

ORIGINAL ARTICLE

COVID-19 vaccine hesitancy and response to a simple educational intervention in patients attending an outpatient dialysis unit in Johannesburg, South Africa

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ABSTRACT

Background: Patients living with kidney failure are at risk of severe COVID-19 disease. However, vaccination reduces transmission and severity of disease. The uptake of COVID-19 vaccination in South Africa remains poor, suggesting a requirement for novel recruitment strategies. We examined COVID-19 vaccine hesitancy in an urban dialysis population in Johannesburg, South Africa, and investigated the efficacy of an educational intervention on vaccination intention.

Methods: One hundred and four participants were recruited from outpatient haemo- and peritoneal dialysis units at the Helen Joseph Hospital. Participants completed anonymous, self-administered questionnaires analysing their acceptance of and concerns regarding COVID-19 vaccination before and after dissemination of the South African Nephrology Society SARS-CoV-2 vaccine information brochure.

Results: Seventy-two participants (69%) were unvaccinated against SARS-CoV-2; 23 (22%) indicated unwillingness to undergo vaccination. Vaccine side effects, safety and perceived risk of SARS-CoV-2 transmission by vaccination were important factors in hesitancy. A small proportion believed that COVID-19 was not a serious threat to personal health. News media was an important information source for vaccine-hesitant respondents; prior health-care worker counselling reduced hesitancy (OR 0.175, 95% CI 0.039–0.784; $P = 0.023$). The information brochure reduced concerns about vaccine side effects ($P = 0.028$), increasing vaccination intention to 84%. In-centre vaccination was additionally identified as a strategy to reduce hesitancy (OR 0.053, 95% CI 0.012–0.221; $P < 0.001$).

Conclusions: This first analysis in an urban dialysis population in South Africa highlights factors contributing to vaccine hesitancy. Simple educational interventions capitalising on trust in healthcare workers and improved vaccine accessibility may increase vaccine uptake.

Keywords: COVID-19; vaccine hesitancy; dialysis.

INTRODUCTION

Numerous studies confirm advanced chronic kidney disease (CKD) to be a significant risk factor for severe COVID-19 disease [1]. Dependence on in-centre dialysis treatment increases the risk of exposure to SARS-CoV-2 and acquisition of infection [1,2]. In response, dialysis units have attempted to curtail in-centre transmission through the use of screening protocols and the isolation of known infected cases. Despite these interventions, asymptomatic or pre-symptomatic transmission in this high-risk population remains a concern [3].

Vaccination against SARS-CoV-2 has been shown to reduce transmission [4] and to ameliorate severity of disease in the event of infection in the general population [5]. mRNA vaccines induce humoral and cellular immunity with greater reliability than other platforms and may therefore be more effective in the immunoparetic milieu of patients living with chronic kidney disease [6]. An additional third, or “booster”, dose of mRNA vaccine has been shown to further improve immunogenicity in patients with kidney failure [7]. mRNA vaccines are gen-

erally well-tolerated by such patients with side-effects being mainly local and temporary in nature [8].

The South African Department of Health began rollout of state-funded vaccination on 17 May 2021. Initial vaccination was provided to members of the public over the age of 60 years and extended to all adults over the age of 18 on 19 August 2021. Immunocompromised patients, including those on kidney replacement therapy, became eligible for a booster inoculation from 1 December 2021. Vaccination in South Africa predominantly makes use of the Pfizer–BioNTech BNT162b2 mRNA vaccine; the Janssen/Johnson & Johnson Ad26.COV2.S replication-defective viral vector vaccine is also in use but restricted to frontline workers and residents of deep rural areas where facilities for providing the mRNA vaccine are lacking.

To date (February 2022), more than 3,616,000 cases of COVID-19 have been recorded in South Africa, with 95,545 directly attributable deaths [9]. The actual number of COVID-19-related deaths may be significantly higher; for the first year of the pandemic (2020) alone, South Africa recorded 150,000 excess deaths [10]. Despite mass media education campaigns and incentivisation programmes, vaccine uptake by the South African public has been slow. At the time of this study (15–30 November 2021), 16,103,887 adults were at least partially vaccinated, representing 40.5% of the eligible population [11]. Vaccine hesitancy appears to show an age distribution, with 44.8% of those aged 35–49 having received the vaccine compared to 64.8% of those aged 60 years and older [11]. Although vaccine roll-out proceeded simultaneously across all of South Africa, vaccine uptake has varied considerably among provinces; at the time of this study, 37.1% of eligible patients had been at least partially vaccinated in Gauteng compared to 48.9% in the Western Cape.

Recent surveys among the general South African public revealed a vaccine hesitancy rate of between 52% and 82% [12]. Age, level of education, ethnicity and urbanization have been reported to correlate with vaccine hesitancy [12]. Between a quarter and half of patients receiving dialysis for kidney failure in the developed world have been reported to be vaccine hesitant [13–15]. Concerns regarding vaccine side-effects, efficacy, and doubts regarding the severity of COVID-19 disease have been identified as reasons for vaccine hesitancy in these populations [13–15]. Higher rates of vaccine hesitancy have been reported in younger patients [13,15] and among minority groups such as African Americans [14,15].

There is a paucity of data on vaccine hesitancy among patients receiving dialysis in low- and middle-income coun-

tries such as South Africa. We therefore sought to determine the rate and reasons for vaccine hesitancy and investigated the efficacy of a simple educational intervention for improving vaccination intention in a dialysis unit serving a low-income urban community in Johannesburg, South Africa.

METHODS

Participants were recruited using convenience sampling from the outpatient haemo- and peritoneal dialysis units at the Helen Joseph Hospital, a tertiary-level public hospital which serves an ethnically diverse, lower-income population resident in the western suburbs of Johannesburg. Participants self-administered an anonymous, paper-based questionnaire (Appendix 1) regarding their acceptance of and concerns regarding vaccination with the Pfizer–BioNTech BNT162b2 mRNA vaccine in general use in South Africa. Partial vaccination with one dose of the double-dose BNT162b2 mRNA vaccine was considered as willingness to undergo vaccination and such patients were included in the vaccinated group. At subsequent clinic visits, participants received a copy of the South African Nephrology Society (SANS) SARS-CoV-2 vaccine information brochure (Appendix 2 and available at <http://sa-renalsociety.org/patient-information/>). In terms of its readability, this English-language brochure has a Flesch–Kincaid grade level of 5.9 and a Flesch Reading Ease score of 64.7, which is acceptable in the South African context where 90% of the population have a minimum grade 7 functional literacy level and 50% a grade 12 level of education [16]. Thereafter, participants self-administered a follow-up questionnaire analysing their responses to the information received (Appendix 1). Patients who were not literate, English-speaking or who required any assistance in completing the questionnaires were assisted by nursing staff. Participants' concerns regarding vaccination were captured by responses to a suite of possible concerns. Multiple responses were permitted for each participant. Where participants noted additional concerns, thematic analysis of these comments was performed. Data were extracted from the completed questionnaires into an Excel file and then analysed using Statistica version 14.0 (TIBCO Software Inc, Palo Alto, California). Vaccine hesitancy was analysed both as “unwillingness to vaccinate” and as “not yet vaccinated”. Participant concerns regarding SARS-CoV-2 vaccination, sources of information regarding the vaccine, and attitudes to other vaccinations were compared between these groups using Fisher's exact test. Stepwise multivariate logistic regression was used to analyse the effect of these parameters as well as demographic factors and comorbidities on vaccine hesitancy. The efficacy

of the information brochure in improving vaccination intention was assessed in terms of the change in the percentage of those willing to be vaccinated, as well as the change in the percentage of those expressing concerns about the vaccine. Participant commentary on the usefulness of the information leaflet and the ease of reading it was also analysed.

Ethical approval for this study was obtained from the Human Research Ethics Committee of the University of the Witwatersrand (reference number M120906).

RESULTS

At the time of the study, the dialysis unit supported 133 patients on outpatient dialysis. A total of 104 (78%) patients consented to participate in the investigation. The follow-up questionnaire was completed by 89 participants (86% of the original sample).

Baseline characteristics of the 104 participants are shown in Table 1. Seventy-two (69%) were unvaccinated against SARS-CoV-2 and 23 (22%) indicated unwillingness to be vaccinated. Unsurprisingly, those who reported an unwillingness to be vaccinated more frequently indicated that they had concerns about the vaccine, with apprehensions regarding vaccine safety and possible side effects being more common in this group (Table 2). A small but significant percentage of participants in this group also indicated that they did not consider COVID-19 to pose a significant threat to their health. Of the 72 unvaccinated members of the study population at the time of the initial questionnaire, additional concerns cited included a fear of inoculation in 11 (15%), a fear of transmission of SARS-CoV2 by the vaccine in 10 (14%) and perceived overly rapid development of the vaccine in 6 (8%). Among the 32 participants who were fully or partially vaccinated, the overwhelming majority (84%) indicated having been motivated by a desire to protect themselves and their families against COVID-19.

Just over half of the participants who self-identified as unwilling to be vaccinated (12, 52%) indicated that they would reconsider their position if the vaccine was offered as part of their in-centre care.

Nineteen respondents (18%) reported lacking sufficient information on the vaccine, including 4 who claimed to have received no information on the vaccine from any source and 15 who reported having received some information but who considered that this did not sufficiently allay their concerns. All 19 of these respondents were unvaccinated (26% of the unvaccinated group); none of the 32 vaccinated participants reported lacking information on the vaccine ($P < 0.001$).

Respondents who indicated having knowledge of the vaccine received their information from a variety of sources. Forty-four (42%) indicated the news media to be their primary source of information; healthcare workers were the second-most common source of information (16, 15%). The remaining participants reported acquiring information from a variety of sources. Reliance on news media as a source of information was more frequent in those patients who had yet to be vaccinated at the time of the initial questionnaire ($P = 0.047$); in contrast, healthcare

Table 1. Baseline characteristics of the cohort (n = 104).

Age (years)	45.0 [36–54]*
Dialysis vintage (years)	4.0 [2–6]*
Gender	
Male	53 (51%)
Female	51 (49%)
Modality	
Haemodialysis	60 (58%)
Peritoneal dialysis	44 (42%)
Vaccinated against other viruses	
Influenza	28 (27%)
Hepatitis B	39 (38%)
Highest level of education	
No formal education	4 (4%)
Primary level	7 (7%)
Secondary level	73 (70%)
Tertiary level	20 (19%)
Socio-economic conditions	
Unemployed	85 (82%)
Informal housing	19 (18%)
Formal housing	85 (82%)
Comorbidities	
Diabetes mellitus	19 (18%)
HIV infection	29 (28%)
Previous experience with COVID-19	
Previous infection of self	37 (36%)
Previous infection of close family member	25 (24%)
Vaccination status	
Fully or partially vaccinated	32 (31%)
Not vaccinated – willing	49 (47%)
Not vaccinated – unwilling	23 (22%)

*Values are median [interquartile range].

Table 2. Self-identified concerns regarding vaccination.

	Unwilling to be vaccinated (n = 23)	Willing to be vaccinated (n = 81)	P	Unvaccinated (n = 72)	Vaccinated (n = 32)	P
Any concern	19 (83%)	36 (44%)	0.002	51 (71%)	4 (13%)	<0.001
Vaccine safety	9 (36%)	16 (20%)	0.094	23 (32%)	2 (6%)	0.005
Vaccine side-effects	12 (52%)	27 (33%)	0.081	36 (50%)	3 (9%)	<0.001
Transmission of SARS-CoV-2 by the vaccine	3 (13%)	7 (9%)	0.386	10 (14%)	0 (0%)	0.021
Perceived overly rapid development of the vaccine	3 (13%)	4 (5%)	0.180	6 (8%)	1 (3%)	0.305
COVID-19 not perceived as a threat to personal health	2 (9%)	0 (0%)	0.047	2 (3%)	0 (0%)	0.477
Fear of needles	3 (13%)	8 (10%)	0.456	11 (15%)	0 (0%)	0.014

Table 3. Sources of information on the vaccine.

	Unwilling to be vaccinated (n = 23)	Willing to be vaccinated (n = 81)	P	Unvaccinated (n = 72)	Vaccinated (n = 32)	P
News media	17 (74%)	58 (72%)	0.537	56 (78%)	19 (59%)	0.047
Healthcare worker	5 (22%)	31 (38%)	0.109	14 (19%)	22 (69%)	<0.001
Social media	8 (35%)	21 (26%)	0.279	22 (31%)	7 (22%)	0.253
Community members	3 (13%)	17 (21%)	0.299	15 (21%)	5 (16%)	0.370
No information received	1 (4%)	3 (4%)	0.638	4 (6%)	0 (0%)	0.309

workers as the primary information source were listed more frequently by the vaccinated group ($P < 0.001$) (Table 3).

Stepwise multivariate logistic regression modeling failed to identify an effect for participant age ($P = 0.120$), dialysis vintage ($P = 0.662$), gender ($P = 0.888$), level of education ($P = 0.148$), or socio-economic status as indicated by type of housing ($P = 0.100$) on vaccine hesitancy. There was also no effect of comorbid diabetes mellitus ($P = 0.642$) or HIV infection ($P = 0.108$). No effect was detected of prior experience with COVID-19 disease, either on a personal level ($P = 0.389$) or through a close family member ($P = 0.212$). Previous vaccination against influenza or hepatitis B had no effect on vaccine hesitancy ($P = 0.395$ and $P = 0.236$, respectively). Availability of the vaccine as a component of in-centre care was independently associated with significantly reduced odds of participants being unwilling to be vaccinated (OR 0.053, 95% CI 0.012–0.221; $P < 0.001$), as was prior counselling by a healthcare worker (OR 0.175, 95% CI 0.039–0.784; $P = 0.023$).

After exposure to the SANS information brochure, responses to the follow-up questionnaire were received from 89 participants (86%). Forty-nine (55%) of these respondents self-identified as vaccine hesitant.

A substantial number of participants had at least a secondary level of education (89%) and most reported the information brochure to have been easy to understand (96%) and helpful in addressing their concerns regarding vaccination against SARS-CoV-2 (94%).

Vaccine hesitancy improved from 55% to 16% after distribution of the information brochure. Intention to be vaccinated improved from 0% to 71% among participants who were vaccine hesitant prior to the intervention. General concerns about the vaccine were ameliorated by the intervention in 62% of all respondents and in 53% of those who had been identified as vaccine hesitant. Improvement in concerns over the safety of the vaccine was reported by 85% of all and 80% of vaccine-hesitant respondents.

Concerns over vaccine side-effects showed significant improvement between initial questionnaire and post-intervention follow-up ($P = 0.028$, Figure 1).

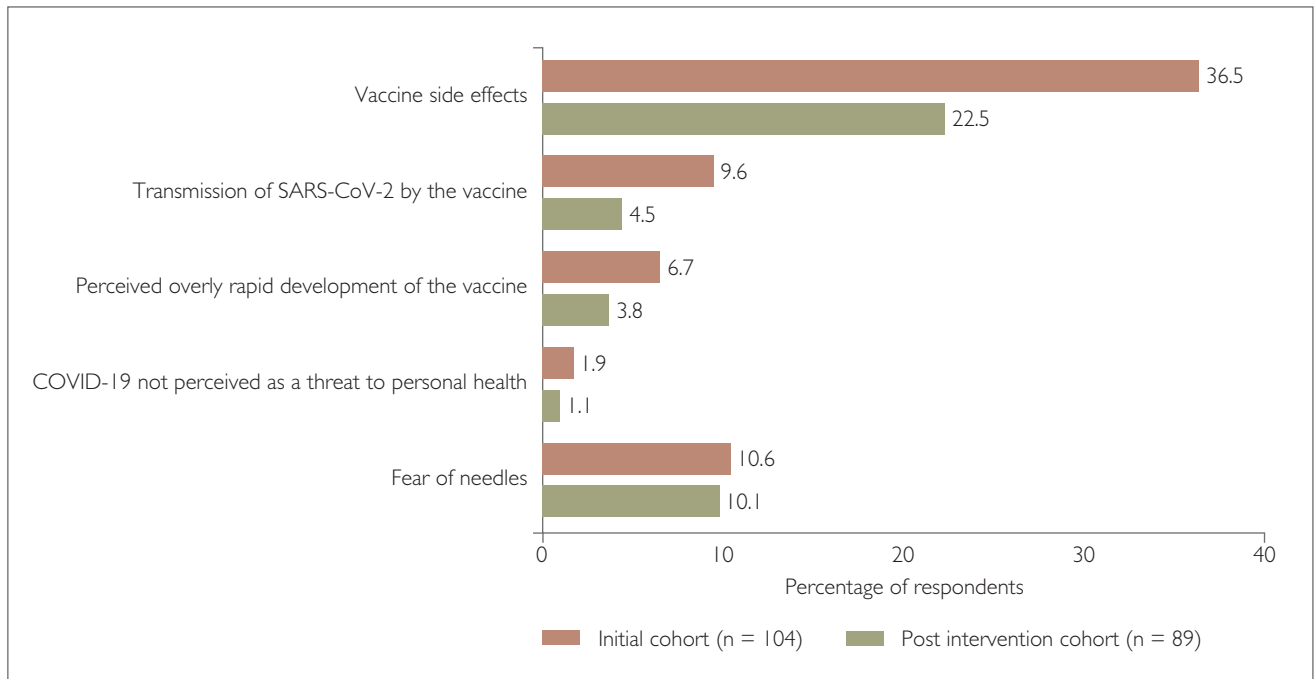


Figure 1. Concerns regarding vaccine before and after an educational intervention.

DISCUSSION

This is the first report from Africa offering insights into the rates and reasons for COVID-19 vaccine hesitancy in a dialysis population. In this study, a healthcare worker-endorsed educational intervention was effective in reducing vaccine hesitancy. These findings may be used in directing the efforts of education about vaccination for this high-risk group of patients, with the aim of improving COVID-19 vaccine uptake.

Only 31% of respondents were vaccinated at the time of the survey, a rate below that of the general South African population [17]. Twenty-two percent of respondents in the initial survey indicated an unwillingness to consider vaccination. This figure increased to more than half of this sample at follow-up, which may be attributable to interaction during the interval with vaccine-hesitant fellow patients and family members. Such significant levels of vaccine hesitancy in the high-risk dialysis population are alarming given that one in three respondents reported previous personal experience of COVID-19 and one in four indicated a close family member having had antecedent infection. Similarly high hesitancy rates have been reported in other dialysis centres [13–15]. Lack of intention to be vaccinated in the face of previous experience of COVID-19 has been shown in other series [14] and may reflect a survivor effect – having previously overcome COVID-19, individuals may perceive the risk from vaccination to outweigh the benefit of preventing reinfection of self or infection of fellow patients. Antibody levels have been shown to decay faster

in those patients acquiring immunity through antecedent infection compared to those acquiring immunity through vaccination [18], suggesting that such confidence may be misplaced. Furthermore, even if individual risk of severe COVID-19 is ameliorated by antecedent infection, transmission within the dialysis unit may result in fatal disease in non-immune fellow patients [19].

We found no effect of participant gender, age or dialysis vintage on willingness to undergo SARS-CoV-2 vaccination. Previous studies have suggested higher rates of vaccine hesitancy among people of Black African ethnicity [14,20,21]. It is noteworthy that these reports originate from countries where Black Africans constitute an ethnic minority and that the observed hesitancy is likely to reflect broader social disenfranchisement. Our patient population largely comprised Black Africans. Reflecting the urbanised nature of this group, most of our patients had at least a secondary level education and resided in formal housing. The homogeneity of our patient cohort likely explains our failure to detect an effect for level of education or socio-economic status on intention to be vaccinated.

Although we initially hypothesized that previous experience of inoculation in the form of hepatitis B virus vaccination (routinely offered to patients on haemodialysis) might be associated with higher rates of SARS-CoV-2 vaccination intention, no such effect was found. We similarly did not find an effect of previous vaccination against respiratory pathogens in the form of influenza virus. Pre-existing education and habituation to infection prophylaxis through

HIV seropositivity and to injection through comorbid diabetes had no effect on vaccination intention, despite the increased risk of severe COVID-19 in patients with these comorbidities [22,23].

Hesitancy in this analysis therefore appears to arise out of individual concerns about the safety and efficacy of the vaccine, which are independent of socio-demographic factors. Key concerns identified by respondents in this study were possible side effects and safety of the vaccine, fear of needles, and transmission of SARS-CoV-2 by the vaccine. A small but significant proportion of those unwilling to be vaccinated did not believe that COVID-19 posed a serious risk to their health. Source of information on the vaccine may contribute to misapprehension regarding vaccine safety: the news media was a significantly more frequent source of information for participants who had yet to be vaccinated. Reportage on the decision by the Centers for Disease Control to suspend use of the Janssen/Johnson & Johnson Ad26.COV2.S vaccine following 6 cases of cerebral venous sinus thrombosis [24], and on the South African Department of Health's suspension of roll-out of the Oxford–AstraZeneca ChAdOx1nCoV-19, following demonstration of reduced efficacy against the Beta variant in the context of other jurisdiction bans following possible vaccine-related deaths [25], may have contributed to some respondents' concerns about vaccine safety. The role of the news media in facilitating vaccine hesitancy has been documented in other studies [26]. Although the media has a responsibility to convey information on the pandemic and the response to vaccination, minimization of the threat posed by SARS-CoV-2 [26], or overemphasis on vaccine side-effects [27], may discourage uptake.

Healthcare workers have a critical role in addressing misapprehension regarding vaccine safety and efficacy; prior counselling by a healthcare worker in the present study significantly reduced the odds of vaccine hesitancy (OR 0.175). Individual counselling may, however, not be practicable in large dialysis centres such as ours. Dissemination of an easy-to-read, healthcare worker-endorsed information brochure appears a satisfactory substitute for one-on-one counselling. In the present study, such an intervention substantially ameliorated concerns regarding vaccine safety, and significantly reduced apprehensions about vaccine side-effects, in turn increasing vaccination intention in this cohort.

Studies evaluating the efficacy of educational interventions in reducing COVID-19 vaccine hesitancy have yielded mixed results [28]. The content and mode of communication appear to be important determinants of the effectiveness of such interventions. For example, interventions emphasizing the safety and efficacy of the vaccine have

been reported to increase uptake in vaccine-hesitant individuals [29], as may those contextualising vaccination as a social norm [28]. Whereas interventions that describe the personal benefits of vaccination may be effective in hesitant individuals [30], those that address collective societal benefit have less impact on vaccination intention [28]. Interventions that seek to ameliorate concern over perceived rapidity of vaccine development in general appear to have limited effect in improving uptake [28]. The medium of communication appears to have less of a role than its perceived source, with healthcare worker or institution-endorsed involvement appearing to increase vaccine uptake [28].

Vaccine uptake may be facilitated further by improving ease of access to vaccination; inoculation by trusted healthcare workers such as those usually responsible for the provision of dialysis may in addition ameliorate fears regarding vaccination. Respondents in this study indicated that the provision of COVID-19 vaccination as a component of routine in-centre care significantly reduced the odds of vaccine hesitancy.

There are some limitations to our study. The single-centre nature of the study and the relatively small number of participants resulted in low numbers of responses to certain vaccination concerns, which may have limited their interpretation. Response bias may have influenced the results as non-respondents may have been more likely to be against vaccination. We acknowledge that the findings in our urbanised, relatively well-educated population may not be fully generalizable. Access to news media and level of education are likely to have significantly affected concerns regarding the vaccine and response to the information brochure. We note, however, that the concerns expressed by our patients with regard to vaccine safety are similar to those reported for the general South African public [12]. We also acknowledge the lack of a control group to test the true efficacy of the information brochure. At the time of this study, South Africa had just emerged from the third Delta variant COVID wave and was entering the fourth Omicron wave, and purposefully withholding potentially life-saving information from patients was not considered to be ethically justifiable. Furthermore, prevention of dissemination of the information in the brochure between an experimental and control group was considered neither desirable nor practicable. Finally, we recognize that the apparent beneficial effect of the intervention represents only an increase in vaccination intention and not an actual increase in vaccine uptake. The centrally regulated process of vaccination registration and booking results in delays in effecting vaccine uptake, which could not be accounted for in the study design. Despite these limitations, this first study

of South African patients receiving maintenance dialysis provides important new information on COVID-19 vaccination hesitancy and uptake and suggests that a simple and cost-effective intervention may translate into improved vaccination intention in this vulnerable population.

CONCLUSIONS

This urban dialysis population in South Africa demonstrated a high level of COVID-19 vaccine hesitancy, which was predominantly driven by mistrust regarding the safety of the COVID-19 vaccine and fear of its side effects. News media platforms were an important source of information and may have contributed to hesitancy. Healthcare workers are a trusted counterpoint to the news media and counselling improves vaccination intention. Healthcare worker-endorsed information brochures are an effective strategy to disseminate accurate information and alleviate concerns and may serve as an effective substitute for individual counselling. Provision of vaccination in the familiar environment of the dialysis unit by trusted healthcare workers as part of routine care should be considered as a potential strategy to increase vaccine uptake.

Conflicts of interest

The authors declare no conflict of interest in this research.

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APPENDIX 1: COVID-19 VACCINATION QUESTIONNAIRES

Vaccine hesitancy pre-intervention questionnaire.


Vaccine hesitancy post-intervention questionnaire.

COVID-19 VACCINATION PRE-INTERVENTION QUESTIONNAIRE		
BACKGROUND		
Study number		
How old are you?		
Gender	<input type="checkbox"/> Male	<input type="checkbox"/> Female
Are you working at the moment?	<input type="checkbox"/> I am working	<input type="checkbox"/> I am unemployed
What kind of home do you live in?	<input type="checkbox"/> House	<input type="checkbox"/> Informal settlement
What level did you get to at school?	<input type="checkbox"/> No schooling <input type="checkbox"/> Primary school	<input type="checkbox"/> High school <input type="checkbox"/> College/University
Are you working at the moment?	<input type="checkbox"/> Employed	<input type="checkbox"/> Unemployed
What type of dialysis are you on?	<input type="checkbox"/> Haemodialysis(HD)	<input type="checkbox"/> Peritoneal dialysis(PD)
How many years have you been on dialysis?		
Have you been diagnosed with diabetes or HIV?	<input type="checkbox"/> Diabetes	<input type="checkbox"/> HIV
Have you ever had COVID?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has any close family member had COVID?	<input type="checkbox"/> Yes If yes, were they admitted to hospital? <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> No
VACCINE RELATED QUESTIONS		
Have you received a COVID vaccine?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Do you want to receive a COVID vaccine?	<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, why are you choosing to take the vaccine? <input type="checkbox"/> Protect myself <input type="checkbox"/> Protect others <input type="checkbox"/> Both	
How do you feel about getting vaccinated?	<input type="checkbox"/> Worried	<input type="checkbox"/> Not worried
If you are worried, what are your reasons for being worried?	<input type="checkbox"/> I have not received enough information about the vaccine <input type="checkbox"/> I am scared of injections <input type="checkbox"/> I do not think the vaccine is safe <input type="checkbox"/> I am worried about the side effects of the vaccine <input type="checkbox"/> I have heard of people getting COVID-19 from the vaccine <input type="checkbox"/> The vaccine was developed too quickly and I don't think it will work <input type="checkbox"/> I have had COVID before and so I do not need to take the vaccine <input type="checkbox"/> I don't believe COVID is a big problem <input type="checkbox"/> Religious reasons: explain <input type="checkbox"/> Cultural reasons: explain <input type="checkbox"/> Other reason: explain	
Where did you receive information about the COVID vaccine?	<input type="checkbox"/> Social media (WhatsApp/Facebook/Instagram) <input type="checkbox"/> News media (radio/television) <input type="checkbox"/> Health care workers (doctors/nurses) <input type="checkbox"/> Community members <input type="checkbox"/> I have not received any information about the vaccine	
Do you go for yearly Flu vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you had the Hepatitis B vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Would you like more information on the COVID vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you know how to get the COVID vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Who would you trust most to help you decide if you should take a COVID vaccine?	<input type="checkbox"/> Dialysis staff (doctor/nurse) <input type="checkbox"/> Government <input type="checkbox"/> Media	<input type="checkbox"/> Family/friends <input type="checkbox"/> Traditional healer/Religious leader <input type="checkbox"/> Your employer
Would you take the vaccine if it was freely available at Helen Joseph Hospital?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

COVID-19 VACCINATION POST-INTERVENTION QUESTIONNAIRE		
BACKGROUND		
Study number		
How old are you?		
Gender	<input type="checkbox"/> Male	<input type="checkbox"/> Female
What kind of home do you live in?	<input type="checkbox"/> House	<input type="checkbox"/> Informal settlement
Are you working at the moment?	<input type="checkbox"/> I am working	<input type="checkbox"/> I am unemployed
What level did you get to at school?	<input type="checkbox"/> No schooling <input type="checkbox"/> Primary school	<input type="checkbox"/> High school <input type="checkbox"/> College/University
VACCINE RELATED QUESTIONS		
Was the information on the COVID vaccine helpful?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Was the information easy to understand?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Were you previously not willing to get the vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Has the information provided changed your mind about getting the vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you want to receive the COVID vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you feel that the COVID vaccine is safe?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you feel less worried about the vaccine?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If you are still worried about the vaccine, what are your reasons?	<input type="checkbox"/> I am scared of injections <input type="checkbox"/> I am worried about the side effects of the vaccine <input type="checkbox"/> I had a bad reaction to a vaccine before <input type="checkbox"/> I have heard of people getting COVID-19 from the vaccine <input type="checkbox"/> The vaccine was developed too quickly and I don't think it will work <input type="checkbox"/> I have had COVID before and so I do not need to take the vaccine <input type="checkbox"/> I don't believe COVID is a big problem <input type="checkbox"/> Religious reasons: explain <input type="checkbox"/> Cultural reasons: explain <input type="checkbox"/> Other reason: explain	
Is there any additional information you would like to know about the vaccine?	<input type="checkbox"/> Yes Explain	<input type="checkbox"/> No


APPENDIX 2: COVID-19 VACCINATION INFORMATION BROCHURE

South African Nephrology Society information brochure on COVID-19 vaccination for people with kidney disease.



**PATIENT
FREQUENTLY ASKED QUESTIONS
COVID-19 VACCINES**

People living with kidney disease and recipients of kidney transplants are at higher risk of severe COVID-19. There is currently no cure for COVID-19, but vaccination helps to reduce the risk of either becoming infected with the virus or developing severe disease in the event of infection. This document provides information for patients living with kidney disease on COVID-19 vaccines.





How do vaccines work?

The immune system consists of specialised white blood cells and proteins (called antibodies) which are trained to recognise and kill viruses. Because the COVID virus has only recently switched to infecting humans, our immune systems have never come across this particular virus before and so cannot recognize it and do not know how to kill it. Vaccination is an old technique for training the immune system to recognize and attack viruses. This is usually done by exposing the immune system to small doses of virus which has been weakened so that it cannot cause disease. You have probably received such vaccinations in your childhood, or you may have been vaccinated for the hepatitis virus if you have been on dialysis.

The COVID vaccines differ from this usual type because they do not contain any virus. Instead, they contain a protein called mRNA. mRNA is a temporary messenger that our cells use to tell themselves how to make other proteins. The mRNA in the COVID vaccine tells your cells how to temporarily make a small part of the COVID virus called the “spike protein”.


Once this “spike protein” has been made, the mRNA from the vaccine is broken down by your cells. The mRNA in the COVID vaccine cannot permanently enter or alter your DNA, and it cannot make a whole COVID virus. The small amount of spike protein which your cells temporarily make after the vaccine trains your immune system to recognise the COVID virus.

Because the COVID virus uses the spike protein to enter your cells to cause disease, training your immune system in this way helps to prevent infection and severe COVID-19.

Which vaccine is better?

Any vaccine is better than no vaccine. However, the Pfizer vaccine may be better at training the immune system and is the preferred vaccine for patients living with kidney disease.





Which vaccines are available in South Africa?

South Africa has two vaccines available:

1. The Johnson & Johnson / Jansen viral vector vaccine (J&J)
2. The Pfizer mRNA vaccine

Both vaccines make use of mRNA to allow our cells to temporarily make the spike protein, but they differ in the technology used to get the mRNA into cells. The J&J vaccine uses a virus called an adenovirus which has been altered so that it cannot spread and cause infection. The Pfizer vaccine uses a lipid nanoparticle (a very small fat droplet) for this purpose.

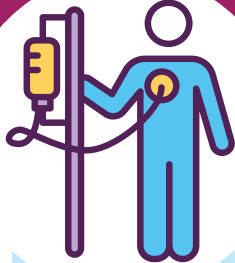
I am taking immunosuppression medicines. Can I take the vaccine?

The COVID vaccines do not contain the virus or allow your cells to make the whole virus. Both vaccines are therefore safe to use if you are taking immunosuppressants. However, because these drugs weaken your immune system, you may need additional doses to train your immune system effectively against the COVID virus. People receiving immunosuppressants should consult with their treating specialist as to the timing of the vaccine and dosing of the immunosuppressant medications.

I have an autoimmune condition. Could the vaccine make my disease flare up?

Because vaccines stimulate the immune system, it is theoretically possible for any vaccine to cause autoimmune diseases to flare. However, since people living with autoimmune disease are at higher risk of more severe COVID-19, the benefit of receiving the vaccine outweighs the potential risk of disease flare. People living with autoimmune disease should consult with their treating specialist with regards to monitoring for disease flares after receiving the vaccine.

Medical Advice Disclaimer
The information, including but not limited to, text, graphics, images, and other material contained herein are for informational purposes only. You are advised to always seek the advice of your physician or other qualified healthcare provider regarding a medical condition or treatment.



What are the potential side-effects of vaccination?

All medical treatments have potential side-effects. However, the COVID vaccines have now been given to millions of people around the world with very few serious side effects reported. Common mild side effects include:

- Pain at the injection site
- Fever
- Headache
- Muscle cramps

These symptoms can be effectively treated with paracetamol (Panado).

You may be aware that the J&J vaccine programme was temporarily stopped out of concern that the vaccine caused lung clots. The total number of patients who developed clots was very low and it is possible that these episodes were unrelated to the vaccine (and would have happened anyway in these patients). The fact that the programme was temporarily stopped is a sign of how carefully these vaccines have been monitored for safety.



I am a kidney transplant recipient. Could the vaccine cause rejection?

Because vaccines stimulate the immune system, it is theoretically possible for any vaccine to cause rejection. However, since transplant recipients are at higher risk of severe COVID-19, the benefit of receiving the vaccine outweighs the potential risk of rejection. Recipients should consult with their treating specialist with regards to monitoring for rejection after receiving the vaccine.



How do I get the vaccine?

To get the vaccine you must first register with the Department of Health. You can do this by:

- The Department of Health website - <https://vaccine.enroll.health.gov.za>
- WhatsApp "REGISTER" to 0600123456
- SMS dial *134*832*[your ID number]

Once registered you will receive a unique code via SMS and an appointment to receive the vaccine. You should take this code and your ID number to your appointment in order to receive the vaccine.