

Research Report

Unintended Consequences of COVID-19 Social Distancing Among Older Adults With Kidney Disease

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Abstract

Background: While social distancing policies protect older adults with advanced chronic kidney disease (CKD) from exposure to COVID-19, reduced social interaction may also have unintended consequences.

Methods: To identify subgroups of patients at risk for unintended health consequences of social distancing, we conducted a cross-sectional analysis of data from a national cohort study of older veterans with advanced CKD ($n = 223$). Characteristics included activities of daily living (ADLs), instrumental ADLs (IADLs), cognition score, depression score, social support, financial stress, symptom burden, and number of chronic conditions. Unintended consequences of social distancing included restricted Life Space mobility, low willingness for video telehealth, reduced in-person contact with caregivers, and food insecurity. We identified subgroups of patients at risk of unintended consequences using model-based recursive partitioning (MoB).

Results: Participants had a mean age of 77.9 years, 64.6% were white, and 96.9% were male. Overall, 22.4% of participants had restricted Life Space, 33.9% reported low willingness for video telehealth, 19.0% reported reduced caregiver contact, and 3.2% reported food insecurity. For Life Space restriction, 4 subgroups partitioned (ie, split) by IADL difficulty, cognition score, and ADL difficulty were identified. The highest rate of restricted Life Space was 54.7% in the subgroup of participants with >3 IADL difficulties. For low willingness for telehealth and reduced caregiver contact, separate models identified 2 subgroups split by cognition score and depression score, respectively.

Conclusions: Measures of function, cognition, and depressive symptoms may identify older adults with advanced CKD who are at higher risk for unintended health consequences of social distancing.

Keywords: Chronic kidney disease, COVID-19, Older adults

Social distancing policies, including recommendations to stay home, avoid crowded places, and limit contact with people outside of one's household, are critical to protect people who are at high risk for severe illness from coronavirus 2019 (COVID-19) infection (1). Given their increased susceptibility to infection, high levels of inflammation, and high burden of comorbidities, older adults with advanced

chronic kidney disease (CKD) are among the highest-risk population for COVID-19-related morbidity and mortality (2,3).

While social distancing policies protect older adults with advanced CKD from exposure to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), reduced social interaction may also have unintended health consequences. Staying home restricts

community mobility, decreases opportunities for physical activity, and could lead to persistent functional limitations (4). Postponing in-person clinic visits in order to avoid crowded doctors' offices reduces CKD monitoring and may lead to worsening chronic disease management (5). In fact, this may have contributed to lower rates of fistula placement during the pandemic, a key metric of lower quality CKD management (6). Social distancing may also reduce access to care provided outside the household if family and paid caregivers limit in-person contact (7). Lastly, avoiding busy grocery stores may reduce access to healthy food, which is a key component of CKD self-management (8).

Optimizing the health of older adults with advanced CKD during a pandemic therefore requires supporting social distancing behaviors while also assisting those vulnerable to unintended health consequences. The purpose of this analysis was to identify patient characteristics associated with higher risk of 4 unintended health consequences of social distancing: restricted community mobility, low access to health care providers, reduced in-person contact with caregivers, and food insecurity. Identifying subgroups of patients with advanced CKD who are at higher risk for these unintended consequences will help providers target resources to support their care and minimize the potential harms of social distancing.

Method

Study Design and Population

We conducted a preliminary cross-sectional analysis of data collected as part of the Physical REsilience Prediction in Advanced REnal Disease (PREPARED) study. PREPARED is a national, prospective cohort study that was actively enrolling veterans with advanced CKD at the time of this report. PREPARED was designed to characterize physical resilience, defined as one's ability to resist or recover from functional decline following a health stressor (9). Inclusion criteria were age ≥ 70 years old, an estimated glomerular filtration rate (eGFR) < 30 mL/min/1.73 m², prior nephrology consultation or outpatient referral, and high risk for hospitalization based on the Veterans Affairs (VA) Care Assessment Need score (10). A random sample of eligible veterans was contacted by mail to introduce the study and allow them to opt out prior to enrollment phone calls which began in October 2019. Those with a history of kidney transplant, dialysis, or cognitive impairment based on a 6-item telephone screen, and those residing in a nursing home or receiving hospice care were not eligible for participation. The current analysis was restricted to 223 veterans who were participating in PREPARED between June 2020 and January 2021. This study was approved by the Durham VA Institutional Review Board.

Data Collection

Data came from 2 sources: (i) the VA Corporate Data Warehouse, a national repository of VA clinical and administrative data that is updated daily and (ii) telephone surveys. Data collected from Corporate Data Warehouse included age, gender, geographic region, eGFR, body mass index, chronic conditions, and number of medications. Chronic conditions included hypertension, diabetes mellitus, coronary heart disease, heart failure, and stroke defined by the presence of inpatient or outpatient ICD-10 diagnosis codes. Telephone surveys were used to collect information on self-reported race, Life Space mobility, difficulty with basic and instrumental activities of daily living (ADLs), cognitive status (modified Telephone Interview for Cognitive Status [TICS-m]) (11), depressive symptoms (4-item

Center for Epidemiologic Studies Depression scale [CES-D-4]) (12), social support (modified Medical Outcomes Survey Social Support scale [mMOS-SS]) (13), financial stress ("barely getting by, falling behind, or serious financial trouble") and a count of 10 symptoms (shortness of breath, fatigue, dizziness, pain, leg weakness, joint stiffness, nervousness, anhedonia, poor appetite, and constipation) (14). In response to the pandemic, COVID-19 exposure, telehealth use, caregiver contact, and food insecurity were added to baseline and follow-up telephone surveys in June 2020. For this analysis, we report results from the first time participants responded to these questions.

Unintended Consequences of Social Distancing

Restriction in community mobility was assessed using Life Space mobility which ranges from 0 to 120 with higher scores indicating greater community mobility (15). Restricted Life Space was defined as < 30 . Although recommendations for social distancing lead to appropriate decreases in community mobility, Life Space < 30 indicates that a participant may not have gone to places beyond the area just outside of their home (eg, yard, porch, apartment hallway) in the past month. Low health care access was defined as a low willingness for video telehealth adapted from the Internet Use and Technology-Related Attitudes Survey (16). The VA transitioned to telehealth to deliver chronic disease care during the pandemic (17), so low levels of willingness to receive visits via video telehealth reflect limited access to care. Among participants who reported having a caregiver outside the household (family, friend, or paid caregiver), we defined reduced contact as fewer in-person visits, no visits, or no longer receiving care. Food insecurity was defined as "worry that [they] would not have enough food" from the Household Food Insecurity Access Scale.

Statistical Analysis

Participant characteristics were reported as means (standard deviations [SD]) or percentages as appropriate. We calculated the percentage of participants with each unintended health consequence of social distancing: restricted Life Space, low willingness for video telehealth, reduced caregiver contact, and food insecurity.

Our exploratory analysis to determine subgroups of patients more likely to experience unintended consequences of social distancing used a data-driven method called model-based recursive partitioning (MoB) (18,19). The basic premise of MoB is that it may be possible to split, or partition, participants into subgroups resulting in better fitting regression models for each respective subgroup. As a first step, MoB assesses whether a split on any participant characteristic improves regression model fit, and that value defines the first split (eg, splitting at ≤ 3 vs > 3 IADL difficulties). The process is repeated within each of the resulting subgroups until the best regression model fit is achieved, implicitly conducting variable selection. MoB yields a regression-based tree with each branch of the tree representing a subgroup experiencing differential rates of the outcome variable. An advantage of this approach is the resulting classification tree which displays variables that contribute to risk prediction. This provides a simple, easy to interpret method for identifying subgroups and does not require calculating risk scores for each patient as is necessary in other risk prediction methods. MoB has the additional advantage of automatically searching for higher-order interactions among factors. Traditional regression approaches to risk prediction rarely include interaction terms because of the complexity involved in interpreting the results.

We applied this method to 3 of the 4 outcomes of interest: restricted Life Space, low willingness for video telehealth, and reduced caregiver contact (limited to participants who reported having a caregiver). Too few participants reported food insecurity to conduct the MoB analysis. For each of the 3 outcomes, we specified a logistic regression model with nine baseline participant characteristics as potential partitioning variables: age, number of ADL difficulties, number of IADL difficulties, cognition score, depression score, social support score, financial stress, symptom burden, and number of chronic conditions. We chose these factors as potential partitioning variables based on hypothesized relationships with the unintended consequences of social distancing, however final variable selection was determined by the MoB model based on statistical assessment of model fit. We specified the models to only identify subgroups with at least 20 participants (approximately 10% of the total sample size). For each model, the concordance statistic (c-statistic) and optimism-corrected c-statistic using 1 000 bootstrap samples were calculated to assess general model discrimination of the final solutions (20).

Results

Participant Characteristics

Participants had a mean (SD) age of 77.9 (6.2) years, 64.6% were white, and 96.9% were male. Participants had a mean (SD) eGFR of 23.2 (8.0) mL/min/1.73 m², consistent with advanced CKD. Additional baseline characteristics are displayed in Table 1. Of the 223 participants, 6 (2.7%) participants reported COVID-19 infection and 4 (1.8%) reported infection among a household member.

Unintended Consequences of Social Distancing

Overall, 53.4% of participants had one or more of the unintended health consequences; 22.4% of participants had restricted Life Space, 33.9% reported low willingness for video telehealth, 19.0% of those with a caregiver reported reduced contact, and 3.2% reported food insecurity (Figure 1).

For Life Space restriction, the MoB solution yielded 4 subgroups, defined by the number of IADLs for which participants reported difficulty, the TICS-m score, and the number of ADL difficulties (Figure 2), with a c-statistic = 0.81 (optimism-corrected c-statistic = 0.76). The highest rate (54.7%) of restricted Life Space was among the participants with > 3 IADL difficulties (subgroup *n* = 53). The lowest rate (0.0%) of restricted Life Space was reported in the subgroup which included participants with ≤ 3 IADL difficulties, a TICS score > 31, and 0 ADL difficulties (*n* = 62).

For low willingness for video telehealth, the MoB approach identified 2 subgroups split by TICS-m score >37 versus ≤37 (c-statistic = 0.56). Among the 26 participants with TICS-m scores >37, 11.5% had low willingness for video telehealth. In contrast, among the 192 participants with a TICS-m score ≤37 (ie, lower cognitive function), 37.0% had low willingness for video telehealth.

Among the 100 participants with a caregiver, the MoB solution found 2 subgroups, split by CES-D-4 score >0 versus 0 (c-statistic = 0.60). Among the 72 participants with CES-D-4 score >0, 25.0% reported reduced caregiver contact. In contrast, among the 28 participants with a CES-D-4 score of 0, only 1 participant (3.6%) reported reduced caregiver contact.

Table 1. Baseline Characteristics of PREPARED Participants Who Completed a Telephone Survey on the Potential Unintended Health Consequences of Social Distancing Between June 2020 Through January 2021 (*n* = 223)

Characteristics	N (%) or Mean (SD)
Age	77.9 (6.2)
Race	
Black	57 (25.6%)
White	144 (64.6%)
Other*	12 (5.4%)
Not reported	10 (4.5%)
Male	216 (96.9%)
Geographic region	
Northeast	29 (13.0%)
South	105 (47.1%)
Midwest	41 (18.4%)
West	48 (21.5%)
eGFR, mL/min/1.73 m ²	23.2 (8.0)
BMI, kg/m ²	30.8 (6.5)
ADL difficulty, range 0–6	1.0 (1.5)
IADL difficulty, range 0–8	2.1 (1.9)
Cognition score (TICS-m), range 0–50	31.5 (5.7)
Depression score (CES-D-4), range 0–12	1.9 (2.2)
Social support (mMOS-SS), range 0–100	77.9 (25.3)
Financial stress	54 (24.2%)
Symptoms burden, range 0–10	4.7 (2.2)
Hypertension	207 (92.8%)
Diabetes	148 (66.4%)
Coronary heart disease	105 (47.1%)
Heart failure	88 (39.5%)
Stroke	14 (6.3%)
Number of chronic conditions, range 0–5	2.5 (1.1)

Notes: ADL = activities of daily living (bathing, dressing, grooming, toileting, eating, transferring); BMI = body mass index; CES-D-4 = 4-item Center for Epidemiologic Studies Depression Scale; eGFR = estimated glomerular filtration rate; IADL = instrumental activities of daily living (heavy household work, light housework, shopping, preparing meals, managing money, using the telephone, taking medications, managing transportation); mMOS-SS = modified Medical Outcomes Survey Social Support scale; TICS-m = modified Telephone Interview for Cognitive Status.

*Includes American Indian, Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, and more than one race.

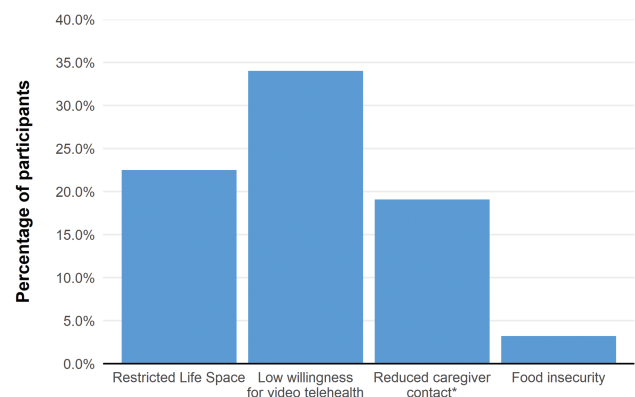


Figure 1. Percentage of PREPARED participants with unintended health consequences of COVID-19 social distancing. *Among participants who reported having a caregiver who lives outside the house (family or paid caregiver).

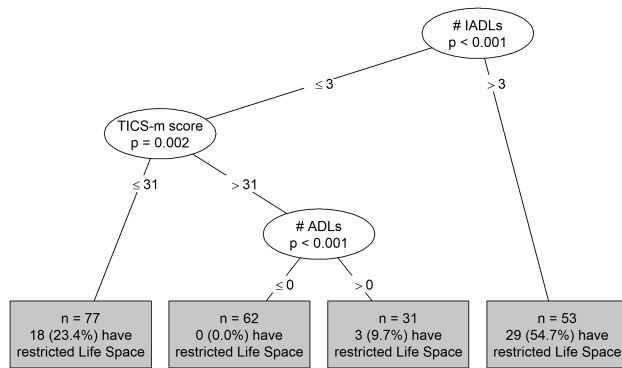


Figure 2. Results of model-based recursive partitioning (MoB) for restricted Life Space. This data-driven approach identified 4 subgroups of risk for restricted Life Space (gray boxes) based on 3 covariates in the model (white ovals). Brief assessments of the number of difficulties with instrumental activities of daily living (IADLs), the modified Telephone Interview for Cognitive Status (TICS-m), and the number of ADL difficulties can be completed by telephone and may be helpful for identifying older adults at higher risk for unintended health consequences during pandemic-related social distancing. MoB was implemented in R version 4.0.3 using the package partykit version 1.2.11.

Age, social support score, financial stress, symptom burden, and number of chronic conditions were not selected as a partitioning variable by any of the 3 MoB models conducted.

Discussion

Among older adults with advanced CKD who were participating in a national prospective cohort study during the COVID-19 pandemic, unintended health consequences of social distancing, including Life Space restriction, low willingness for video telehealth, and reduced caregiver contact were common. Food insecurity was not commonly reported among the PREPARED study participants. A data-driven method identified subgroups at higher risk of Life Space restriction partitioning by measures of function and cognition, low willingness for video telehealth by cognition, and reduced caregiver contact by depressive symptoms. These findings suggest that brief measures, all of which were completed by telephone, may be helpful for identifying those at higher risk for unintended health consequences of social distancing and used to direct resources to those with the highest need.

Findings from this preliminary report suggest that subgroups of older adults with lower function and cognition and greater depressive symptoms are most vulnerable to unintended health consequences of social distancing. Measures of function, cognition, and depression, which are not part of routine assessment in CKD, were also more predictive for social distancing–related harms than age and number of chronic conditions. These findings are consistent with prior studies that have identified the added value of a geriatric approach to patients with CKD (21). Given these preliminary findings, brief telephone assessment of function, cognition, and depression could be used to stratify risk and identify subgroups who need additional support during the pandemic. Furthermore, the regression tree for Life Space restriction suggests that it is not just a single variable that should be considered, but rather the combination of IADLs, cognition, and ADLs that supports subgroup identification. As telehealth will likely be an available modality for health care delivery even as the pandemic evolves, telephone-based assessment tools that can identify high risk older adults will continue to be important. This may be particularly relevant for the large proportion of older adults

with advanced CKD who may not be aware of their diagnosis and would benefit from routine follow-up to monitor progression.

There are potential limitations that should be considered. Enrollment in PREPARED began before the pandemic and our sample was restricted to those participating when COVID-19 questions were added to the study. Older adults with COVID-19 infection may have been less likely to enroll, which may explain low infection rates in participants. Because of the timing of the addition of COVID-19-related questions, prospective data or data on COVID-19 vaccines were not available for this analysis. Findings from the MoB for willingness for video telehealth and reduced caregiver contact provide interesting preliminary data, but should be interpreted cautiously given the sample sizes and c-statistics. Lastly, the study population was mostly male and all participants had CKD, limiting the generalizability of the findings. Despite these limitations, the PREPARED study provided a unique and timely opportunity to study potential unintended consequences of social distancing in a high-risk population with detailed measures of function, cognition, and geriatric syndromes that are often not available in CKD studies.

In conclusion, social distancing policies implemented during a pandemic may result in unintended health consequences for older adults with advanced CKD. Although these potential harms are common, some subgroups are at higher risk. Measures of cognition, function, and depressive symptoms can be completed by telephone and may be helpful for targeting resources to support the care of those at highest risk.

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Conflict of Interest

None declared.

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