

# Psychosocial Impact of COVID-19 Pandemic on Patients with End-Stage Kidney Disease on Hemodialysis

Jacqueline Lee,<sup>1</sup> Jennifer Steel,<sup>2</sup> Maria-Eleni Roumelioti,<sup>3</sup> Sarah Erickson,<sup>4</sup> Larissa Myaskovsky,<sup>3,5</sup> Jonathan G. Yabes,<sup>6</sup> Bruce L. Rollman,<sup>6,7</sup> Steven Weisbord,<sup>8,9</sup> Mark Unruh,<sup>3</sup> and Manisha Jhamb<sup>1,8</sup>

## Abstract

**Background** The coronavirus disease 2019 (COVID-19) may have a negative effect on the mental and social health of patients with ESKD on chronic in-center hemodialysis (HD), who have a high burden of psychologic symptoms at baseline and unavoidable treatment-related COVID exposures. The goal of our study was to assess the effect of the COVID-19 pandemic on the psychosocial health of patients on chronic in-center HD.

**Methods** Participants enrolled in the ongoing Technology Assisted Collaborative Care (TACCare) trial in Western Pennsylvania and New Mexico were approached for participation in a phone survey in May 2020. Data on the pandemic's effects on participants' physical and mental health, symptoms (such as anxiety, mood, loneliness, sleep, and stress), and food and housing security were collected.

**Results** Surveys were completed by 49 participants (mean age 56 years; 53% men, 18% Black, 20% American Indian, and 22% Hispanic). Almost 80% of participants reported being moderately to extremely worried about the pandemic's effects on their mental/emotional health and interpersonal relationships. More than 85% of the participants were worried about obtaining their dialysis treatments due to infection risk from close contact in the dialysis facility or during transportation. Despite this, 82% of participants reported being not at all/slightly interested in trying home dialysis as an alternative option. Overall, 27% of the participants had clinical levels of depressive symptoms but only 12% had anxiety meeting clinical criteria. About 33% of participants reported poor sleep quality over the last month. Perceived stress was high in about 30% of participants and 85% felt overwhelmed by difficulties with COVID-19, although 41% felt that things were fairly/very often going their way.

**Conclusions** Our study provides preliminary insights into the psychosocial distress caused by the COVID-19 pandemic among a diverse cohort of patients receiving chronic HD who are participating in an ongoing clinical trial.

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## Introduction

The coronavirus disease 2019 (COVID-19) global pandemic, caused by novel severe acute respiratory syndrome coronavirus 2, has affected billions of people worldwide. Patients with kidney disease, especially those receiving chronic dialysis treatment, have enhanced risk of severe COVID-19 infection-related complications and poor prognosis including higher risk of hospitalization, intensive care unit admission, mechanical ventilation, and death (1,2). In addition to these direct effects, the pandemic may have indirect effects on the psychosocial health of patients on in-center chronic hemodialysis (HD), even if they are not infected with COVID-19. These effects may be particularly

overwhelming in a patient population that already has a disproportionately high burden of symptoms such as depression and anxiety (3).

Patients with ESKD require life-sustaining treatment at a specialized facility three times weekly and need to travel to dialysis centers, often using public transportation or shared ride services. Accordingly, they are particularly vulnerable to COVID-19 secondary to their inability to strictly follow social distancing guidelines while undergoing treatment, as well as during transport to the dialysis center for some. Dialysis facilities often have open floor plans with treatment chairs lined up next to each other and open waiting

<sup>1</sup>University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania

<sup>2</sup>Department of Surgery, Psychiatry and Psychology, University of Pittsburgh, Pittsburgh, Pennsylvania

<sup>3</sup>Division of Nephrology, Department of Internal Medicine, University of New Mexico School of Medicine, Albuquerque, New Mexico

<sup>4</sup>Department of Psychology, University of New Mexico Health Sciences Center, Albuquerque, New Mexico

<sup>5</sup>Center for Healthcare Equity in Kidney Disease, University of New Mexico School of Medicine, Albuquerque, New Mexico

<sup>6</sup>Center for Research on Health Care, Division of General Internal Medicine, Department of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania

<sup>7</sup>Center for Behavioral Health, Media, and Technology, University of Pittsburgh, Pittsburgh, Pennsylvania

<sup>8</sup>Renal-Electrolyte Division, Department of Medicine, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania

<sup>9</sup>Renal Section, VA Pittsburgh Healthcare System, Pittsburgh, Pennsylvania

**Correspondence:** Manisha Jhamb, University of Pittsburgh, 200 Lothrop St., PUH C-1111, Pittsburgh, PA 15213. Email: [jhambm@upmc.edu](mailto:jhambm@upmc.edu)

rooms, which may make social distancing between patients challenging. Also, several aspects of treatment such as cannulation, decannulation, and vital status monitoring require repeated close contact with multiple dialysis staff who have had multiple contacts with other patients. Moreover, new dialysis unit practices to limit the spread of infection, such as requiring patients to wear masks at all times, disallowing consumption of food during treatment, and limiting entry of family members in dialysis units, may add to patients' stress in attending dialysis treatment. The psychologic distress caused by these circumstances may cause patients to develop or experience worsening of symptoms such as depression, anxiety, or poor sleep. These COVID-19-related concerns may also cause some patients to miss in-center HD treatments to limit exposure to the virus, and thereby worsen their clinical condition and increase risk for hospitalization and mortality. Additionally, some patients may experience food and housing insecurity due to the economic effect of the pandemic that may contribute to, or exacerbate, psychologic symptoms.

The goal of our study was to assess the effect of the COVID-19 pandemic on the psychosocial health of patients on chronic in-center HD. We additionally explored the effect on food and housing security, and adherence with HD. We also explored patients' accessibility to participate in telemedicine visits from their home, because this may be a potential avenue for providing mental health care and psychosocial support during the pandemic.

## Materials and Methods

### Study Participants

Participants enrolled in the ongoing Technology Assisted Collaborative Care (TACCare) trial (4) were approached for participation in this ancillary study. TACCare is a multisite randomized controlled trial (RCT) evaluating a collaborative care intervention to improve pain, fatigue, sleep, and depression among participants on chronic HD, and incorporates the use of telemedicine-delivered cognitive behavioral therapy. From April 2018 to March 2020, 109 participants [56 from Western (PA) and 53 from New Mexico (NM)] were recruited for the parent study. Recruitment and trial activities were put on hold and trial activities suspended in mid-March 2020 due to COVID-19. All TACCare participants who had been enrolled in the RCT were contacted by phone in May 2020, while the local restrictions were still in place at both study sites. During the retention phone call, participants were provided with COVID-19-related education and support, information on community resources (e.g., local food bank or crisis line contact numbers), and were invited to participate in a survey evaluating the effect of COVID-19 on their health. The study was approved by the Universities of Pittsburgh and New Mexico Institutional Review Boards, and all participants provided informed consent.

### Sociodemographic and Clinical Covariates

Baseline participant data on sociodemographics, comorbidities, and laboratory variables collected as part of the TACCare RCT were used in this study.

### Survey Instrument

We adapted the CoRonavIRuS Health Impact Survey (CRISIS) developed by the National Institute of Mental Health (5). CRISIS includes questions on the effect of the pandemic on participants' physical and mental health symptoms (e.g., anxiety, mood, and loneliness), interpersonal relations, and food and housing security. We added specific validated symptom assessments for depression (Patient Health Questionnaire-2), anxiety (Generalized Anxiety Disorder-2), sleep quality (one item from the Pittsburgh Sleep Quality Index PSQI), and stress [Perceived Stress Scale-4 (PSS-4)], and asked whether the symptoms had changed since the pandemic started (6–9). These instruments were chosen on the basis of their psychometric properties in ESKD patients and brevity (to minimize participant burden). Lastly, we added questions on participant's concerns regarding in-center HD, their adherence to HD, preferences for home dialysis, and their ability to do telemedicine sessions from home. Of note, participants in the parent study were provided with tablets in the dialysis unit and were not required to have telemedicine accessibility from home. Open-ended questions on worries about going to dialysis and on the positive effect of the pandemic were also included. The final survey had 27 questions (Supplemental Table 1).

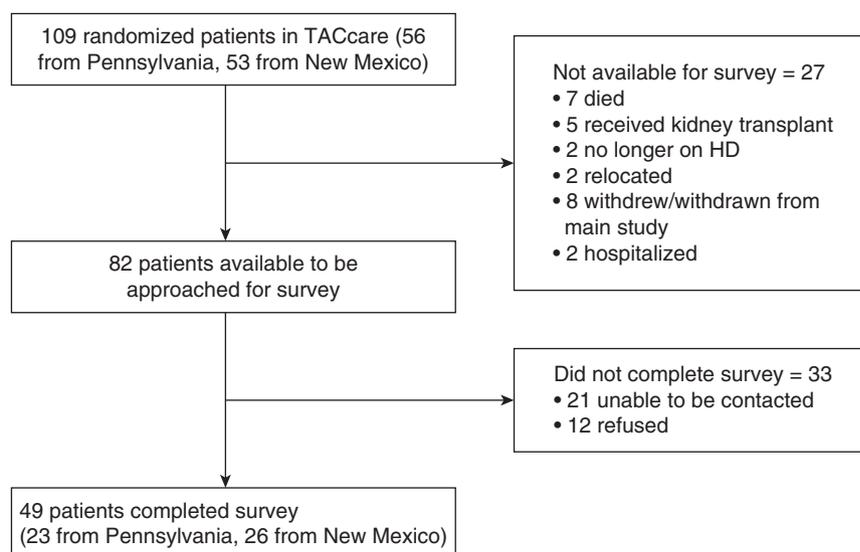
### Statistical Analyses

We examined descriptive statistics for participants' baseline characteristics using percent and count for categorical variables, and means and SDs, or medians and interquartile ranges, for continuous variables. We used *t* tests, and chi-squared or Fisher's exact tests, to compare participants from PA and NM. Reported symptom levels were compared between participants from PA and NM, and if no significant differences were found results for the entire cohort were combined and reported as such. We also compared those who completed and did not complete the survey (were unable to be contacted or refused) for baseline characteristics. We analyzed responses to survey questionnaires and present them as percentages or means. Answers to open-ended questions were collated into broad categories. We conducted all analyses using R version 3.6.3 (10).

## Results

### Study Participants

Of the original 109 randomized participants in the TACCare RCT, 27 were ineligible/unavailable for this study [*i.e.*, death ( $n=7$ ), kidney transplant ( $n=5$ ), relocation ( $n=2$ ), no longer on HD ( $n=2$ ), hospitalized ( $n=2$ )], or had withdrawn from the TACCare RCT ( $n=8$ ) by May 2020 when the survey was conducted (Figure 1). We were unable to contact 21 of the remaining 82 participants who were eligible to participate in this ancillary study. Of the remaining 61 participants who we could reach, 49 (23 from PA, 26 from NM) completed the survey, yielding a 60% participation rate. Participants who could not be contacted or refused to participate in the survey ( $n=33$ ) were similar by site, demographic characteristics, and comorbidity burden to those who completed the survey (Supplemental Table 1). For participants who completed the survey, the median number



**Figure 1.** | Flowchart for patients included in this study. HD, hemodialysis; TACcare, Technology Assisted Collaborative Care.

of call attempts was two and the average call length was  $20 \pm 15$  minutes.

Baseline characteristics of the survey participants are shown in Table 1. The sample was predominantly included men (53%,  $n=26$ ) with mean age 56 years and median dialysis duration of 3.2 years. Although more than one half of the participants were White (55%,  $n=27$ ), we had fair representation of other racial and ethnic groups (18.4% Black and 22.4% Hispanic), reflecting the geographical diversity of the participating sites. As expected, there was high burden of comorbidities such as diabetes (69.4%) and cardiovascular disease (34.7%). The PA site participants were older, were more likely to be Black than Hispanic or Native American, and had a higher prevalence of cardiovascular disease than the NM cohort.

### Effect of the Pandemic on Health and Socioeconomic Well-Being

The pandemic had a significant effect on participants' well-being, with 61% of the sample at least moderately worried about being infected themselves or their family/friends being infected, and 77% moderately to extremely worried about their physical health being affected by the pandemic. Most participants (81.7%) reported being moderately to extremely worried about the pandemic's effect on their mental/emotional health and interpersonal relationships (Table 2). Significant concerns over housing insecurity were reported by 90% of the participants. However, fewer participants [29% ( $n=14$ )] were worried about food security [yes/no response]. There were no differences in any of these reported concerns among participants from PA and NM (data not shown).

Although many participants (59%,  $n=29$ ) reported no positive changes from the pandemic, some did experience positive changes such as spending more time with family, getting to know neighbors, adopting health behaviors (washing hands, quitting smoking, limiting alcohol, and

being more careful in general), eating at home more often, becoming more religious, and not taking things for granted.

### Effect of Pandemic on Dialysis Treatments

In this cohort, 85.8% of the sample was either moderately, very, or extremely concerned about leaving home to attend dialysis, and 75% were similarly stressed by restrictions for leaving home for nondialysis purposes (Table 2). Responses to the open-ended question on worries about going to dialysis revealed patient's concerns regarding being close to other dialysis participants, health care workers, and people in the dialysis facility or during transportation. When asked about missing dialysis treatments, 16% ( $n=8$ ) reported missing treatments, but none reported this as being due to the above-mentioned pandemic-related reasons. Despite the restrictions caused by the pandemic, 82% of participants reported being not at all/slightly interested in trying home dialysis, if that was an option. There were no differences in any of these outcomes between participants from PA and NM (data not shown).

### Effect of the Pandemic on Specific Patient-Reported Symptoms

Only 14% of the participants reported being at least moderately sad or unhappy within the last 2 weeks, but 27% of the sample reported significant depressive symptoms (score  $\geq 2$ ) on the Patient Health Questionnaire-2 (Figure 2, Table 3). However, 57% of those reporting being at least moderately sad or unhappy indicated that these symptoms had changed since the pandemic started, suggesting they were due to the effect of the pandemic. We found that 27% of the participants reported feeling moderately or very anxious, and over 50% reported feeling distracted and unable to concentrate (Figure 2). However, only 12% reported a Generalized Anxiety Disorder-2 score  $\geq 3$ , the cutoff for clinically significant anxiety symptoms (Table 3). Like depressive symptoms, almost 85% of the participants reported

**Table 1. Baseline characteristics of patients that completed the coronavirus disease 2019 survey**

Variable	Total (n=49) (n (%))	New Mexico (n=26) (n (%))	Western Philadelphia (n=23) (n (%))	P Value
Age (yr) <sup>a</sup>	55.9 (10.7)	52.9 (10.8)	59.4 (9.6)	0.03
Men	26 (53.1%)	14 (53.8%)	12 (52.2%)	1.00
<b>Race/ethnicity</b>				
White	27 (55.1%)	12 (46.2%)	15 (65.2%)	<0.01
Black or African American	9 (18.4%)	1 (3.8%)	8 (34.8%)	
Native Hawaiian/Other Pacific Islander	1 (2.0%)	1 (3.8%)	0 (0.0%)	
American Indian/Alaska Native	10 (20.4%)	10 (38.5%)	0 (0.0%)	
Hispanic	11 (22.4%)	11 (42.3%)	0 (0.0%)	<0.01
A least high school education (high school or greater)	43 (87.8%)	22 (84.6%)	21 (91.3%)	0.67
Married	13 (26.5%)	8 (30.8%)	5 (21.7%)	0.90
Employed	2 (4.1%)	1 (3.8%)	1 (4.3%)	1.00
Tobacco use (ever)	29 (59.2%)	16 (61.5%)	13 (56.5%)	0.95
Alcohol use	3 (6.1%)	3 (11.5%)	0 (0.0%)	0.24
<b>Household income</b>				
<\$20,000	27 (55.1%)	17 (65.4%)	10 (43.5%)	0.56
\$20,000 to <\$40,000	10 (20.4%)	5 (19.2%)	5 (21.7%)	
\$40,000 to <\$60,000	4 (8.2%)	1 (3.8%)	3 (13.0%)	
>\$60,000	5 (10.2%)	2 (7.7%)	3 (13.0%)	
Diabetes	34 (69.4%)	21 (80.8%)	13 (56.5%)	0.13
Cardiovascular disease	17 (34.7%)	4 (15.4%)	13 (56.5%)	<0.01
Charlson Comorbidity Index	4.7 (1.6)	4.3 (1.3)	5.1 (1.7)	0.06
<b>Cause of ESKD</b>				
Diabetic nephropathy	29 (60.4%)	20 (76.9%)	9 (40.9%)	0.03
Hypertensive nephrosclerosis	3 (6.2%)	1 (3.8%)	2 (9.1%)	
Other	13 (27.1%)	5 (19.2%)	8 (36.4%)	
Dialysis vintage (yr) <sup>b</sup>	3.2 [1.4–5.8]	3.2 [1.7–5.6]	3.2 [1.1–5.5]	0.67
Hemoglobin (g/dl) <sup>a</sup>	11.5 (1.5)	11.6 (1.8)	11.3 (1.1)	0.41
Phosphorus (mg/dl) <sup>a</sup>	5.6 (1.3)	5.8 (1.4)	5.5 (1.2)	0.39
Albumin (mg/dl) <sup>a</sup>	3.9 (0.4)	4.0 (0.3)	3.9 (0.5)	0.33
Single pool Kt/V <sup>a</sup>	1.7 (0.5)	1.8 (0.6)	1.6 (0.3)	0.11
Creatinine (mg/dl) <sup>a</sup>	8.8 (2.7)	9.4 (2.1)	8.0 (3.1)	0.08

Missing values: race 2 (4.1%), household income 3 (6.1%), and cause of ESKD 3 (6.2%).

<sup>a</sup>Mean (SD).

<sup>b</sup>Median (interquartile range).

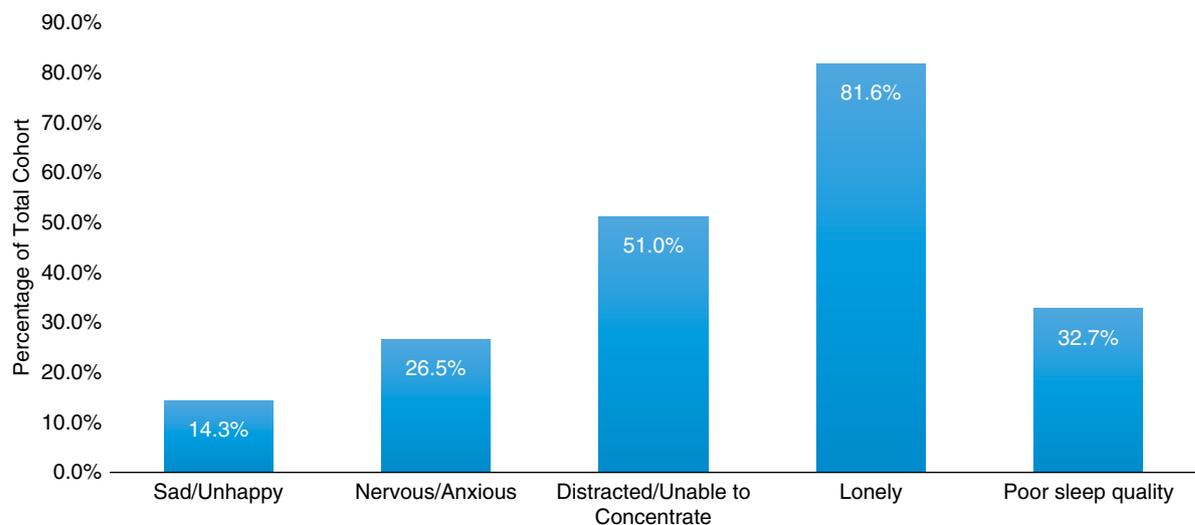
that these symptoms had changed since the pandemic started (data not shown).

Most participants (82%) felt at least moderately lonely due to social distancing measures. About 33% of the participants reported poor sleep quality over the last month (Figure 2). For the PSS-4 score, 31% of participants had a PSS-4 score ≥6, which is the mean score for population norms (mean ± SD: 6.1 ± 3.1), indicating high levels of perceived stress

(11,12). Since the pandemic started, almost 73% of the participants reported feeling sometimes, fairly, or very often that they were unable to control important things in their lives, and almost 85% of the participants reported feeling overwhelmed by difficulties at least some of the time. Despite these feelings, 76% of the participants felt confident in handling personal problems fairly or very often, and over 41% of the participants reported that they felt that things

**Table 2. Effect of coronavirus disease 2019 pandemic on patients' health and socioeconomic well-being**

Since the Pandemic Started, How Worried Have You Been about...	No/Slightly (n (%))	Moderately (n (%))	Very/Extremely (n (%))
Being infected	19 (38.8)	16 (32.7)	14 (28.6)
Friends or family being infected	18 (36.7)	16 (32.7)	15 (30.6)
Your physical health being influenced by it	11 (22.4)	24 (49.0)	14 (28.6)
Your mental/emotional health being influenced by it	10 (20.4)	30 (61.2)	9 (18.4)
Has the quality of relationships between you and members of your family changed	9 (18.4)	38 (77.6)	2 (4.1)
To what degree are you concerned about the stability of your living situation	5 (10.2)	43 (87.8)	1 (2.0)
How stressful have the restrictions on leaving home been for you (not including going to dialysis)	12 (24.5)	27 (55.1)	10 (20.4)
How worried have you been about leaving the house to go to your dialysis unit	7 (14.3)	38 (77.6)	4 (8.2)



\*For each of these symptoms, participants who reported at least moderate level of symptoms were included; for sleep quality participants who reported "bad" (as compared to good) were included

Figure 2. | Patient-reported symptoms during the coronavirus disease 2019 pandemic.

were going their way fairly or very often (Table 4). There were no differences in any of these reported symptoms among participants from PA and NM (data not shown).

#### Dialysis Participants' Accessibility to Telemedicine from Home

Most participants (71%) in our study reported access to an internet device (*e.g.*, smartphone, or tablet) and a reliable internet connection at home, and were capable of doing videoconferencing sessions from home. Among those unable to videoconference from home ( $n=14$ ), ten did not have an internet device and 12 did not have an internet connection at home. However, even among the ten participants who did not own an internet device, nine had a cellphone and only one reported not having a cellphone. Thus, 98% of the participants in the study could participate in telemedicine visits with mental or health care providers (71% video visits and 27% phone visits) from home. More participants from PA had internet at home compared with participants from NM (91% versus 58%,  $P=0.02$ ). Access to an internet device or cellphone was not different between the groups.

#### Discussion

Ours is the first study to evaluate the psychosocial effect of the COVID-19 pandemic among patients on chronic in-center HD. In our study, a large proportion of participants on in-center HD reported worry and stress due to the COVID-19 pandemic, and about one quarter met clinical criteria for depression. Participants were worried about the risk of infection with going for dialysis treatments, and the effect of infection on their physical and mental health, and on their interpersonal relationships. The economic instability due to the pandemic caused concern over housing insecurity in almost 90% of the participants and food insecurity in 30% of the participants.

More than 85% of the participants were worried about going for their dialysis treatments due to risk of infection from close contact in the dialysis facility or during transportation. However, very few reported missing treatments, and none reported missing dialysis due to worries about infection. In order to prioritize patient safety, several different approaches to modify HD have been proposed including shortening treatment times, screening patients before every treatment, wearing masks at all times, and

Table 3. Patient-reported symptoms during the coronavirus disease 2019 pandemic over the last 2 weeks

Variable	All	New Mexico	Western Philadelphia	<i>P</i> Value
Depressive symptoms PHQ-2 <sup>a</sup>	1.1 (1.6)	0.7 (1.0)	1.5 (2.0)	0.10
PHQ-2 score $\geq 2$ <sup>b</sup>	13 (26.5%)	6 (23.1%)	7 (30.4%)	0.80
Anxiety symptoms GAD-2 score <sup>a</sup>	1.1 (1.4)	1.1 (1.5)	1.0 (1.2)	0.93
GAD-2 score $\geq 3$ <sup>b</sup>	6 (12.2%)	4 (15.4%)	2 (8.7%)	0.67

PHQ-2, Patient Health Questionnaire-2; GAD-2, Generalized Anxiety Disorder-2.<sup>b</sup>

<sup>a</sup>Mean (SD).

<sup>b</sup>Percent of people with scores greater than or equal to 2 for PHQ-2 or greater than 3 for GAD-2.

**Table 4. Patient-reported stressors during the coronavirus disease 2019 pandemic over the last 2 weeks (Perceived Stress Scale)**

Since the Pandemic Started...	No/Almost Never ( <i>n</i> (%))	Sometimes ( <i>n</i> (%))	Fairly/Very Often ( <i>n</i> (%))
How often have you felt that you were unable to control the important things in your life	13 (26.5)	31 (63.3)	5 (10.2)
How often have you felt confident about your ability to handle your personal problems	9 (18.4)	3 (6.1)	37 (75.5)
How often have you felt things were going your way	24 (49.0)	5 (10.2)	20 (40.8)
How often have you felt difficulties were piling up so high that you could not overcome them	8 (16.3)	37 (75.5)	4 (8.2)

decreasing frequency of HD to twice weekly (13–15). The dialysis units in PA and NM involved in this study continued to provide treatments that were unchanged in duration or frequency. However, enhanced safety precautions were implemented across the units including daily screening for all patients and staff, masking at all times, limiting family members in the waiting rooms, adopting strict hand-washing and social-distancing guidelines, and education of staff and patients. These positive changes perhaps helped allay some of the participants' fears and worries, resulting in no missed treatments directly due to the pandemic, and in fact reinforced health behaviors among participants. Interestingly, despite worries about in-center HD, 82% of participants reported being not at all/slightly interested in trying home dialysis as an alternative option. There may be some unique socioeconomic factors that might partially explain this finding. For some patients receiving chronic HD, going to their unit for dialysis is sometimes their only chance of seeing other people and socializing. More importantly, in very rural and poor areas, the housing conditions may not be adequate to support home dialysis.

Depression and anxiety are common in patients with kidney failure on dialysis and are associated with impaired quality of life, and higher risk of hospitalization and death (3). The prevalence of depression in patients undergoing chronic dialysis is reported to be 20%–25% (16). Prevalence of anxiety in patients on chronic dialysis varies from 12% to 50% (17). However, the majority of our participants did not report feeling sad/unhappy or nervous/anxious, nor did they score in the clinical range on the validated screening scale we used for anxiety. On the other hand, 27% of the participants met clinical criteria for depressive symptoms. Additionally, many participants reported feeling worried about the risk of infection, especially when going for dialysis treatments, and the effect of the pandemic on their health. Although the screening instruments used in this study are well validated and commonly used in the ESKD population, the lower rate of anxiety seen may be due to a failure of these instruments to capture the effects of the pandemic (6,18). These scales were not designed to evaluate symptoms due to such an ongoing and uncertain life event, and only ask about symptoms over the last 2 weeks. Another possible explanation may be that when this survey was conducted in May 2020, the numbers of patients with COVID-19 were low at both sites, although they were rising in NM and falling in Western PA (19,20). However, despite the low number of patients, significant worry and stress were reported similarly among participants at both sites. When asked about

perceived stress, participants reported feeling overwhelmed with difficulties and felt quite often that things were not going their way. Future studies are needed to assess the long-term effects of COVID-19 on this patient population's mental health.

Most participants in our study reported a median household income below \$40,000 per year, demonstrating that participants had financial burdens before any loss of income or stresses from COVID-19. In fact, more than one half of the participants reported income <\$20,000 per year, which is below the US poverty line of \$26,000 per year for a family of four (21). Thus, it is not surprising that 90% of the participants were worried about the economic effect of the pandemic on the stability of their housing situation. Although food insecurity was less commonly reported, it was still a concern among about one third of the participants.

We explored accessibility to telemedicine as this may be a potential avenue for providing mental and psychosocial support for patients during the pandemic, while adhering to social-distancing guidelines and minimizing exposure (4). Despite the low incomes of many participants, most participants had accessibility to engage in videoconferencing sessions from home and, among those without this accessibility, cellphone ownership was high. Overall, 98% of the participants in the study reported having access to technology that is required for telemedicine visits (either video or audio/phone) from home. Thus, an alternative form of home-based care delivered through telemedicine may be a potential avenue to provide mental health and psychosocial support to these patients, while conforming to social-distancing guidelines and minimizing patient burden. However, we did not assess other limitations that participants might encounter for telemedicine visits such as internet bandwidth constraints, technology literacy, or cellphone data limitations. We also recognize that there may be selection bias in our cohort as these participants were enrolled in an ongoing RCT using telemedicine. However, accessibility to do such telemedicine sessions from home or prior knowledge on how to do such sessions was not a requirement to participate in the TACcare trial, and participants were provided with study tablets and training on how to do videoconferencing from dialysis units. Future work should explore the accessibility and usability of telemedicine in a larger population, and its potential to provide psychosocial support to patients.

Strengths of our study include diverse racial/ethnic and geographic representation, and novel findings regarding the psychosocial effect of the pandemic in patients on in-center

HD. However, our study had some limitations as well. Our sample size was small because the survey only included participants already enrolled in an ongoing trial and we were unable to reach everyone in our original study. Given the small sample size, we were unable to compare participants by intervention arm. Our results may have been affected by selection bias given that we could not interview all participants enrolled in the original RCT. However, among participants who we were able to contact, the refusal rate was low (20%). Also, there were no differences among participants who completed the survey as compared to those who were unable to be contacted or refused. Lastly, since the participants in the intervention arm received cognitive behavioral therapy, it would limit our potential findings for clinically significant rates of anxiety and depression, although only 37% of the survey respondents were in the intervention arm. Among patients receiving chronic HD who are participating in an ongoing clinical trial, a large proportion report adverse psychosocial effects of COVID-19. Future research is needed to verify our findings in a larger sample using the newly developed, pandemic-specific questionnaires to evaluate the psychosocial effect of the pandemic on patient well-being.

#### Disclosures

All authors have nothing to disclose.

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#### Author Contributions

M. Jhamb and M. Unruh were responsible for study conceptualization, funding acquisition, project administration, and supervision; M. Jhamb, M. Unruh, J. Steel, S. Erickson, and M.E. Roumelioti were involved in study planning and methodology; J. Yabes and J. Lee were responsible for data analysis; M. Jhamb and J. Lee wrote the original draft; and all authors reviewed and edited the manuscript.

#### Supplemental Material

This article contains supplemental material online at <http://kidney360.asnjournals.org/lookup/suppl/doi:10.34067/KID.0004662020/-/DCSupplemental>.

Supplemental Table 1. Baseline characteristics of patients who completed survey compared with those who refused.

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**Supplementary Table 1**

**TableS1. Baseline characteristics of patients who completed survey compared with those who refused**

Variable	[ALL]	Completed	Refused	p
Site	N	49	12	0.70
	Western PA	23 (46.9%)	7 (58.3%)	
	New Mexico	26 (53.1%)	5 (41.7%)	
Age at consent (years)	mean(sd)	55.9 (10.7)	51.6 (11.6)	0.25
Male		26 (53.1%)	6 (50.0%)	1.00
Race	White	27 (55.1%)	6 (50.0%)	0.87
	Black or African American	9 (18.4%)	3 (25.0%)	
	Native Hawaiian/Other	1 (2.0%)	0 (0.0%)	
	American Indian/Alaska	10 (20.4%)	3 (25.0%)	
Hispanic Ethnicity	Yes	11 (22.4%)	2 (16.7%)	1.00
Education (HS or greater)	Yes	43 (87.8%)	10 (83.3%)	0.65
Married	Married	13 (26.5%)	2 (16.7%)	0.77
Employed	Yes	2 (4.1%)	1 (8.3%)	0.49
Tobacco use (ever)	Yes	29 (59.2%)	6 (50.0%)	0.80
Alcohol use	Yes	3 (6.1%)	3 (25.0%)	0.08
Household income	Less than \$20,000	27 (55.1%)	7 (58.3%)	0.72
	\$20,000 to less than \$40,000	10 (20.4%)	4 (33.3%)	
	\$40,000 to less than \$60,000	4 (8.2%)	0 (0.0%)	
	Greater than \$60,000	5 (10.2%)	0 (0.0%)	
	Greater than \$60,000	5 (10.2%)	0 (0.0%)	
Diabetes	Yes	34 (69.4%)	7 (58.3%)	0.50
Cardiovascular Disease	Yes	17 (34.7%)	7 (58.3%)	0.19
Charlson Comorbidity Index	mean(sd)	4.7 (1.6)	4.8 (1.7)	0.77
Etiology of ESRD	Diabetic nephropathy	29 (60.4%)	5 (41.7%)	0.20
	Hypertensive nephrosclerosis	3 (6.2%)	4 (33.3%)	
	Other	13 (27.1%)	3 (25.0%)	

Variable		[ALL]	Completed	Refused	p
Dialysis vintage (years)	median[Q1,Q3]	3.2 [1.4, 6.4]	3.2 [1.4, 5.8]	3.1 [1.9, 8.7]	0.46
Hemoglobin (g/dL)	mean(sd)	11.5 (1.5)	11.5 (1.5)	11.5 (1.5)	0.96
Phosphorus (mg/dl)	mean(sd)	5.7 (1.5)	5.6 (1.3)	6.0 (2.2)	0.54
Albumin (mg/dl)	mean(sd)	4.0 (0.4)	3.9 (0.4)	4.0 (0.3)	0.44
Single pool Kt/V	mean(sd)	1.6 (0.5)	1.7 (0.5)	1.5 (0.4)	0.32
Creatinine	mean(sd)	9.0 (3.0)	8.8 (2.7)	9.8 (4.1)	0.39

**Missing values:** race 2 (3.3%), household income 4 (6.6%), etiology of ESRD 3 (5.0%)

**Supplementary Table 1**

**TableS1. Baseline characteristics of patients who completed survey compared with those who refused**

Variable	[ALL]	Completed	Refused	p
Site	N	49	12	0.70
	Western PA	23 (46.9%)	7 (58.3%)	
	New Mexico	26 (53.1%)	5 (41.7%)	
Age at consent (years)	mean(sd)	55.9 (10.7)	51.6 (11.6)	0.25
Male		26 (53.1%)	6 (50.0%)	1.00
Race	White	27 (55.1%)	6 (50.0%)	0.87
	Black or African American	9 (18.4%)	3 (25.0%)	
	Native Hawaiian/Other	1 (2.0%)	0 (0.0%)	
	American Indian/Alaska	10 (20.4%)	3 (25.0%)	
Hispanic Ethnicity	Yes	11 (22.4%)	2 (16.7%)	1.00
Education (HS or greater)	Yes	43 (87.8%)	10 (83.3%)	0.65
Married	Married	13 (26.5%)	2 (16.7%)	0.77
Employed	Yes	2 (4.1%)	1 (8.3%)	0.49
Tobacco use (ever)	Yes	29 (59.2%)	6 (50.0%)	0.80
Alcohol use	Yes	3 (6.1%)	3 (25.0%)	0.08
Household income	Less than \$20,000	27 (55.1%)	7 (58.3%)	0.72
	\$20,000 to less than \$40,000	10 (20.4%)	4 (33.3%)	
	\$40,000 to less than \$60,000	4 (8.2%)	0 (0.0%)	
	Greater than \$60,000	5 (10.2%)	0 (0.0%)	
	Greater than \$60,000	5 (10.2%)	0 (0.0%)	
Diabetes	Yes	34 (69.4%)	7 (58.3%)	0.50
Cardiovascular Disease	Yes	17 (34.7%)	7 (58.3%)	0.19
Charlson Comorbidity Index	mean(sd)	4.7 (1.6)	4.8 (1.7)	0.77
Etiology of ESRD	Diabetic nephropathy	29 (60.4%)	5 (41.7%)	0.20
	Hypertensive nephrosclerosis	3 (6.2%)	4 (33.3%)	
	Other	13 (27.1%)	3 (25.0%)	

Variable		[ALL]	Completed	Refused	p
Dialysis vintage (years)	median[Q1,Q3]	3.2 [1.4, 6.4]	3.2 [1.4, 5.8]	3.1 [1.9, 8.7]	0.46
Hemoglobin (g/dL)	mean(sd)	11.5 (1.5)	11.5 (1.5)	11.5 (1.5)	0.96
Phosphorus (mg/dl)	mean(sd)	5.7 (1.5)	5.6 (1.3)	6.0 (2.2)	0.54
Albumin (mg/dl)	mean(sd)	4.0 (0.4)	3.9 (0.4)	4.0 (0.3)	0.44
Single pool Kt/V	mean(sd)	1.6 (0.5)	1.7 (0.5)	1.5 (0.4)	0.32
Creatinine	mean(sd)	9.0 (3.0)	8.8 (2.7)	9.8 (4.1)	0.39

**Missing values:** race 2 (3.3%), household income 4 (6.6%), etiology of ESRD 3 (5.0%)