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Editorial Comment

EDITORIAL COMMENT

Often forgotten, transport modality to dialysis may be life-saving

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ABSTRACT

Haemodialysis patients commute to the dialysis facility thrice weekly, for a total of six trips per week. While nephrologists may think that how patients do this is up to them and their insurance companies, there is growing evidence that providing advice on how to commute to dialysis is part of an integrated care plan for dialysis patients. In this issue of *Clinical Kidney Journal*, two reports emphasize the importance of transport modality on dialysis patient well-being and even survival. Rincon *et al.* report on the epidemiology and clinical spectrum of coronavirus disease 2019 (COVID-19) in a Spanish haemodialysis unit. A key source of infection was related to access to healthcare or elderly care facilities. Indeed, healthcare transportation with future symptomatic [odds ratio (OR) = 3.33] or asymptomatic (OR = 4.73) COVID-19 patients increased the risk of infection. Working with transport providers to minimize cross-infection between patients during transport was one of the measures taken to stop disease transmission. Lessons learned from COVID-19 may also apply to influenza and other infections. In the second report, Yazawa *et al.* describe an association between transport modality to the dialysis facility and health-related quality of life (QOL) among haemodialysis patients in the Japanese Dialysis Outcomes and Practice Patterns study. These reports emphasize the need for nephrologists to understand how patients are transported to dialysis and how transport modality may be optimized to promote QOL and decrease potentially life-threatening complications.

Keywords: COVID-19, haemodialysis, influenza, quality of life, SARS-CoV-2, transportation

This issue of *Clinical Kidney Journal* (*CKJ*) contains two reports on the well-being of haemodialysis patients from opposite parts of the world and obtained under very different circumstances: a report from the coronavirus disease 2019 (COVID-19) pandemic in Spain and a routine care report from Japan [1, 2]. However, both reports convey the same message: nephrologists should be well aware of how patients are transported to the haemodialysis unit and should strive to optimize transportation as a key component of the integrated approach to end-stage kidney disease patient care.

HEALTHCARE TRANSPORTATION AND VIRAL PANDEMICS

In 2020, global health, including dialysis patient health, has been marked by the COVID-19 pandemic. COVID-19 has several links to Nephrology, including its potential to cause acute kidney injury (AKI) and infection of kidney disease patients, who may be on renal replacement therapy (RRT) [3, 4].

The potential causes of kidney injury in COVID-19 keep expanding. They include hypoxia and hypoperfusion, a cytokine

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storm, potential viral infection of glomerular and tubular cells and additionally, non-viral, non-immune glomerular injury in patients with genetic predisposition (e.g. *APOL1* risk variants) as well as diverse forms of vascular injury such as complement-mediated thrombotic microangiopathy, antiphospholipid syndrome and, as reported in this issue of *CKJ*, renal artery thrombosis presenting as AKI as a manifestation of the prothrombotic state [5, 6]. This issue of *CKJ* also presents a systematic review and meta-analysis of AKI and RRT in COVID-19, which showed that age, diabetes mellitus and hypertension were associated with the occurrence of AKI, while AKI was associated with a 4.4-fold (2.8–6.9) increased risk of death [7]. However, while AKI and RRT were common in hospitalized COVID-19 patients, the estimates of their frequency varied across geographic location [7]. Both different geographical criteria for hospitalization and local genetic or environmental factors may have contributed to these differences and additional studies should unravel the potential causes. Interestingly, several drugs commonly used for nephroprotection and cardiovascular protection in CKD patients are being trialled for tissue protection in COVID-19, including sodium-glucose co-transporter-2 inhibitors and statins [8, 9].

On top of COVID-19 causing kidney disease, kidney disease patients are at increased risk of severe COVID-19. Indeed, COVID-19 is more frequent in haemodialysis than in peritoneal dialysis and transplant patients [10], and this is likely related to frequentation of healthcare facilities. Indeed, the European Renal Association – European Dialysis and Transplant Association (ERA-EDTA) Council issued recommendations on how to reduce the risk of transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in dialysis units [11]. However, these recommendations focused on the dialysis facilities themselves. In this issue of *CKJ*, Rincon *et al.* [1] publish the COVID-19 experience of a Spanish outpatient haemodialysis unit. The manuscript is significant because all haemodialysis patients were tested for SARS-CoV-2 by Polymerase chain reaction (PCR) of nasopharyngeal swabs and because, further to this exceptional exercise, which uncovered a large population of asymptomatic infected patients, the risk factors for COVID-19 were identified. The results were discouraging and illustrative of the catastrophic approach of the Public Health officials from the Spanish Ministry of Health to the pandemic: the key risk factors for COVID-19 were access to the healthcare systems or elderly care systems.

The analysis of risk factors for COVID-19 identified a source that may have been overlooked in many dialysis centres, including those taking precautions like triaging patients at arrival to the dialysis centres and use of personal protective materials by both staff and patients ONCE INSIDE the dialysis facility: healthcare transportation. Patients who had shared the same car with patients that later became infected with SARS-CoV-2, even if those later infected patients remained asymptomatic throughout, had a 3.3- to 4.7-fold increased risk of developing COVID-19. This means that SARS-CoV-2, and likely other respiratory viruses like influenza, are easily transmitted in the closed quarters of a shared vehicle, at least when no precautions (social distancing and surgical mask) are practiced.

Although there was no information on the SARS-CoV-2 status of the drivers or cleaning procedures of surfaces inside the vehicle, the fact that sharing transport with patients that were later shown to become infected, even asymptomatically, suggests that every dialysis patient (and healthcare personnel) should be considered as potentially infective, independently from the presence of symptoms.

These lessons learnt from COVID-19 may very well apply to influenza. Despite the availability of the influenza vaccine, influenza has been estimated to account for 1000 dialysis patient deaths per year in the USA alone [12]. Indeed, dialysis patients are known to respond poorly to vaccines and the optimal influenza vaccination schedule in dialysis patients is currently

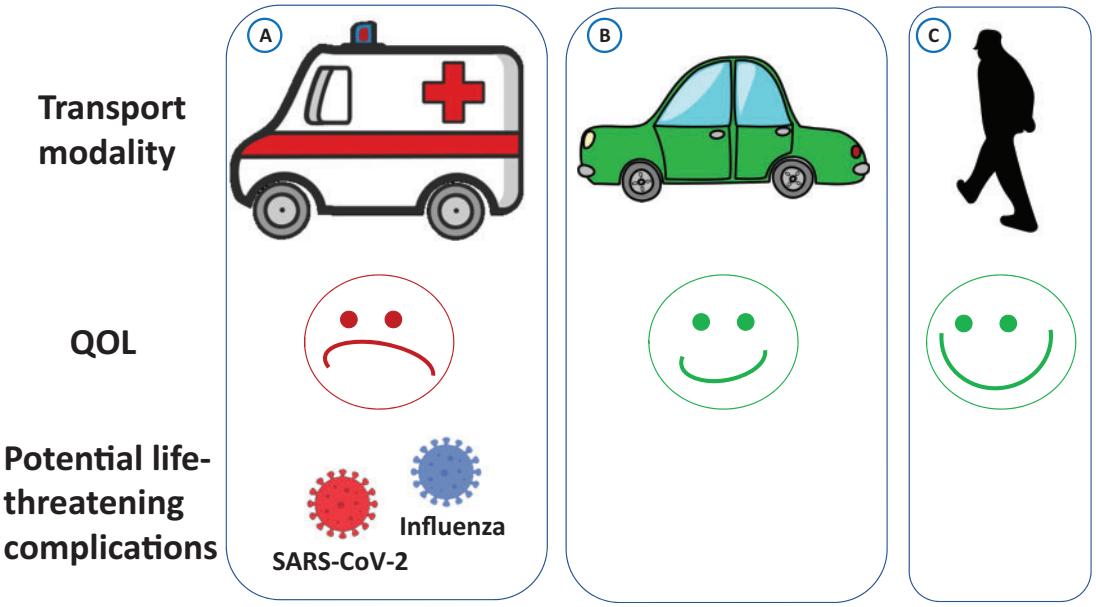

FIGURE 1: Transportation means to dialysis facilities and clinical impact. The figure illustrates three different transport modalities to dialysis facilities. (**A**) The ambulance image represents collective healthcare transport: patients are driven by others to the dialysis facility, sometimes in shared cars. (**B**) The private car represents self-driving and (**C**) the man walking represents walking or cycling to dialysis with or without using public transport. According to the Japanese Dialysis Outcomes and Practice Patterns study data, there was a relationship between transport modality and QOL; 1 year later, QOL was lower for those who are driven to dialysis [2]. Additionally, a Spanish study showed that collective healthcare transport was associated with the risk of COVID-19 (**A**) [1]. This increased risk of respiratory virus infection likely extends to seasonal influenza.

unknown [13, 14]. Thus, it would be reasonable to exercise extreme precautions in healthcare transport for haemodialysis patients during influenza season, especially the upcoming influenza season in which COVID-19 and influenza will likely coexist. Influenza vaccination should thus also include the drivers, in addition to patients and healthcare personnel.

TRANSPORT MODALITY AND QOL

Yawaza *et al.* analysed, in functionally independent haemodialysis patients from the Japanese Dialysis Outcomes and Practice Patterns study, the relationship between the means of transportation (driven by others, self-driving or walking/cycling with or without public transportation) and health-related quality of life (QOL) at 1 year [2]. A majority of patients belonged to the self-driving group and only one-third were driven by others to the dialysis session. This distribution differs clearly from that in Spain, in which a majority of patients are driven to the dialysis session, frequently in collective ambulances. In the Japanese study, patients being driven to dialysis had lower QOL as assessed by physical and mental health composite scores at 1 year than patients self-driving or walking/cycling in adjusted analysis. However, these patients also had lower baseline QOL. These results are aligned with prior results showing that transportation time was also associated with QOL [15]. While this is an observational study and no cause-and-effect relationship conclusion may be drawn, the authors speculate that self-transporting to dialysis may be associated with benefits that may increase QOL, ranging from social interaction to exercising. In contrast, transport means were not associated with first hospitalization or death.

CONCLUSION

Two different reports from haemodialysis patients in very different circumstances point to the importance that should be assigned to the transport means to the dialysis facility (Figure 1). Physicians should be aware of what transport means are patients using, encouraging self-transportation and thinking of collective healthcare transport as a potential risk of infection by respiratory viruses (e.g. SARS-CoV-2 or influenza) if proper protective measures are not taken during transport. Physicians should discuss with patients how to optimize transport and what measures to take in winter or during pandemics to minimize the risk of potentially fatal respiratory virus infection.

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CONFLICT OF INTEREST STATEMENT

No conflict of interest.

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