

# How Hemodialysis Patients Perceive the SARS-CoV-2 Health Crisis: Lessons from Austria

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## Abstract

**Background** The ongoing SARS-CoV-2 pandemic forced many countries to implement strict and unprecedented precautions to stop the spread of the virus. On top of these measures, hemodialysis units have adopted their own rules to protect wards and patients from infection with SARS-CoV-2. Despite the rapidly growing knowledge on epidemiology, virology, and clinical disease, little is known about how these measures are perceived by patients themselves on hemodialysis.

**Methods** The study was performed in the three hemodialysis units in Vorarlberg, Austria's westernmost state. A questionnaire was developed consisting of 22 questions on patients' perceptions of the COVID-19 crisis and their feelings about the general precautions and specific steps implemented on dialysis wards. All adult patients were asked to fill out the questionnaire anonymously.

**Results** Of 202 patients on hemodialysis, 148 completed the questionnaire (66.9% men, mean age  $68.3 \pm 13.3$  years). The vast majority (83.1%) were worried by the COVID-19 crisis, but only 28.4% reported a negative effect on emotional well-being. Daily life was most affected by the general ban on visitors (58.6%) and home confinement (35.9%). Of the patients, 64.2% feared contracting COVID-19, 30.7% were afraid of financial consequences, and 14.6% were afraid of loneliness and isolation. The safety measures on dialysis wards were classified as adequate by 97.3% of the respondents. Of the patients, 78.2% felt safe during dialysis treatment. All dialysis-specific precautions (individual patient transport, health check, hand disinfection, wearing a face mask, and physical distancing) were rated important or very important by almost all patients. To date, none of the patients have acquired SARS-CoV-2 infection.

**Conclusions** Although the SARS-CoV-2 crisis brought worry to and affected the lives of most patients on hemodialysis, its effect on their emotional well-being was moderate. Patients felt safe on dialysis wards, and acceptance of specific precautions was high.

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## Introduction

The novel coronavirus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first detected in the city of Wuhan in China in December 2019, has rapidly spread around the globe (1). On March 11, 2020, the World Health Organization declared coronavirus disease 2019 (COVID-19), the disease caused by SARS-CoV-2, a pandemic (2,3). On March 16, the government of the Republic of Austria announced a complete lockdown for the country. People were allowed to leave their homes only to go to work, buy necessities for daily living, help others, or get physical exercise. Universities, schools, shops (except supermarkets selling food), restaurants, and hotels were closed, and all borders to neighboring countries were shut.

It is clear that such a pandemic and the unprecedented restrictions put in place to prevent the disease from spreading will also affect many people's well-being, emotions, and mental health (4). Such effects were already observed during the 2003 severe acute respiratory syndrome and the 2009–2010 H1N1 influenza

epidemics (5,6). During the current pandemic, studies of its effects on mental health have focused on the general population, patients with COVID-19 infection, and health care workers (7–10).

Patients on hemodialysis are possibly at increased risk to contract COVID-19 and also, for severe disease and death (11,12). Most of them are elderly, and many live in nursing homes. They usually have a high burden of comorbidities, such as diabetes and heart disease. They have to come to the dialysis unit three times a week, where they have multiple contacts with other patients and health care workers. Special guidelines have been issued to protect dialysis units from SARS-CoV-2 by organizations such as the Centers for Disease Control and Prevention, the American Society of Nephrology, and the European Dialysis and Transplant Association (13–15). Our goal was to investigate how patients on hemodialysis react to the crisis and how much they are affected by general public restrictions as well as by dialysis-specific precautions. A special simple questionnaire was developed, and all patients on

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hemodialysis in our region were asked to take part in the study.

## Materials and Methods

All 202 adult patients on hemodialysis in Vorarlberg, Austria's westernmost state, were invited to participate. The patients were treated in three units: the central unit at Feldkirch Academic Teaching Hospital and two satellite units. Of the 202 patients, 148 ultimately filled out and returned the questionnaire. Most of the patients answered the questionnaire during the dialysis session, and a minority completed it at home and did not return it until the next treatment.

A detailed patient flow chart is provided in Figure 1.

The questionnaire consisted of 22 questions, with two to six response choices per question. The form is available in Supplemental Material.

Informed consent was obtained from all participants. The questionnaire was anonymous without any possibility to identify the patient. The study was performed in accordance with the Declaration of Helsinki and Austrian law. Ethics approval for this study was waived by the Ethics Committee of Vorarlberg.

In the second week of March 2020, the following preventive regulations were introduced to protect patients and wards: individual transport to and from the unit; health check, including taking of temperature; hand disinfection before entering the unit; wearing a face mask; and physical distancing in the waiting area. All patients on dialysis were informed about precautions by medical staff and nurses. They also received leaflets on March 12 and April 7 describing general precautions, such as social distancing and hygiene, as well as specific regulations for safety on the dialysis wards.

Data are presented as number of patients, relative frequencies, or mean values  $\pm$  SD. Patients were stratified by sex and three age groups (<65, 65–77, and >77 years). Groups were compared using the chi-squared test and the Fisher exact test. A two-sided  $P$  value = 0.05 was deemed to indicate statistical significance. All statistical analyses

were performed with SPSS 26 for Windows (SPSS Inc., Chicago, IL).

## Results

The study was performed and completed during the second week of April 2020, which was the fourth week of complete lockdown in Austria and implementation of safety precautions in the three dialysis wards. At that time in the state of Vorarlberg with 398,000 inhabitants, 6082 individuals were tested for SARS-CoV-2 by PCR, and 828 were found to be positive. Thirty-seven patients were hospitalized, with ten in intensive care units. Seven patients died from COVID-19. Of the 202 patients on hemodialysis, none contracted SARS-CoV-2 infection. Four suspected cases tested negative by PCR.

### Baseline Characteristics

Data on age and sex were missing on eight and three questionnaires, respectively. Of the participants, 66.9% were men, and 31.1% were women. Mean age was  $68.3 \pm 13.3$  years. Median dialysis vintage was 28.5 months (25th percentile, 12.0 months; 75th percentile, 53.3 months). Concerning their housing situation, 66.7% lived with their family, 23.6% lived alone, 5.6% were in a nursing home, and 4.2% had other housing. For transportation to the dialysis unit, 60.5% of the patients used a taxi, 14.3% used an ambulance, 18.4% drove themselves, and 6.8% were driven by relatives.

### Response to General Precautions

First, patients were asked about their general feeling during the pandemic and how they were affected by the general lockdown implemented by the Austrian government.

As shown in Figure 2, the vast majority of patients (83.1%) were worried about the coronavirus crisis in general, but only a small portion (18.2%) felt very worried. The responses did not differ between sex or age groups.

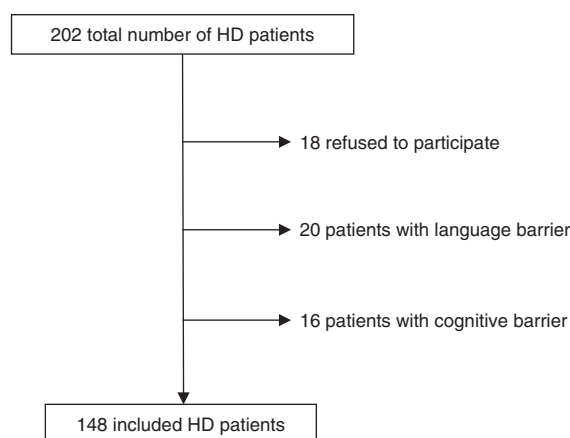
Patients were asked whether the crisis affected their emotional and physical well-being. The majority (69.6%) denied any effect on their emotional well-being, but 28.4% of patients replied that the crisis had a negative influence. The proportion of unaffected patients was greater among men (73.7%) than women (58.7%;  $P=0.04$ ) (Figure 3).

The coronavirus crisis had a very moderate negative effect on the physical well-being of patients (6.1% of men and 17.4% of women felt worse,  $P=0.10$ ).

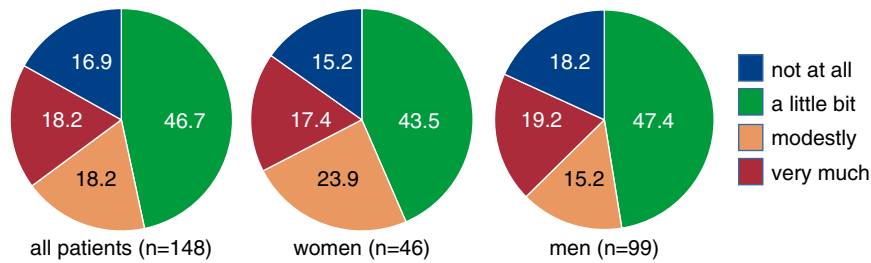
Concerning the effect of the general precautions on patients' daily life, only 28.6% of the patients on dialysis stated that the precautions did not affect their daily life at all, 51.7% stated that they had a moderate effect, and 19.7% stated that their daily life was severely impaired (no statistical difference between sex or age groups).

For further differentiation, patients were asked which government precautions affected them in particular. The results are shown in Table 1. The largest burden for the dialysis population was social distancing, the inability to visit someone or to be visited by family members or friends, and home confinement.

Asked about their concerns about getting the disease, suffering financial consequences, and loneliness during



**Figure 1.** | Patient flow chart depicts the number of patients and reasons why they did not participate in the study. HD, hemodialysis.



**Figure 2. | Proportion of all patients, women and men, who did not feel worried to felt very worried by the coronavirus crisis.** Numbers show percentages of patients. Differences between women and men are not significant.

the crisis, 64.2% of the patients reported that they feared contracting COVID-19, 30.7% were afraid of financial consequences, and 14.6% were afraid of loneliness and isolation. Fear of infection (70.7% versus 60.2%) and loneliness (19.5% versus 12.9%) were somewhat greater in women compared with men, whereas men feared economic consequences more than women (32.3% versus 29.3%). These differences did not reach statistical difference. Also, there were no differences between age groups.

Patients were asked whether they believed they belonged to a high-risk group for severe COVID-19 disease. Half of them (51%) affirmed, 23% negated, and 25.6% said they did not know, with no significant difference between men and women.

Concerns about infection risk and disease severity differed by age groups. Of patients <65 years, 48.9% believed they belonged to a high-risk group. This proportion increased to 64.5% in patients aged 65–77 years but declined to 38.6% in those aged over 77 years. In this older age group, however, 43.2% stated that they did not know ( $P=0.01$ ) (Figure 4).

**Safety and Precautions in the Dialysis Unit**

In the second part of the questionnaire, patients were asked to give their impression concerning general safety in the dialysis ward and share their opinion on the special safety precautions.

Concerning safety on the ward, 78.2% of patients reported that they felt as safe as always, 21.1% felt a little bit unsafe, and 0.7% felt very unsafe during the coronavirus crisis, without any difference between women and men. The impression of being unsafe declined by age group with increasing age (<65 years, 29.8%; 65–77 years, 25%; >77 years, 6.8%;  $P=0.01$ ).

In addition, 12.3% of the respondents felt that dialysis was a welcome change to their usual daily life with social distancing. Overall, 99.3% of the respondents felt they received optimal medical care despite the coronavirus crisis.

The safety precautions implemented in the dialysis wards in general were qualified as adequate by 97.3% of the patients, as insufficient by 1.4%, and as exaggerated by 1.4%.

Table 2 shows how patients classified the individual safety precautions in the dialysis units.

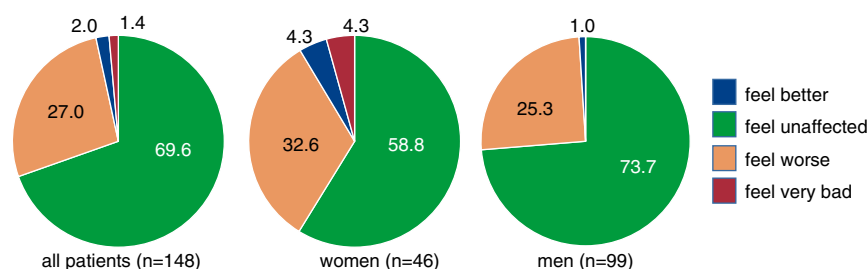
Almost all patients stated that these precautions were important or very important. In particular, the patients did not feel disturbed by any of these measures. There were no statistical differences between sex or age groups.

When asked how to further improve safety in the dialysis unit, 4.1% suggested better personal protective equipment, such as better face masks; 2.0% wanted more physical distancing; and 1.4% desired more testing for SARS-CoV-2 infection among patients.

Patients were asked about their greatest concerns and wishes. Of the respondents, 10.1% replied that they did not want to contract SARS-CoV-2. Another 6.8% desired a prompt end to the coronavirus crisis, but 2% were worried about a too rapid lifting of restrictions. An end to social distancing or financial normalization was mentioned by 1.4% of the patients each. Finally, 0.7% of the patients wished that the kidney transplant program would be restarted soon.

**Discussion**

The SARS-CoV-2 pandemic is a global public health emergency, the likes of which have not been seen since the Spanish influenza pandemic a century ago. Not unexpectedly,



**Figure 3. | Effect of the coronavirus crisis on emotional well-being reported by all patients and according to sex.** Numbers show percentages of patients. Differences between women and men are significant ( $P=0.04$ ).

**Table 1. The numbers and percentages of patients who felt their daily life was affected by general precautions introduced by the government**

Precaution	n (%)
Shelter at home	46 (35.9)
Ban on visitors	75 (58.6)
Closing of shops	27 (21.1)
Closing of restaurants	22 (17.2)
Wearing a face mask	24 (18.8)

There was no statistical difference between sex and age groups. n, number of patients.

such emergencies will severely affect emotional well-being and mental health. They cause stress, depression, and anxiety (4). During the ongoing pandemic, online studies conducted in China, Italy, and Spain using the Depression Anxiety Stress Scales (DASS) reported depressive symptoms in 12%–33%, anxiety in 15%–29%, and stress in 8%–28% of the general population (16–18). To the best of our knowledge, our study is the first study of emotional well-being in patients on dialysis and their perception of the restrictions imposed during the current crisis. We did not focus on general measures of well-being in our patients and therefore, did not use established questionnaires, such as the DASS-21 or the Kidney Disease Quality of Life short form forms (16,19). To evaluate how patients on hemodialysis responded to the general and dialysis-related restrictions, we created our own simple but specific questionnaire.

As expected, the vast majority of patients on hemodialysis were worried by the SARS-CoV-2 pandemic. Patients also felt the general precautions affected their daily life, but only a minority was severely worried and affected. The most intrusive restriction was felt to be social distancing (ban on visitors, home confinement). Roughly one-third of the respondents also reported, in addition to a negative effect on daily life, decreased emotional well-being. This proportion is comparable with that mentioned in reports on the general population in other countries (10,17,18). The biggest concern of patients was obviously to not contract COVID-19. That fear of infection is slightly more prevalent in women has also been reported in other studies (10,17,20). Financial consequence or unemployment was a minor concern, possibly because almost all respondents were retired

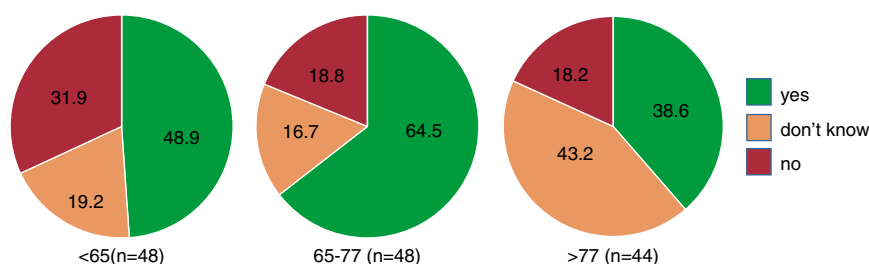
and therefore, did not fear unemployment or bankruptcy. Because two-thirds of the patients on hemodialysis lived with their family, most patients did not fear loneliness and isolation.

Compared with the general population, patients with ESKD are at increased risk to contract COVID-19 (0.5% versus 2% in Wuhan, China) (12). In addition, the disease has a much higher mortality rate (2% versus 25%) (11,12). Our patients were well aware of that risk. Most of them believed that they belonged to a high-risk group, especially those in the age group 65–77 years. Younger patients possibly thought their age protected them from severe COVID-19. In the oldest patient group, understandably almost half answered that they did not know whether they were at increased risk or not.

None of our patients on hemodialysis contracted SARS-CoV-2. This suggests that rapid implementation of precautions by the Austrian government as well as by dialysis units was effective. In addition, patients were generally very compliant with these rules. The actions for dialysis units proposed by several nephrology societies were very useful and effective (13–15,21,22). Because of these precautions, most of the patients also felt very safe during individual transport and dialysis treatment. All of them stated they received optimal care despite the risk of infection. Almost all patients classified the measures in general as adequate and the individual precautions as important or very important (Table 2). Only a minority suggested that safety could be further improved by better personal protective equipment, stricter physical distancing, or more PCR testing.

Our study has limitations. First, Vorarlberg was only mildly affected by the SARS-CoV-2 pandemic. The results may be different in severely affected regions, such as Lombardy or New York. Indeed, it has been shown that coronavirus infection of relatives and acquaintances or living in areas with multiple cases is associated with a greater effect on emotional well-being (17,23). Furthermore, had one of our patients contracted COVID-19, possibly with a life-threatening course, the results would very likely be different. Second, because of the nature of our questionnaire, we do not know whether reduced emotional well-being was mainly due to depression, anxiety, or stress. Third, as all our patients were White, the results cannot be extrapolated to others, such as Blacks or Asians.

There are also some limitations concerning the methods of our study. Because of lack of time, no piloting or validation of the questionnaire was possible. Question format and



**Figure 4. | The proportion of patients who believed they belonged to a high-risk group for severe coronavirus disease 2019 according to age groups.** Numbers show percentages of patients. Differences between groups were significant ( $P=0.01$ ).



**Table 2. How patients ranked the importance of precautions taken on the dialysis wards**

Precaution	Unnecessary, n (%)	Important, n (%)	Very Important, n (%)	Disturbing, n (%)
Individual transport	12 (8.4)	69 (48.2)	59 (41.3)	3 (2.1)
Health check	2 (1.4)	65 (45.1)	77 (53.5)	0 (0)
Hand disinfection	3 (2.1)	61 (41.8)	82 (56.1)	0 (0)
Face mask	7 (4.9)	67 (46.5)	68 (47.2)	2 (1.4)
Physical distancing	2 (1.4)	66 (45.8)	75 (52.1)	1 (0.7)

There was no statistical difference between sex and age groups. n, number of patients.

response scales could not be validated and therefore, may be prone to ambiguity and lack of discrimination. We do not have data on depression or depression symptoms of our patients prior to the coronavirus pandemic, which may have affected the results of our study. Because of lack of information from the pre-pandemic period, we are also unable to assess how much their lives were affected in the midst of the pandemic compared with pre-pandemic conditions.

In conclusion, general precautions introduced during the SARS-CoV-2 pandemic had an effect on the daily life of patients on hemodialysis and some negative effect on their emotional well-being. In general, patients felt safe on the dialysis wards, agreed that specific precautions were necessary and adequate, and complied with these rules. Despite the fact that patients on hemodialysis constitute a risk group for a negative outcome of COVID-19 infection, these patients seem to be quite resilient to negative emotional consequences of the pandemic.

#### Disclosures

All authors have nothing to disclose.

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None.

#### Author Contributions

A. Abbassi-Nik, T. Davidovic, K. Lhotta, H. Sprenger-Mähr, and E. Zitt conceptualized the study; A. Abbassi-Nik, T. Davidovic, K. Lhotta, and H. Sprenger-Mähr were responsible for data curation; T. Davidovic and E. Zitt were responsible for formal analysis; A. Abbassi-Nik, T. Davidovic, and K. Lhotta were responsible for investigation; T. Davidovic, K. Lhotta, and E. Zitt were responsible for methodology; T. Davidovic and E. Zitt were responsible for validation; A. Abbassi-Nik and T. Davidovic were responsible for visualization; K. Lhotta provided supervision; K. Lhotta wrote the original draft; A. Abbassi-Nik, T. Davidovic, H. Sprenger-Mähr, and E. Zitt reviewed and edited the manuscript; and A. Abbassi-Nik, T. Davidovic, K. Lhotta, H. Sprenger-Mähr, and E. Zitt revised the manuscript critically, gave their final approval, and agree to be accountable for all aspects of the work.

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