How hemodialysis patients perceive the SARS-CoV-2 health crisis: Lessons from Austria

Tamara Davidovic, Hannelore Sprenger-Mähr, Armin Abbassi-Nik, Emanuel Zitt, Karl Lhotta

Department of Internal Medicine III (Nephrology and Dialysis), Feldkirch Academic Teaching Hospital, Feldkirch, Austria

Address for Correspondence

Karl Lhotta, MD

Department of Internal Medicine III (Nephrology and Dialysis)

Feldkirch Academic Teaching Hospital

Carinagasse 47

A-6800 Feldkirch

Tel +43 5522 303 2700

Fax +43 5522 303 7506

Karl.lhotta@lkf.at
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 hemodialysis patients themselves.

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 hemodialysis patients, 148 completed the questionnaire (66.9% males, mean age 68.3±13.3 years). The vast majority (83.1%) were worried by the Covid-19 crisis but only 28.4% reported a negative impact on emotional wellbeing. 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% 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.

Conclusion

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

The novel coronavirus 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 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 home 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 neighbouring 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 wellbeing, emotions and mental health(4). Such effects were already observed during the 2003 SARS 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 healthcare workers(7-10).

Hemodialysis patients 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 healthcare workers. Special guidelines have been issued to protect dialysis units from SARS-CoV-2 by organizations such as the Centers for Disease Control, the American Society of Nephrology and the European Dialysis and Transplant Association(13-15). Our goal was to investigate how hemodialysis patients 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 hemodialysis patients in our region were asked to take part in the study.
Patients and Methods

All 202 adult hemodialysis patients 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 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 as supplementary 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; physical distancing in the waiting area. All dialysis patients 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.

Statistical Methods.

Data are presented as number of patients or relative frequencies, mean values ± SD. Patients were stratified by gender and three age groups (<65 years, 65-77 years, >77 years). Groups were compared using $\chi^2$- and Fisher’s 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, USA).

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 6,082 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 hemodialysis patients none contracted SARS-CoV-2 infection. Four suspected cases tested negative by PCR.

Baseline characteristics

Data on age and gender were missing in eight and three questionnaires, respectively. Of the participants 66.9% were male and 31.1% female. Mean age was 68.3 ± 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% 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 genders or age groups.

Patients were asked whether the crisis affected their emotional and physical wellbeing. The majority (69.6%) denied any impact on their emotional wellbeing, 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 impact on the physical wellbeing of patients (6.1% of men and 17.4% of women felt worse, p=0.095).

Concerning the impact of the general precautions on patients’ daily life, only 28.6% of the dialysis patients stated that the precautions did not affect their daily life at all, 51.7% stated that they had a moderate impact and 19.7% that their daily life was severely impaired (no statistical difference between genders 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 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% vs 60.2%) and loneliness (19.5% vs 12.9%) was somehow greater in women compared to men, whereas men feared economic consequences more than women (32.3% vs 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% 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 genders 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. And 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, such emergencies will severely affect emotional wellbeing 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, ours is the first study of emotional wellbeing in dialysis patients and their perception of the restrictions imposed during the current crisis. We did not focus on general measures of wellbeing in our patients and therefore did not use established questionnaires such as the DASS-21 or the Kidney Disease Quality of Life KDQOL-SF forms(16, 19). To evaluate how hemodialysis patients responded to the general and dialysis-related restrictions we created our own simple but specific questionnaire.

As expected, the vast majority of hemodialysis patients 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 reported, in addition to a negative impact
on daily life, also decreased emotional wellbeing. This proportion is comparable to 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 consequences or unemployment were a minor concern, possibly because almost all respondents were retired and therefore did not fear unemployment or bankruptcy. Because two-thirds of the hemodialysis patients lived with their family, most patients did not fear loneliness and isolation.

Compared to the general population end-stage kidney disease patients 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 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 hemodialysis patients 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). Due to 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 impact on emotional wellbeing\(^{(17, 23)}\). Furthermore, had one of our patients contracted Covid-19, possibly with a life-threatening course, the results would very likely be different. Second, due to the nature of our questionnaire we do not know whether reduced emotional wellbeing was mainly due to depression, anxiety or stress. Third, as all our patients were Caucasian, the results cannot be extrapolated to others such as African-Americans or Asians.

There are also some limitations concerning the methods of our study. Due to lack of time no piloting or validation of the questionnaire was possible. Question format and response scales could not be validated and therefore may be prone to of 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. Due to 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 to pre-pandemic conditions.

In conclusion, general precautions introduced during the SARS-CoV-2 pandemic had an impact on the daily life of hemodialysis patients and some negative effect on their emotional wellbeing. 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 hemodialysis patients 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.
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Author Contributions:

T Davidovic: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing - review and editing

H Sprenger-Mähr: Conceptualization; Data curation; Writing - review and editing

A AbbassiNik: Conceptualization; Data curation; Investigation; Visualization; Writing - review and editing

E Zitt: Conceptualization; Formal analysis; Methodology; Validation; Writing - review and editing

K Lhotta: Conceptualization; Data curation; Investigation; Methodology; Supervision; Writing - original draft

All authors revised the manuscript critically, gave their final approval and agree to be accountable for all aspects of the work.
References

1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, Zhao X, Huang B, Shi W, Lu R, Niu P, Zhan F, Ma X, Wang D, Xu W, Wu G, Gao GF, Tan W, China Novel Coronavirus I, Research T: A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med*, 382: 727-733, 2020
2. Cucinotta D, Vanelli M: WHO Declares COVID-19 a Pandemic. *Acta Biomed*, 91: 157-160, 2020
3. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, Liu J, Shan H, Lei CL, Hui DSC, Du B, Li LJ, Zeng G, Yuen KY, Chen RC, Tang CL, Wang T, Chen PY, Xiang J, Li SY, Wang JL, Liang ZJ, Peng YX, Wei L, Liu Y, Hu YH, Peng P, Wang JM, Liu JY, Chen Z, Li G, Zheng ZJ, Qiu SQ, Luo J, Ye CJ, Zhu SY, Zhong NS, China Medical Treatment Expert Group for C: Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*, 2020
4. Pfefferbaum B, North CS: Mental Health and the Covid-19 Pandemic. *N Engl J Med*, 2020
5. DiGiovanni C, Conley J, Chiu D, Zaborski J: Factors influencing compliance with quarantine in Toronto during the 2003 SARS outbreak. *Biosecur Bioterror*, 2: 265-272, 2004
6. Pfefferbaum B, Schonfeld D, Flynn BW, Norwood AE, Dodgen D, Kaul RE, Donato D, Stone B, Brown LM, Reissman DB, Jacobs GA, Hobfoll SE, Jones RT, Herrmann J, Urasno RJ, Ruzek JI: The H1N1 crisis: a case study of the integration of mental and behavioral health in public health crises. *Disaster Med Public Health Prep*, 6: 67-71, 2012
7. Duan L, Zhu G: Psychological interventions for people affected by the COVID-19 epidemic. *Lancet Psychiatry*, 7: 300-302, 2020
8. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R, Tan H, Kang L, Yao L, Huang M, Wang H, Wang G, Liu Z, Hu S: Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open*, 3: e203976, 2020
9. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, Min BQ, Tian Q, Leng HX, Du JL, Chang H, Yang Y, Li W, Shangguan FF, Yan TY, Dong HQ, Han Y, Wang YP, Cosci F, Wang HX: Mental Health and Psychosocial Problems of Medical Health Workers during the COVID-19 Epidemic in China. *Psychother Psychosom*: 1-9, 2020
10. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC: Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Environ Res Public Health*, 17, 2020
11. Yan Y, Shin WI, Pang YX, Meng Y, Lai J, You C, Zhao H, Lester E, Wu T, Pang CH: The First 75 Days of Novel Coronavirus (SARS-CoV-2) Outbreak: Recent Advances, Prevention, and Treatment. *Int J Environ Res Public Health*, 17, 2020
12. Xiong F, Tang H, Liu L, Tu C, Tian JB, Lei CT, Liu J, Dong JW, Chen WL, Wang XH, Luo D, Shi M, Miao XP, Zhang C: Clinical Characteristics of and Medical Interventions for COVID-19 in Hemodialysis Patients in Wuhan, China. *J Am Soc Nephrol*, 2020
13. Basile C, Combe C, Pizzarelli F, Covic A, Davenport A, Kanbay M, Kirmizis D, Schneditz D, van der Sande F, Mitra S: Recommendations for the prevention, mitigation and containment of the emerging SARS-CoV-2 (COVID-19) pandemic in haemodialysis centres. *Nephrol Dial Transplant*, 2020
14. American Society of Nephrology (2020, March 13). Information for Screening and Management of COVID-19 in the Outpatient Dialysis Facility. [https://www.asn-online.org/g/blast/files/DIALYSIS_COVID_2019_Update_03.13.2020_FINAL.pdf](https://www.asn-online.org/g/blast/files/DIALYSIS_COVID_2019_Update_03.13.2020_FINAL.pdf)
15. Centers for Disease Control and Prevention (2020, May 4). Interim Additional Guidance for Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed COVID-19 in Outpatient Hemodialysis Facilities. [https://www.cdc.gov/coronavirus/2019-ncov/hcp/dialysis.html](https://www.cdc.gov/coronavirus/2019-ncov/hcp/dialysis.html)
16. Lovibond PF, Lovibond SH: The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther.*, 33: 335-343, 1995

17. Mazza C, Ricci E, Biondi S, Colasanti M, Ferracuti S, Napoli C, Roma P: A Nationwide Survey of Psychological Distress among Italian People during the COVID-19 Pandemic: Immediate Psychological Responses and Associated Factors. *Int J Environ Res Public Health*, 17, 2020

18. Ozamiz-Etxebarria N, Dosil-Santamaria M, Picaza-Gorrochategui M, Idoiaga-Mondragon N: Stress, anxiety, and depression levels in the initial stage of the COVID-19 outbreak in a population sample in the northern Spain. *Cad Saude Publica*, 36: e00054020, 2020

19. Korevaar JC, Merkus MP, Jansen MA, Dekker FW, Boeschoten EW, Krediet RT, group NE-s: Validation of the KDQOL-SF: a dialysis-targeted health measure. *Qual Life Res*, 11: 437-447, 2002

20. Bitan DT, Grossman-Giron A, Bloch Y, Mayer Y, Shiffman N, Mendlovic S: Fear of COVID-19 scale: Psychometric characteristics, reliability and validity in the Israeli population. *Psychiatry Res*: 113100, 2020

21. Ikizler TA: COVID-19 and Dialysis Units: What Do We Know Now and What Should We Do? *Am J Kidney Dis*, 2020

22. Ikizler TA, Kliger AS: Minimizing the risk of COVID-19 among patients on dialysis. *Nat Rev Nephrol*, 2020

23. Yang H, Ma J: How an Epidemic Outbreak Impacts Happiness: Factors that Worsen (vs. Protect) Emotional Well-being during the Coronavirus Pandemic. *Psychiatry Res*, 289: 113045, 2020
Tables

| 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) |          |          |          |          |

Table 1 shows the number and percentage of patients who felt their daily life was affected by general precautions introduced by the government. n = number of patients. There was no statistical difference between genders and age groups.

| precaution                  | unnecessary | important | very important | disturbing |
|-----------------------------|-------------|-----------|----------------|------------|
| 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)    |

Table 2 shows how patients ranked the importance of precautions taken on the dialysis wards. n = number of patients. There was no statistical difference between genders and age groups.
**Figure 1.** Patient flow chart depicting the number of patients and reasons why they did not participate in the study.
Figure 2. Proportion of all patients, women and men, who felt not worried to very worried by the coronavirus crisis. Numbers show percentage of patients. Differences between women and men are not significant.
Figure 3. Impact of the coronavirus crisis on emotional wellbeing reported by all patients and according to gender. Numbers show percentage of patients. Differences between women and men are significant (p=0.04).
Figure 4. shows the proportion of patients who believed they belonged to a high-risk group for severe Covid-19 according to age groups. Numbers show percentage of patients. Differences between groups were significant (p=0.01).