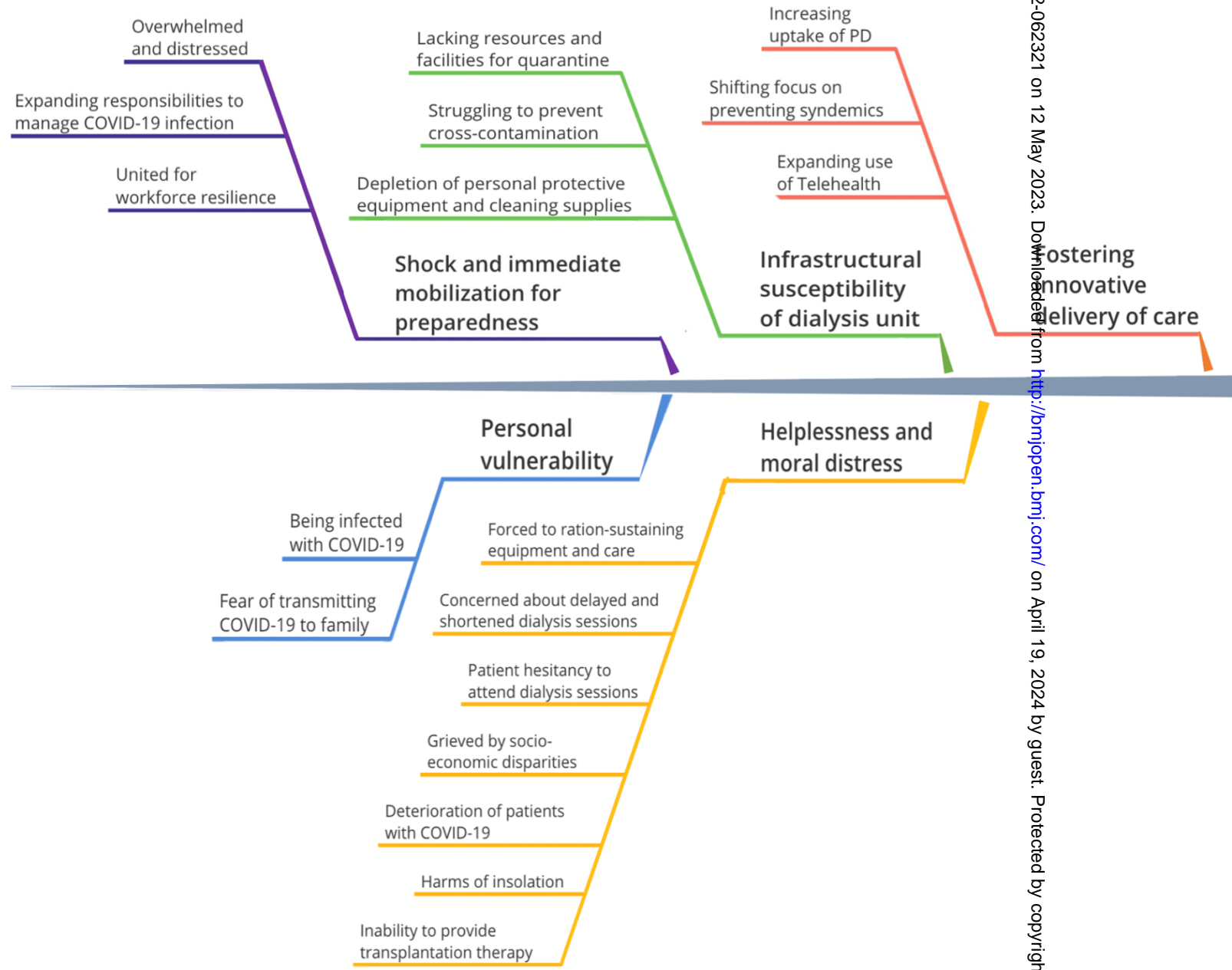
The five themes from the study were shock and immediate mobilization for preparedness (overwhelmed and distressed, expanding responsibilities to manage COVID-19 infection, united for workforce resilience); personal vulnerability (being infected with COVID-19, fear of transmitting COVID-19 to family); infrastructural susceptibility of dialysis units (lacking resources and facilities for quarantine, struggling to prevent cross-contamination, depletion of personal protective equipment and cleaning supplies); helplessness and moral distress (forced to ration life-sustaining equipment and care, concerned about delayed and shortened dialysis sessions, patient hesitancy to attend to dialysis sessions, grieved by socio-economic disparities, deterioration of patients with COVID-19, harms of isolation, inability to provide kidney replacement therapy) and fostering innovative delivery of care (expanding use of telehealth, increasing uptake of peritoneal dialysis, shifting focus on preventing syndemics).

Figure 1. Thematic schema

Supplementary File 1. COREQ Checklist

Supplementary File 2. Interview guide

Figure 1. Thematic schema



Supplementary File 1. COREQ Checklist

No.	Item	Comment	Pages of the manuscript
Domain 1: Research team and reflexivity.			
1	Interview/facilitator	A.M.G	6
2	Credentials	A.M.G (BNtrSc1)	1
3	Occupation	A.M.G, Research Assistant, Dietitian	1
4	Gender	A.M.G (Female)	-
5	Experience and training	A.M.G has conducted and published qualitative research	-
6	Relationship established	2 interviewees were known colleagues	-
7	Participant knowledge of the interviewer	A.M.G is conducting a study to elicit nephrologists' perspectives on providing care to patients receiving dialysis during the COVID-19 pandemic to inform strategies for improving the quality and safety of care for patients receiving dialysis.	-
8	Interviewer characteristics	A.M.G is a PhD Candidate with qualifications in Dietetics and Nutrition	-
Study design			
9	Theoretical framework	Qualitative study (using techniques from grounded theory)	6
10	Sampling	Purposive and snowballing	6
11	Method of approach	Email	6
12	Sample size	N=25 See table 1	23
13	Non-participation	One did not participate because of conflicting schedules.	-
14	Setting of data collection	Zoom	6
15	Presence of non-participants	None	-
16	Description of sample	Refer to Table 1	23
17	Interview guide	Provided in Supplementary File 1	-
18	Repeat interviews	Single interview conducted	-
19	Audio/visual recording	Interviews were audio recorded	6
20	Field notes	A.M.G recorded field notes	6
21	Duration	The mean duration of the interviews was 20 minutes.	-
22	Data saturation	Yes	7
23	Transcripts returned	No	-
Analysis and findings			
24	Number of data coders	4 (A.H., E.L., S.C., A.T.)	7
25	Description of the coding tree	No – see themes	-
26	Derivation of themes	Inductively derived from data	7
27	Software	HyperRESEARCH	7
28	Participant checking	Yes	23
29	Quotations presented	Refer to Table 2	24-25
30	Data and findings consistent	Quotations provided to illustrate each theme.	24-25
31	Clarity of major themes	Yes – themes	7
32	Clarity of minor themes	Yes – see subthemes and description of the themes	7

Supplementary File 2. Interview guide

Introduction

We are interested in the nephrologists' perspectives on the impact of COVID-19 on the care of patients receiving haemodialysis. We would like to know your opinion about whether you think there are differences in the care of patients on haemodialysis therapy infected by the SARS-CoV-2 virus. What are the first reactions to prepare for the Covid pandemic, the consequences of COVID-19 on the care of patients receiving dialysis, and the expectations and suggestions for post-Covid care?

Part 1: Initial reactions and preparation for Covid-19:

1. When did you initially hear about COVID 19? What was your response to caring for patients on dialysis?
2. What were your main concerns – for patients, for yourself, for the staff?
3. What sorts of things did you have to do to prepare for the COVID-19 in terms of managing dialysis? What were the challenges, and how did you resolve these?

Part 2: Impact of COVID-19 on the care of the patient receiving dialysis

4. What was the most significant impact of COVID-19 on the care of patients receiving dialysis – why? (Access to dialysis, health outcomes, quality of life etc.)
5. Were you able to address these – why, how?
6. What were the biggest challenges for you and the staff, the dialysis unit?
7. What were the most significant changes you have made, and how did you feel about these changes? Did you have patients receiving dialysis who had COVID-19 – what were the biggest challenges for the patient/for you?

Part 3: Expectations and Suggestions for Post-Covid care:

8. What are/what do you expect maybe the challenges or changes patients will face as things improve?
9. What do you expect will happen after COVID-19 with the care of patients receiving dialysis? (Medium to long-term changes?)
10. Are there any changes you should implement or should continue through the post -COVID 19 - why?
11. What are the key learnings you have gained during this pandemic in terms of patient care? Could those apply now and in the future?

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2 **Close**
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4 Is there anything else you would like to add?
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6 Thank you.
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Nephrologists' perspectives on the impact of COVID-19 on caring for patients receiving dialysis in Latin America: a qualitative study

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1 **Nephrologists' perspectives on the impact of COVID-19 on caring for patients**
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4 **receiving dialysis in Latin America: a qualitative study**
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Abstract

Objectives: To describe the experiences of nephrologists on caring for patients receiving in-center hemodialysis during the COVID-19 pandemic in Latin America.

Design: Twenty-five semi-structured interviews were conducted by zoom videoconference in English and Spanish languages during 2020 until data saturation. Using thematic analysis, we conducted line-by-line coding to inductively identify themes.

Setting: 25 centers across 9 countries in Latin America.

Participants: Nephrologists (17 male, 8 female) were purposively sampled to include diverse demographic characteristics and clinical experience.

Results: We identified five themes: shock and immediate mobilization for preparedness (overwhelmed and distressed, expanding responsibilities to manage COVID-19 infection, united for workforce resilience); personal vulnerability (being infected with COVID-19, fear of transmitting COVID-19 to family); infrastructural susceptibility of dialysis units (lacking resources and facilities for quarantine, struggling to prevent cross-contamination, depletion of personal protective equipment and cleaning supplies); helplessness and moral distress (forced to ration life-sustaining equipment and care, concerned about delayed and shortened dialysis sessions, patient hesitancy to attend to dialysis sessions, grieved by socio-economic disparities, deterioration of patients with COVID-19, harms of isolation, inability to provide kidney replacement therapy) and fostering innovative delivery of care (expanding use of telehealth, increasing uptake of peritoneal dialysis, shifting focus on preventing syndemics).

Conclusions: Nephrologists felt personally and professionally vulnerable and reported feeling helpless and morally distressed because they doubted their capacity to provide safe care for patients receiving dialysis. Better availability and mobilization of resources, and capacities to adapt models of care, including telehealth and home-based dialysis, are urgently needed.

1 **Keywords:** Covid-19, dialysis therapy, interviews, nephrologists' experience, pandemic, qualitative,
2 Latin America.
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9 **Strengths and limitations of the study**

- 10 • Semi-structured interviews were conducted with nephrologists purposively sampled across nine
11 countries to obtain in-depth and diverse data on their perspectives on the impact of COVID-19
12 on caring for patients receiving dialysis in Latin America.
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- 15 • The range of perspectives and challenges obtained will inform the need to improve access to care
16 during the COVID-19 pandemic.
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- 19 • All participants were from Latin America, and thus the transferability of the findings beyond this
20 region is uncertain.
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INTRODUCTION

The SARS-CoV-2 related disease (COVID-19) pandemic has disrupted, delayed, and impeded access to treatment among individuals with chronic illness, including patients with kidney failure receiving maintenance dialysis¹. For patients receiving long-term dialysis, their risk of acquiring COVID-19 is estimated to be five times higher, and they are four times more likely to die than the general population².

The pandemic has seen major reconfiguration of care in many health institutions to manage the increased demand to care for people with COVID-19. Unfortunately, this has inadvertently shifted resources away from the care of patients with other medical conditions, including kidney disease.

Dialysis units have been faced with unprecedented challenges. For patients receiving in center hemodialysis (HD), physical distancing within the unit and during transportation can be difficult³.

Clinicians caring for patients receiving dialysis have encountered a shortage of personal protective equipment (PPE) and could not access quarantine facilities for patients with infection⁴. Preventing infection in dialysis facilities is particularly challenging in resource-limited settings. For example, guidelines recommend against that the reuse of dialysis filters⁵, however this remains to be common practice in some resource-limited settings, including in Latin America. Such regions, also contend with an increased risk of SARS-CoV-2⁶ because of high-density housing and large socioeconomically disadvantaged communities.

However, little is known about nephrologists' experiences providing care to patients receiving dialysis; particularly in low-resource settings with high rates of COVID-19 infection, including Latin America.

This study aims to describe nephrologists' perspectives on providing care to patients receiving dialysis during the COVID-19 pandemic to inform strategies for improving the quality and safety of care for patients receiving dialysis.

METHODS

We used the Consolidated Criteria for Reporting Qualitative Health Research (COREQ)⁷ (Supplementary File 1).

Patient and public involvement

Patients were not involved in this study as this study aimed to describe the perspectives of clinicians.

Participant selection

Nephrologists caring for adults receiving dialysis, including hemodialysis and peritoneal dialysis, in Latin America, irrespective of years of clinical experience in dialysis settings, were eligible to participate. We used purposive sampling to include participants across a diverse range of ages, gender, years of clinical experience, and countries. Nephrologists were identified through our professional networks (SLANH- Sociedad latinoamericana de nefrología e hipertensión) and invited by email to participate. Participants could nominate other colleagues to participate. All the participants were given a consent form to participate. This study was approved by the Ethics Committee of the University of Sydney (2019-899).

Data collection

The interview guide was developed based on the literature and discussion among the investigators (Supplementary File 2). Two authors (A.M.G, A.H) conducted semi-structured interviews in English or Spanish language (as preferred by the participant) by zoom videoconference from June 2020 to

1 November 2020 until data saturation. Author A.M.G, a PhD candidate with experience in qualitative
2 studies, had practiced as a dietitian, in dialysis units in Chile. Her interest in the impact of COVID-19
3 and knowledge of the health system informed to the conceptualization of the research, design, data
4 collection and analysis. The interviews were recorded and transcribed in English and Spanish.
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10 11 12 **Data analysis**

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17 Using inductive thematic analysis and drawing from the principles of grounded theory, author A.M.G
18 performed line-by-line coding of the transcripts, used constant comparison within and across transcripts,
19 and inductively identified preliminary concepts. Similar concepts were grouped into themes and
20 subthemes, and patterns were identified among themes. The interview transcripts were imported into
21 HyperRESEARCH (version 4.0.1 ResearchWare Inc. Randolph MA). Investigators A.H., E.L., S.C.,
22 A.J., reviewed the themes to ensure that the analysis captured the full range and depth of the data
23 obtained. We conducted a member checking whereby the preliminary findings were sent to participants
24 for comment and integrated any additional insights into the final analysis.
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38 **RESULTS**

39 **Participant characteristics**

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43 All 25 invited nephrologists (100% response rate) participated, from 25 centers across 9 countries
44 (Chile, Colombia, Uruguay, Guatemala, Peru, Bolivia, Brazil, Argentina, Mexico) (Table 1). Of the
45 participants, 8 (55%) were women; 17 (59%) were from countries where English was not an official
46 language, and 9 (18%) were from low- and middle-income countries. The average duration of the
47 interviews was 35 minutes (ranging from 30 to 42 minutes). Nine participants responded to the
48 preliminary findings and confirmed that the findings captured their perspectives.
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Table 1. Participant characteristics (N=25)

Characteristic		N	%
Sex			
	Female	8	32
	Male	17	68
Age group (years)			
	30-39	1	4
	40-49	8	32
	50-59	10	40
	60 and over	6	24
Center volume (number of patients receiving dialysis)			
	1-20	3	12
	21-40	1	4
	41-60	2	8
	More than 60	19	76
Dialysis setting*			
	Outpatient dialysis units	14	56
	Hospital	16	64
Care for patients with confirmed COVID-19			
	Yes	21	84
	No	4	16
Tested for COVID-19			
	Yes	12	48
	No	13	52
COVID-19 test result			
	Positive	1	4
	Negative	24	96
Country*			
	Chile	13	52
	Colombia	3	12
	Uruguay	2	8
	Guatemala	2	8
	Peru	1	4
	Bolivia	1	4
	Brazil	1	4
	Argentina	1	4
	Mexico	1	4

*Percentage may not equal to 100% as participants could have experience in multiple settings

Themes

We identified five themes: shock and immediate mobilization for preparation, personal vulnerability, infrastructure susceptibility of the dialysis unit, helplessness, and moral anguish, promotion of innovative provision of care. The respective subthemes are described below with illustrative quotations provided in Table 2.

Table 2. Selected illustrative quotations to support each theme

Theme	Quotations
Shock and immediate mobilization for preparedness	
Overwhelmed and distressed	<p>"We become in little machines to make decisions, with a high emotional cost" (Male 40-49 age group, Chile).</p> <p>"200 dead in one day, dam! there is a stab in the back. The distress of colleagues and the health professionals is enormous" (Male 60-69 age group, Chile).</p> <p>"It is shocking to see all the mortality. It has been painful for our patients and us. Every week they inform us: [patient A, B, C] did not survive and died" (Female 50-59 age group, Chile).</p>
Expanding responsibilities to manage COVID 19 infection	<p>"We went as a team, gaining experience, but at first, it was like a hit in my head. We did not know what we were up against" (Female 50-59 age group, Chile).</p> <p>"I have had to learn a lot about COVID, about acute kidney failure, about mechanical ventilation, because of this emergency" (Male 40-49 age group, Chile).</p> <p>"So, we have to adapt, study and collect others' experiences since nothing was known about this virus. Everything has been new" (Female 30-39 age group, Chile).</p>
United for workforce resilience	<p>"Everything has changed in my life. I was focused on being well to collaborate and being useful in the pandemic, putting aside personal projects because this is my vocation. I could not subtract myself, there was a spirit to serve, help, and resist" (Female 30-39 age group, Chile).</p> <p>"We had a very nice movement, lovely behaviour of the health workers, students. They proactively asked to help because they are young, and low risk" (Male 47-49 age group, Brazil)</p> <p>"During this COVID period, we have learned to work as a team, everyone giving his best" (Male 40-43 age group Chile).</p>
Personal vulnerability	
Being infected with COVID-19	<p>"It was very uncertain, waiting to get sick, exposing oneself, or hiding. I was scared" (Male 40-49 age group, Chile).</p> <p>"How to combat the fear of getting ill, first as a human being, and then as a member of a health team. How to prevent the infection from your patients, and it does not affect you" (Male 60-69 age group, Chile).</p> <p>When the patients got infected, I checked their symptoms when I got home. "This hurts me, it hurts there" (Female 60-60 age group, Chile).</p>
Fear of transmitting COVID-19 to family	<p>"I am most concerned about spreading the virus to my family rather than getting sick myself." (Female 50-59 age group, Chile)</p> <p>"Old and young people have died, and you can be responsible for infecting your family members by bringing the virus home." (Male 50-59 age group, Colombia)</p> <p>"Health personnel with risk factors, or who fear infecting their family members, were absent"(Female 30-39 age group, Chile).</p>
Infrastructural susceptibility of dialysis unit	
Lacking resources and facilities for quarantine	<p>"Having no control during the pandemic has made it impossible for patients to access medicine. We are running out of space in the units because they have not been followed up on, have stage 5 and need dialysis urgently." (Male 40-49 age group, Bolivia).</p> <p>"Patients cannot eat anymore during the dialysis session, we have had to adapt the dialysis centres 24x7 with separations, so they have the minor contact possible." (Male 40-49 age group, Chile).</p> <p>"The dialysis access has been cut off. "We are trying to make our stage five patients endure as long as possible, medically and nutritionally, to prevent complications." (Female 50-59 age group, Chile).</p>

Struggling to prevent cross-contamination	<p>"Dialysis patients do not have a quarantine; it is an armchair and a different shift than usual." (Female 50-59 age group, Chile).</p> <p>"some patients must take public transportation to go home.. This is exactly the opposite of what we are trying to prevent cross-contamination in the units, to take care of them." (Male 40-49 age group, Brazil).</p> <p>"Some patients have bought biosecurity suits and wear them while walking in the street or while putting on gloves without washing their hands." (Male 40-49 age group, Bolivia).</p>
Depletion of PPT and cleaning supplies	<p>"We wore shoe covers that, after a short time, were no longer available due to a lack of resources. So you place quaternary ammonium rubbers on the floor to clean feet" (Male 60-69 age group, Chile).</p> <p>"As opposed to using alcohol on hands, they put a hand wash at the entrance. "We were doing it due to lack of supplies, to protect them and ourselves." (Female, 40-49 age group, Chile).</p> <p>"Our protections were not sufficient, so it was very scary." (Female, 30-39 age group, Chile).</p>
Helplessness and moral distress	
Forced to ration life-sustaining equipment and care	<p>"The most severe problem is access to respirator treatment. There have been many such cases, and we have seen many deaths at home" (Male, 50-59 age group, Chile).</p> <p>"They do not seem to take the patients into account much. They treat them like high-risk patients without recovery and don't put them on a ventilator." (Female, 60-69 group of age, Chile).</p> <p>"I understood that the patient died from a lack of dialysis, not from severe organ failure. However, the patient died because of the lack of access to dialysis" (Male, 40-49 age group, Chile).</p>
Concerned about delayed and shortened dialysis sessions	<p>"Patients did not receive an accurate dialysis because of all covid protocol measures you have to take." (Female, 50-59 age group, Chile).</p> <p>"We reduced dialysis time because the hospitals and private units were overstretched. So dialysis is sometimes started late, or the dose is not adequate". (Male, 40-49 age group, Chile).</p> <p>"We do not provide the best quality dialysis because we have less staff to dialyze people, and I have to dialyze people shorter" (Male, 40-49 age group, Chile).</p>
Patient refusal to attend dialysis sessions	<p>"Some patients are afraid of going to the hospital. Other patients take medications on their own, to avoid going to the institution." (Male, 50-59 age group, Peru).</p> <p>"Due to COVID, a patient decided to come only twice a week. A revolver cannot be held to his head to make him attend all three sessions." (Female, 60-69 age group, Uruguay).</p> <p>"A fourth shift of dialyzing COVID-positive patients was started this morning at the largest public hospital. Therefore, patients staged a hunger strike at the entrance door. They were refusing to let patients in because they believed they would infect them." (Male, 40-49 age group, Bolivia)</p>
Grieved by socio-economic disparities	<p>"It is very difficult to realize that people who undergo dialysis are really sick and have no other alternatives." (Male, 40-49 age group, Chile).</p> <p>"Many patients do not work and receive miserable pensions. They are also unable to go out and cannot afford food." (Male, 60-69 age group, Chile).</p> <p>"The lack of access to hospital beds in sectors where the poorest are dialyzed is quite shocking. Consequently, many of them die." (Male, 40-49 age group, Chile).</p>
Deterioration of patients with COVID-19	<p>"We have seen that people, both the staff and patients with positive covid, are very physically impaired." (Male, 60-69 age group, Chile).</p> <p>"After the worst moment, we were left with many chronic patients, and what we deeply owed was rehabilitation. Sadly, these patients were wasted after spending two, three, or four weeks in the intensive care unit (ICU). " (Male, 40-49 age group Chile).</p> <p>The medical community does not give much thought to rehabilitation. With the second wave, we must prepare for what is coming next, so we have little vision for the future." (Male, 40-49 age group, Chile).</p>
Harms of isolation	<p>"Patients and professionals had to wear masks and glasses, so the patient didn't know who he was talking to. No one visited them at any time, and every day was the same for them. They felt very alone." (Male, 40-49 age group, Chile).</p> <p>"There is much fear and uncertainty in the patients' faces about what is going to happen. Some of them are delivered to death, and they know they are going to die. Because some wanted to be accompanied, share with families, or talk, it was distressing." (Male, 40-49 age group, Chile).</p> <p>"Many doctors bring in screens to help patients communicate, but the most important thing is that you arrive at the emergency room without knowing if you have covid positive relatives until a week or ten days later. The isolation is horrifying." (Female, 50-59 age group, Chile).</p>
Inability to provide kidney replacement therapy	<p>"As a precaution, the living donor transplant was halted. The cadaver donor transplant was also stopped shortly after. By the time we realized we could resolve the issue, we no longer had beds because all of them were being used by COVID patients" (Male, 40-49 age group, Chile).</p> <p>"Some transplant patients were infected with COVID, and one of them died. Thus, when someone appears to have a fever, we call them, monitor them, and hospitalize them if needed." (Male, 40-49 age group, Chile).</p> <p>"CKD patients disappeared overnight. COVID ate them up. One does not know where they are, how they are. I am frightened of what will happen to them." (Male, 40-49 age group, Chile).</p>
Fostering innovative delivery of care	

Expanding use of telehealth	<p>Getting used to the fact that no by person consultation is required, getting used to telehealth" (Male, 40-49 age group, Bolivia).</p> <p>"We have a chat group where our patients ask questions, and if something happens, I send a message and come right away." (Female, 60-69 age group, Uruguay).</p> <p>"The prescription was sent to them via message, and they stay at home, sheltered, and come to the hospital as little as possible." (Male, 40-49 age group, Chile).</p>
Increasing uptake of PD	<p>"COVID patients undergoing PD are managed as outpatients. It is better to leave them at home. PD patients do telehealth unless they have a special clinical situation." (Male, 40-49 age group, Colombia).</p> <p>"We have much fewer complications in PD" (Female, 50-59 age group, Chile).</p> <p>"Patients on PD dialyze at home without risk to other patients nearby." (Male, 40-49 age, Colombia).</p>
Shifting focus on preventing syndemics	<p>"Two young patients with COVID are hospitalized, one of whom is obese. Obese patients have a lower chance of recovery than those with an abnormal BMI " (Female, 40-49 age group, Mexico).</p> <p>"Chronic people are often at risk of developing complications from COVID. Unfortunately, no matter what the vaccine does, there may still be another virus next year. The world is treating the symptoms of this pandemic, but not the causes of this syndemic" (Male, 60-69 age group, Chile).</p> <p>"The world has lost a considerable number of people. We have to lead a healthy lifestyle as we are more vulnerable than we think". (Male, 50-59 age group, Chile).</p>

The conceptual links are shown in Figure 1.

Shock and immediate mobilization for preparedness

Overwhelmed and distressed: Participants were overwhelmed and unprepared for the sudden and severe consequences of COVID-19 and were distressed by the high mortality rates in patients receiving dialysis. They faced “chaos” and a “tsunami of demands” in making rapid changes to minimize the risks of infection in the dialysis setting, and to accommodate an unexpected increased “demand” in the number of patients requiring acute dialysis. It was stressful and exhausting having to constantly remain “alert” in facing such a medical emergency.

Expanding responsibilities to manage COVID 19 infection: Some took on additional responsibilities and cared for non-dialysis patients with COVID-19 and thus felt pressure to high-level skills for treatment they were less familiar with, for example, oxygen therapy and mechanical ventilation – “In hospitals, they throw you to the wolves without you knowing how to provide oxygen; they tell you: just do it.” For some, having to administer treatments for managing COVID-19 was “new” and challenged their “comfort zone.”

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4 *United for workforce resilience:* Dialysis centers faced a critical shortage of staff; some nephrologists
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6 were unable to work because their older age placed them at increased risk for worse outcomes if infected
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8 with COVID-19 and other nephrologists were unavailable because they strived to work on “the front
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10 line”. Younger participants were committed to help because they believed they had a lower risk of
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12 developing severe disease. Confronting the pandemic together cultivated team solidarity, and they were
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14 conscious of supporting each other – “Every day we would discuss, talk, and approach the health staff,
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16 with questions like how you are doing, how are you, or what you need?”. Some chose to prioritize their
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18 clinical responsibility to patients over their own personal commitments - "I put aside crucial personal
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20 things temporarily because this is my job.”
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26 **Personal vulnerability**

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31 *Being infected with COVID-19:* Participants were terrified about their own risk of being infected with
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33 COVID-19 and tried to stay healthy and said they were “fighting and resisting” the virus. They stated,
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35 “it was very uncertain, we are waiting to get sick, we don’t want to expose ourselves.”
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41 *Fear of transmitting COVID-19 to their family:* Some were worried about bringing the virus home and
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43 infecting family members. That was their “primary concern” because they could not predict if their
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45 family would be exposed to severe illness and even death from COVID-19. Some noted their colleagues
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47 suspended clinic work because they had vulnerable family members, or those who continued to work
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49 chose to isolate themselves from their family – “I sent my family away from Santiago these five months,
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51 because it was very intense.”
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56 **Infrastructural susceptibility of the dialysis unit**

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4 *Lacking resources and facilities for quarantine:* Participants despaired for patients who had COVID-19
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6 as there were insufficient quarantine facilities in the dialysis unit to meet the demand. They could not
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8 isolate patients with COVID-19 from their family members. In some countries, participants felt helpless
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10 as dialysis units were “running out of space and collapsed.” Participants were devastated as their patients
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12 could not access dialysis and died at home.
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17 *Struggling to prevent cross-contamination:* At the onset of the pandemic, participants turned much of
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19 their attention and resources to preventing exposure to COVID-19. It was challenging to enforce social
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21 distancing, avoid “crowds in the waiting room,” and for staff and patients to wear personal protective
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23 equipment. Participants noted that patients took their masks off in the vehicle in which they were
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25 transported to and from the dialysis unit – “if one patient becomes infected, he or she will infect the
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27 entire van because they spend more than an hour and a half or two hours being transported by the van in
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29 a closed space”. In some countries, reusing dialysis filters were no longer permitted– “here we reuse the
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31 dialysis filters. That procedure had to be suspended also when patients had coronavirus.”
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38 *Depletion of personal protective equipment and cleaning supplies:* Some faced an insufficient supply of
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40 personal protective equipment for patients and clinicians – “you cannot give everything to everyone
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42 because there is a lack of resources.” It was stressful to ration supplies between patients and clinicians –
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44 “we wanted to put masks on our patients but initially our hospital did not give us permission to do so
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46 because they were very afraid that they did not have enough supplies for everyone.”
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51 **Helplessness and moral distress**

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1 *Forced to ration life-sustaining equipment and care:* Some had to make harrowing decisions about
2 rationing life-sustaining treatments, in particular dialysis and mechanical ventilation. One participant
3 explained, “I would have made the effort to offer dialysis to two critically ill patients with COVID, but I
4 gave up on offering dialysis. They had no chance of receiving dialysis because there was no dialysis
5 machine.” They were also forced to allocate ventilation to patients receiving dialysis in the hospital
6 setting, who they judged to have a better prognosis. They had to do “war medicine” and “tried to
7 distribute the few resources that were available as best as they could.” Some felt judged by others and
8 the dire consequences on patients caused anguish and guilt – “The tremendous challenge of playing God,
9 in the sense of who lives and who does not live, who has the right to be connected or not.”
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24 *Concerned about delayed and shortened dialysis sessions:* Participants were concerned about having to
25 reduce the dialysis prescription for patients to account for the increased time taken to implement strict
26 cleaning protocols due to COVID-19, also to ensure that other patients could receive dialysis – “I had
27 six patients who had to dialyze, and you had only one machine, and there you had to cut dialysis time.”
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43 *Patient hesitancy to attend dialysis sessions:* Participants explained about some hesitancy by patients to
44 attend in-center dialysis because of fear of being infected with COVID-19, which caused worry,
45 helplessness, and frustration – “This morning, the largest public hospital adapted an area to dialyze
46 COVID-positive patients on a fourth shift. Therefore, this morning patients went on a hunger strike at
47 the entrance door. They were not letting patients enter because they said they were going to infect
48 them.” They stated that patients were afraid of the possibility of dialyzing near patients with COVID-19.
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1 *Grieved by socio-economic disparities:* Participants were saddened that, patients from low socio-
2 economic backgrounds were more disadvantaged because of COVID-19 – “many patients are do not
3 work and receive miserable pensions. They cannot leave their home and they face difficulties accessing
4 food.” They explained that “where the poorest patients are dialyzed, it is shocking to see how patients
5 arrive at the emergency room and cannot access a hospital bed, and many of them end up dying.”
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15 *Deterioration of patients with COVID-19:* Some participants did not expect COVID-19 would have
16 severe and ongoing symptoms and complications and observed how dialysis patients were in a severely
17 weakened state after being infected, "with much sarcopenia that caught my attention". However,
18 participants commented that “rehabilitation is what we least think about now because we have to prepare
19 for the waves that come next.”
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29 *Harms of isolation:* Due to the COVID-19 protocols, the dialysis sessions were described as "a bit
30 depersonalized". Health professionals had to wear a mask and glasses and participants mentioned that
31 patients "had no idea with whom they were talking to". Participants sought to provide emotional support
32 because the "patients were very alone"; and for patients with COVID-19, "there were no visits at any
33 time, and every day for them was the same of others". They noticed that patients were "quite depressed"
34 and that some patients, “knew they were going to die”.
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45 *Inability to provide transplantation therapy:* In some countries, participants explained that their kidney
46 transplantation programs were suspended during the COVID-19 pandemic. Participants reported they
47 did not have beds for transplantation because "they were all used by COVID patients" and "there is a
48 long list of dialysis patients waiting for a transplant". Likewise, patients with kidney transplantation who
49 come to be monitored with some frequency stopped attending hospitals or clinics. They noticed that
50 patients stopped their following up – “COVID-19 devoured them”. Participants highlighted having no
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1 idea about where their transplant patients, how they are doing or if they have controlled their immune
2 response – “I have a considerable fear of what will happen to them”.
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8 **Fostering innovative delivery of care**

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13 *Expanding the use of telehealth:* Participants remarked that telehealth "had to be implemented rapidly"
14 because of the pandemic. Participants described how telehealth “has allowed us to continue working
15 remotely in hemodialysis’s units. This is good because we can conduct nephrology consults during the
16 COVID-19 pandemic”. Telemedicine provided them a safe, effective, and efficient way of
17 communication – “patients send us messages when something happens, and don’t have to travel more
18 than 800 kilometers to see the doctor”.
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29 *Increasing uptake of Peritoneal dialysis (PD):* Some participants expected that there would be an
30 increase in the number of patients who choose peritoneal dialysis over hemodialysis during the
31 pandemic – “We see less complications with peritoneal dialysis than with hemodialysis “. They
32 recognized that for patients receiving PD "the risk is minimal" and could be managed through
33 telemedicine.
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43 *Shifting focus on preventing syndemics:* Participants explained that patients with comorbidities were at
44 an increased risk of severe infection – “patients with chronic disease, including those with kidney
45 disease, suffer the most when developing complications from COVID-19 infection”, and that these
46 clustered within socially disadvantaged and vulnerable groups, and thus had concerns about inequity.
47 They stated that, "a relatively large number of dialysis patients have died in the world, particularly in our
48 Latino communities". They urged for a focus on addressing the “syndemic”; "this world is treating the
49 pandemic's symptoms, and they are not looking for the causes of this as a syndemic"; and called for a
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1 more comprehensive approach, encompassing education, employment, housing, food, and the
2 environment – "a comprehensive vision is needed if we are to protect the health of our communities."
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8 **DISCUSSION**

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12 Nephrologists caring for patients receiving in-centre HD in Latin America during the COVID-19
13 pandemic felt overwhelmed. They had to suddenly mobilize resources to prevent the dialysis patients'
14 and others' exposure to COVID-19 and simultaneously manage individuals who were COVID-19
15 positive. A major challenge was contending with the susceptibility of dialysis units to cross-infection,
16 particularly with the lack of resources for quarantine and PPE supplies. They felt personally vulnerable
17 in being exposed to COVID-19 infection, and the flow on risks to their own families. Having to ration
18 life-sustaining treatment and being unable to provide adequate dialysis and witnessing the trauma of
19 patients being isolated compounded a sense of helplessness and moral distress among nephrologists. The
20 challenges provided an impetus for nephrologists to change the delivery of care with a focus on
21 increasing the use of telehealth, home-based modalities, and preventing syndemics.
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38 The findings were broadly consistent across participants. Nephrologists were concerned about the
39 susceptibility of dialysis units including the lack of PPE, resources for quarantine, and cross-
40 contamination. There appeared to be some differences in the availability of resources at the clinic in
41 which they worked, which was determined by the resources, and the roles in which they had to take on.
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43 Due to the risk of infection, some participants reported suspending some procedures such as the reuse of
44 filters, a common practice in dialysis centres in Latin America. They felt helpless about the
45 socioeconomic disparities as patients in low resource areas faced substantial barriers to accessing
46 healthcare and had worse outcomes.
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1 Whilst there are very few studies on nephrologists' perspectives on the care of patients receiving dialysis
2 during the COVID-19 pandemic, similar challenges have been identified across other medical
3 disciplines. Clinicians have described the angst of having to ration⁸ and withhold treatment and
4 experienced tremendous physical and psychological burden. In studies conducted across China, the
5 USA, and Europe, clinicians have reported increased anxiety, depression, and symptoms of post-
6 traumatic stress disorder⁹. Studies in the United States have also identified that Latinx communities are
7 severely disadvantaged in terms of accessing healthcare, and patients were afraid of unemployment,
8 eviction, and inability to protect themselves from COVID-19 as they lived in high-density housing¹⁰.
9 However, specific to the context of dialysis, nephrologists were particularly concerned about patients
10 receiving inadequate dialysis due to the shortened sessions, patient hesitancy to attend dialysis,
11 preventing infection in dialysis units, and suspension of transplantation programs, further increasing the
12 waiting lists in some Latin American countries.
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31 Compared with the perspectives of clinicians, patients receiving dialysis and caregivers have also
32 reported feeling distressed and vulnerable in dialysis settings during the COVID-19 pandemic,
33 particularly if they observed inadequacies and inconsistencies in infection control practices¹¹. Patients
34 receiving dialysis reported that they were concerned about the cancellation of follow up appointments as
35 they could not monitor their blood results, missed dialysis sessions, and were anxious about risk of
36 complications such as hyperkalaemia^{12, 13}. However, patients have emphasized concerns about the
37 potential loss of or delay in receiving a kidney transplant¹⁴.
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50 Our study generated comprehensive insights about nephrologists' perspectives on caring for patients
51 receiving dialysis during the COVID-19 pandemic. We conducted interviews until data saturation and
52 used member checking and investigator triangulation to ensure that the findings captured the data
53 collected. However, there are some potential limitations. The participants did not mention the impact on
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1 caregivers. Some findings suggest that family caregivers of patients undergoing in-centre HD should be
2 considered by the dialysis team to develop educational and supportive interventions to meet family
3 caregivers' needs, mitigate emotional distress, fears, and concerns, and prevent caregiver burden during
4 the COVID-19 pandemic¹⁵. All participants were from Latin America, and thus the transferability of the
5 findings beyond this region is uncertain.
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15 The prevention of "syndemics," defined as a synergistic interaction between multiple epidemics or
16 disease clusters (i.e. SARS-CoV-2 infection and non-communicable diseases)^{16,17} that exacerbate worse
17 health outcomes, was also identified as a priority. Nephrologists recognized that the impact of the
18 pandemic on patients with CKD and receiving dialysis was intensified because of its diverse nexus of
19 intertwined biological (including comorbidities) and socioecological factors. Therefore, they advocated
20 the need for the health system not to have a single-disease focus but to ensure comprehensive whole-
21 person care. It has been argued that the COVID-19 pandemic has escalated into a syndemic due to
22 several driving factors: overcrowding, loneliness, uncertainty, poor nutrition, and lack of access to health
23 services; and consequently, depression, suicide, domestic violence, and psychiatric illnesses have
24 significantly increased¹⁷. Social determinants of health, such as poverty, social inequality, social stigma,
25 and the environment where people live and work, significantly affect the intensity of the syndemic¹⁸;
26 which is apparent in the dialysis population particularly in resource-poor settings.
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45 CONCLUSION

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50 Nephrologists felt vulnerable, helpless, and moral anguish because they were unable to provide access to
51 quality and safe care for patients receiving dialysis. In particular, they were concerned that patients were
52 not receiving an adequate prescription of dialysis with many patients also refusing to attend dialysis
53 sessions. They struggled with infection control measures due to the lack of resources for quarantine and
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1 PPE. They also encountered anguish and guilt from having to ration treatment. Better availability and
2 mobilization of resources, and capacities to adapt models of care (i.e. telehealth, home-based dialysis)
3 are urgently needed. This may also help to prepare for future pandemics beyond COVID-19, to
4 minimize the consequences on the care and outcomes of patients receiving dialysis.
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10 11 12 **Acknowledgements**

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16 We thank all the nephrologists who shared their experiences and thoughts about their perspectives
17 during this COVID-19 pandemic and specially to the nephrologist Dr. Andrés Boltansky Brenner who
18 participated in this study and died because of COVID-19 during the preparation of this article.
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24 **Contributions**

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28 AMG participated in the design of the study, conducted the interviews, analysed the data, and drafted the
29 manuscript. AMG, EL, SC, AH, CZ-SM, LS, LM, AFF, LC, MM, ATP, GW, JCC, AJ participated in
30 the design of the study, contributed to the analysis, and provided critical intellectual input on the
31 manuscript revisions. All authors approved the manuscript.
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38 **Ethics approval**

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42 All participants provided written informed and voluntary consent.. This study was approved by the
43 Ethics Committee of the University of Sydney (2019-899).
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47 **Data sharing**

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51 No additional data are available.
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2
3
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8 **Competing interests statement** 9

10 The authors do not have any competing interests or conflicts of interest to declare.
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For peer review only

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Figure Legends

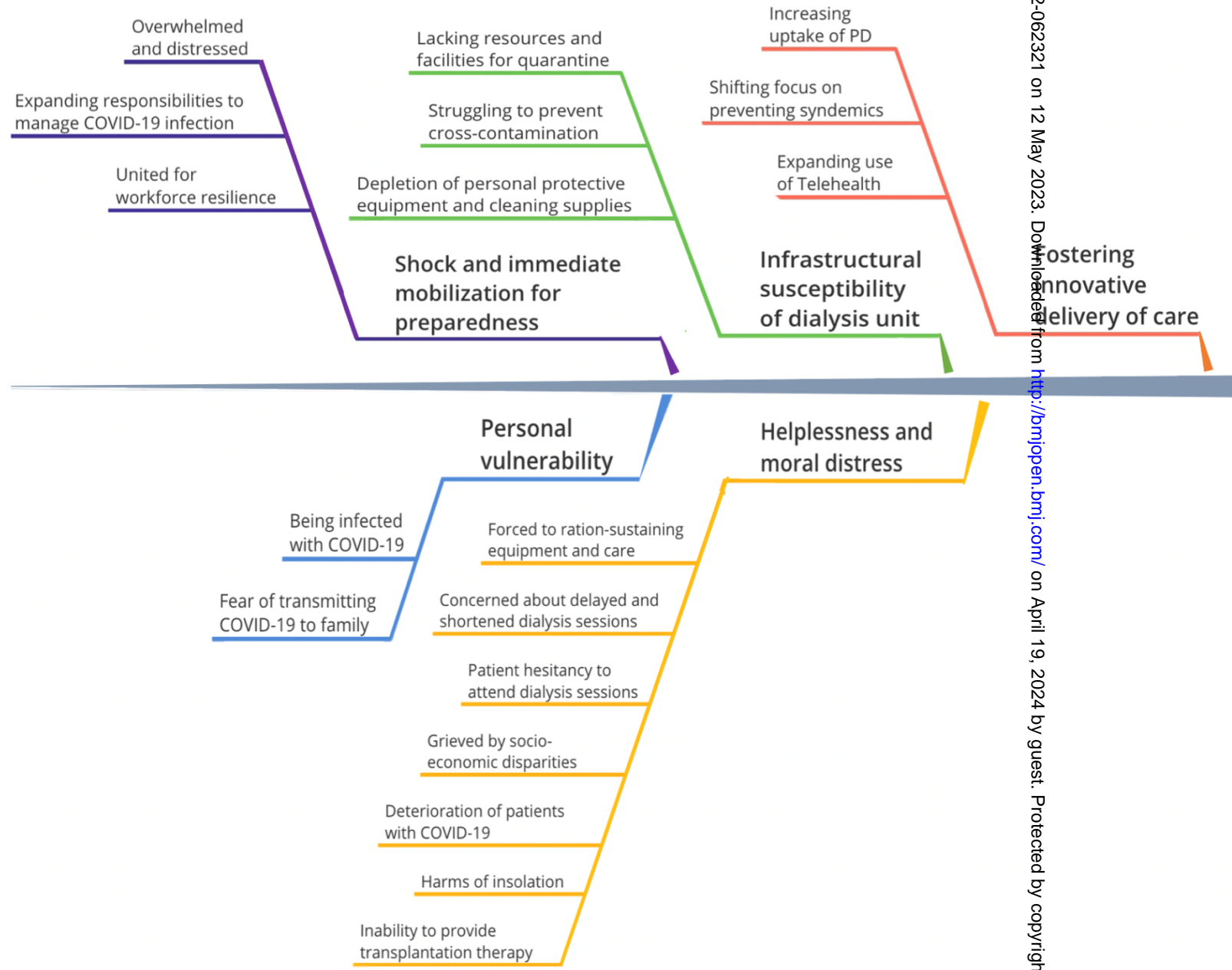
The five themes from the study were shock and immediate mobilization for preparedness (overwhelmed and distressed, expanding responsibilities to manage COVID-19 infection, united for workforce resilience); personal vulnerability (being infected with COVID-19, fear of transmitting COVID-19 to family); infrastructural susceptibility of dialysis units (lacking resources and facilities for quarantine, struggling to prevent cross-contamination, depletion of personal protective equipment and cleaning supplies); helplessness and moral distress (forced to ration life-sustaining equipment and care, concerned about delayed and shortened dialysis sessions, patient hesitancy to attend to dialysis sessions, grieved by socio-economic disparities, deterioration of patients with COVID-19, harms of isolation, inability to provide kidney replacement therapy) and fostering innovative delivery of care (expanding use of telehealth, increasing uptake of peritoneal dialysis, shifting focus on preventing syndemics).

Figure 1. Thematic schema

Supplementary File 1. COREQ Checklist

Supplementary File 2. Interview guide

Figure 1. Thematic schema



Supplementary File 1. COREQ Checklist

No.	Item	Comment	Pages of the manuscript
Domain 1: Research team and reflexivity.			
1	Interview/facilitator	A.M.G	6
2	Credentials	A.M.G (BNtrSc1)	1
3	Occupation	A.M.G, Research Assistant, Dietitian	1
4	Gender	A.M.G (Female)	-
5	Experience and training	A.M.G has conducted and published qualitative research	-
6	Relationship established	2 interviewees were known colleagues	-
7	Participant knowledge of the interviewer	A.M.G is conducting a study to elicit nephrologists' perspectives on providing care to patients receiving dialysis during the COVID-19 pandemic to inform strategies for improving the quality and safety of care for patients receiving dialysis.	-
8	Interviewer characteristics	A.M.G is a PhD Candidate with qualifications in Dietetics and Nutrition	-
Study design			
9	Theoretical framework	Qualitative study (using techniques from grounded theory)	6
10	Sampling	Purposive and snowballing	6
11	Method of approach	Email	6
12	Sample size	N=25 See table 1	23
13	Non-participation	One did not participate because of conflicting schedules.	-
14	Setting of data collection	Zoom	6
15	Presence of non-participants	None	-
16	Description of sample	Refer to Table 1	23
17	Interview guide	Provided in Supplementary File 1	-
18	Repeat interviews	Single interview conducted	-
19	Audio/visual recording	Interviews were audio recorded	6
20	Field notes	A.M.G recorded field notes	6
21	Duration	The mean duration of the interviews was 20 minutes.	-
22	Data saturation	Yes	7
23	Transcripts returned	No	-
Analysis and findings			
24	Number of data coders	4 (A.H., E.L., S.C., A.T.)	7
25	Description of the coding tree	No – see themes	-
26	Derivation of themes	Inductively derived from data	7
27	Software	HyperRESEARCH	7
28	Participant checking	Yes	23
29	Quotations presented	Refer to Table 2	24-25
30	Data and findings consistent	Quotations provided to illustrate each theme.	24-25
31	Clarity of major themes	Yes – themes	7
32	Clarity of minor themes	Yes – see subthemes and description of the themes	7

Supplementary File 2. Interview guide

Introduction

We are interested in the nephrologists' perspectives on the impact of COVID-19 on the care of patients receiving haemodialysis. We would like to know your opinion about whether you think there are differences in the care of patients on haemodialysis therapy infected by the SARS-CoV-2 virus. What are the first reactions to prepare for the Covid pandemic, the consequences of COVID-19 on the care of patients receiving dialysis, and the expectations and suggestions for post-Covid care?

Part 1: Initial reactions and preparation for Covid-19:

1. When did you initially hear about COVID 19? What was your response to caring for patients on dialysis?
2. What were your main concerns – for patients, for yourself, for the staff?
3. What sorts of things did you have to do to prepare for the COVID-19 in terms of managing dialysis? What were the challenges, and how did you resolve these?

Part 2: Impact of COVID-19 on the care of the patient receiving dialysis

4. What was the most significant impact of COVID-19 on the care of patients receiving dialysis – why? (Access to dialysis, health outcomes, quality of life etc.)
5. Were you able to address these – why, how?
6. What were the biggest challenges for you and the staff, the dialysis unit?
7. What were the most significant changes you have made, and how did you feel about these changes? Did you have patients receiving dialysis who had COVID-19 – what were the biggest challenges for the patient/for you?

Part 3: Expectations and Suggestions for Post-Covid care:

8. What are/what do you expect maybe the challenges or changes patients will face as things improve?
9. What do you expect will happen after COVID-19 with the care of patients receiving dialysis? (Medium to long-term changes?)
10. Are there any changes you should implement or should continue through the post -COVID 19 - why?
11. What are the key learnings you have gained during this pandemic in terms of patient care? Could those apply now and in the future?

1
2 **Close**
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4 Is there anything else you would like to add?
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