Original Study-Brief Report

Neither Race nor Ethnicity Impact the Mortality of Residents of Veterans Affairs Community Living Center With COVID-19

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A R T I C L E  I N  F O

Article history:
Received 3 August 2022
Received in revised form
26 October 2022
Accepted 30 October 2022

Keywords:
Nursing homes
health care disparities
SARS-CoV-2
long-term care

A B S T R A C T

Objectives: COVID-19 disproportionately affected nursing home residents and people from racial and ethnic minorities in the United States. Nursing homes in the Veterans Affairs (VA) system, termed Community Living Centers (CLCs), belong to a national managed care system. In the period prior to the availability of vaccines, we examined whether residents from racial and ethnic minorities experienced disparities in COVID-19 related mortality.

Design: Retrospective cohort study.

Setting and Participants: Residents at 134 VA CLCs from April 14 to December 10, 2020.

Methods: We used the VA Corporate Data Warehouse to identify VA CLC residents with a positive SARS-CoV-2 polymerase chain reaction test during or 2 days prior to their admission and without a prior case of COVID-19. We assessed age, self-reported race/ethnicity, frailty, chronic medical conditions, Charlson comorbidity index, the annual quarter of the infection, and all-cause 30-day mortality. We estimated odds ratios and 95% confidence intervals of all-cause 30-day mortality using a mixed-effects multivariable logistic regression model.

Results: During the study period, 1133 CLC residents had an index positive SARS-CoV-2 test. Mortality at 30 days was 23% for White non-Hispanic residents, 15% for Black non-Hispanic residents, 10% for Hispanic residents, and 16% for other residents. Factors associated with increased 30-day mortality were age >70 years, Charlson comorbidity index >6, and a positive SARS-CoV-2 test between April 14 and June 30, 2020. Frailty, Black race, and Hispanic ethnicity were not independently associated with an increased risk of 30-day mortality.

This was an unfunded study supported in part by funds and facilities provided by Geriatric Research Education and Clinical Center (GRECCs) at the VA Northeast Ohio Healthcare System and the VA Pittsburgh Healthcare System. None of the authors have relevant conflicts of interest to disclose. FP and RJ have received research funding from Pfizer, Merck and Accelerate. RJ has participated in advisory boards for Pfizer and Merck.

This work was supported in part by funds and facilities provided by the Geriatric Research Education and Clinical Center (GRECCs) at the VA Northeast Ohio Healthcare System and the VA Pittsburgh Healthcare System. This used data from the VA COVID-19 Shared Data Resource as well as resources and facilities from the Department of Veterans Affairs (VA) Informatics and Computing Infrastructure (VINCI), VA HSE RES 13-457. These entities had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication. The findings and conclusions in this document are those of the authors, who are responsible for its content, and do not necessarily represent the views of the VA or of the US Government.

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https://doi.org/10.1016/j.jamda.2022.10.020

1525-8610/Published by Elsevier Inc. on behalf of AMDA – The Society for Post-Acute and Long-Term Care Medicine.
Conclusions and Implications: Among a national cohort of VA CLC residents with COVID-19, neither Black race nor Hispanic ethnicity had a negative impact on survival. Further research is needed to determine factors within the VA health care system that mitigate the influence of systemic racism on COVID-19 outcomes in US nursing homes.

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The COVID-19 pandemic disproportionately affected residents in nursing homes. Although nursing homes provide care for <1% of the adult population in the United States, 14% of deaths because of COVID-19 occurred in nursing homes.5,6 Prior to vaccines, nursing home residents accounted for over 33% of COVID-19 related deaths.7 SARS-CoV-2 infections also disproportionately affected people from racial and ethnic minorities relative to White non-Hispanics. The degree to which racial and ethnic disparities, a reflection of the influences of systemic racism on health care, were observed among nursing home residents is less clear.

Several studies that considered the period prior to the availability of an effective SARS-CoV-2 vaccine reported that nursing homes with higher proportions of non-White residents had higher rates of COVID-19 infections and mortality.8,9 A systematic review of studies that included facility-level characteristics concluded that nursing home size and community prevalence of COVID-19 were among the most important factors influencing outcomes.8 The review also noted that outcomes varied by the facility racial composition. In contrast, studies that included resident-level factors found that age as well as impaired cognitive and physical function, but not race or ethnicity, were associated with an increased risk of COVID-19 related mortality among nursing home residents.9,10 Considering both facility- and resident-level characteristics, Lu et al assessed risk factors for COVID-19 deaths among Medicare beneficiaries age ≥65 years and living in a nursing home. The authors reported that for-profit ownership and low health inspection ratings (facility characteristics) as well as age, sex, and cognitive impairment (resident characteristics) were all risk factors for COVID-19 related mortality.11 Lu et al proposed that equal access to care, such as that provided by Medicare benefits for older persons, would mitigate the impacts of systemic racism observed in prior studies of nursing home residents.

The Veterans Health Administration is a national managed care system that offers eligibility and benefits based on prior military service. The Department of Veterans Affairs (VA) has 134 nursing homes, termed Community Living Centers (CLCs). We hypothesized that among VA CLC residents with COVID-19, age, frailty, and chronic medical conditions, but not race nor ethnicity, would be associated with mortality. To test our hypothesis, we conducted a retrospective cohort study of VA CLC residents with documented SARS-CoV-2 infection prior to the availability of COVID-19 vaccines and assessed 30-day all-cause mortality.

Methods

Study Design, Setting, and Data Sources

We conducted a retrospective cohort study of residents living in any of 134 VA CLCs from April 14, 2020 to December 10, 2020. On April 14, 2020, the VA issued a memorandum calling for widespread SARS-CoV-2 testing of all CLC residents. After December 10, 2020, COVID-19 vaccines became available to VA CLC residents.

We used the Veterans Affairs Informatics and Computing Infrastructure (VAICI) to access clinical databases from the US Veterans Healthcare Administration (VHA). Data were extracted from the VHA’s Corporate Data Warehouse, the VHA’s Vital Status File, and the VA COVID-19 Shared Data Resource. The Institutional Review Board at the VA approved the study protocol.

Case Ascertainment and Clinical Characteristics

The cohort included all VA CLC residents with a reverse transcription polymerase chain reaction (PCR)-based assay that was positive for SARS-CoV-2 within 2 days prior to or during their admission to a VA CLC. Particularly in the early phase of the pandemic, patients may have been asymptomatic or presymptomatic while in the CLC and subsequently found to be positive while admitted to other settings within the same VA medical center (ie, acute care). Therefore, residents who tested positive for SARS-CoV-2 in the week following transfer from the CLC to another unit in a VA medical center were also included in the cohort. For each CLC resident, only the index case (first case) was included, and individuals with a prior positive SARS-CoV-2 PCR test or prior documentation of a COVID-19 case were excluded. We assessed age, sex, self-reported race, self-reported ethnicity, annual quarter of the positive test, and, based on International Classification of Diseases and/or procedure codes, the VA Frailty Index, the Charlson comorbidity index (CCI), and chronic comorbid conditions.12,13 All-cause mortality was evaluated at 30 days following the first positive SARS-CoV-2 test of a resident.

Statistical Analyses

Case patient characteristics were summarized by race and ethnicity. Differences in mean age, frailty index, and CCI were compared using least-squares regression and, when omnibus differences were detected, we performed Tukey-adjusted pairwise comparisons. Kaplan-Meier survival curves, stratified by race and ethnicity and considering mortality events within 30 days of positive SARS-CoV-2 PCR test, were compared using an omnibus log-rank test. A mixed-effects multivariable logistic regression model was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for all-cause 30-day mortality, which included age, sex, race and ethnicity, VA Frailty Index, CCI, and the date of the positive test (stratified by quarter from April to December 2020) as fixed effects. With the mixed-effects model, we estimated random facility effects as patient outcomes within a single facility may be correlated. Statistical analyses were performed using R v 4.1.2 (R Foundation for Statistical Computing) including functions from additional packages.

Results

After excluding patients with prior positive SARS-CoV-2 PCR tests or documented COVID-19 cases, we identified 1133 CLC residents with an index positive SARS-CoV-2 PCR test between April 14 and December 10, 2020. The majority were male (1105, 98%) and their mean age was 75.6 years (±10.4) (Table 1). The average age of White non-Hispanic residents 770 years (±10.2) was greater than that of Black non-Hispanic [72.4 (±9.7); P < .001] and Hispanic residents [72.4 (±9.7); P < .001; Supplementary Table 1]. The mean CCI for White non-Hispanic residents [4.53 (±2.7)] was lower than that observed for Black non-Hispanic residents [5.12 (±3.1); P = .021].
All-cause 30-day mortality for CLC residents following a positive SARS-CoV-2 PCR test was 20% (229 of 1133). When stratified by race and ethnicity, all-cause mortality at 30 days was higher among White non-Hispanic residents (175 of 758, 23%) compared with Black non-Hispanic residents (36 of 246, 15%), Hispanic residents (4 of 42, 10%), and all other residents (14 of 87, 16%; Figure 1). To assess the independent contribution of factors influencing mortality, we used a mixed-effects multivariable logistic regression model in which CLC facility was a random effect; all other variables were fixed effects. Among CLC residents with a positive SARS-CoV-2 PCR test, the most notable factor impacting 30-day all-cause mortality was advanced age, increasing from an OR of 5.98 (95% CI 1.407–25.433) for residents age 70–79 years to an OR of 19.0 (95% CI 4.309–83.854) for residents age 79 years or older (Table 2). Residents with a CCI score $>6$ had increased odds of 30-day mortality (OR 1.57; 95% CI 1.021–2.413). In contrast, frailty was not associated with increased odds of mortality, and a positive test after October–December 2020 was associated with decreased odds of mortality (OR 0.560; 95% CI 0.359–0.874). Of note, neither Black race nor Hispanic ethnicity (vs White–Non-Hispanic) was associated with increased odds of mortality in our multivariate logistic regression model.

**Discussion**

This retrospective study of VA CLC residents with positive SARS-CoV-2 PCR tests during the prevaccine period found an overall all-cause 30-day mortality rate of 20%, and advanced age was the resident-level factor most strongly associated with mortality. Infection early in the epidemic and a high burden of comorbid medical conditions, but not frailty, were also associated with increased odds of mortality. Importantly, we found that in this national cohort of VA CLC residents with COVID-19, Black or Hispanic race and ethnicity were not associated with increased odds of 30-day all-cause mortality.

Previous studies reported increased mortality among White compared with Black Veterans hospitalized for common conditions, including pneumonia and exacerbations of congestive heart failure or chronic obstructive pulmonary disease.**15–**17** In these studies, the mean age of White non-Hispanic patients was greater than that of Black non-Hispanic patients. Attempts to account for age and several other demographic, clinical, and social variables did not alter the findings supporting similar or better outcomes for Black Veterans. Our results differ somewhat in that our multivariable logistic regression model implicated advanced age as an independent risk factor for mortality for CLC residents with a positive SARS-CoV-2 test. In addition, 2 assessments from the prevaccine period found that people from racial and ethnic minorities were more likely to get tested for COVID-19 than the VA and were more likely to have a positive test compared with White non-Hispanic people.**18,19** Similar to our results, the rates of all-cause 30-day mortality among those with positive tests did not differ by Veteran race or ethnicity. Taken together, these studies indicate that—in a health care system where access to care is based on qualifying military service rather than employment or personal finances—people from racial and ethnic minorities do not receive equitable care compared with White non-Hispanic people.

**Table 1**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>All Cases N = 1133</th>
<th>White Non-Hispanic n = 758</th>
<th>Black Non-Hispanic n = 246</th>
<th>Hispanic n = 42</th>
<th>Other n = 87</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (±SD)</td>
<td>75.6 (±10.4)</td>
<td>77.0 (±10.2)</td>
<td>72.4 (±9.7)</td>
<td>70.6 (±11.9)</td>
<td>75.4 (11.3)</td>
</tr>
<tr>
<td>Male, no. (%)</td>
<td>1084 (97%)</td>
<td>719 (98%)</td>
<td>241 (96%)</td>
<td>41 (98%)</td>
<td>83 (99%)</td>
</tr>
<tr>
<td>Frailty index (±SD)</td>
<td>0.41 (±0.1)</td>
<td>0.42 (±0.1)</td>
<td>0.40 (±0.1)</td>
<td>0.40 (±0.1)</td>
<td>0.39 (±0.1)</td>
</tr>
<tr>
<td>Charlson Comorbidity Index, mean (±SD)</td>
<td>4.65 (±2.8)</td>
<td>4.53 (±2.7)</td>
<td>5.12 (±3.1)</td>
<td>4.60 (±2.9)</td>
<td>4.43 (±2.3)</td>
</tr>
</tbody>
</table>

*Other includes American Indian or Alaska Native, Asian, Multiple, Unknown, Missing, or Declined.

![Fig. 1. Survival Curves of VA Community Living Center Residents with a Positive SARS-CoV-2 PCR Test. White — gray continuous line; Black — black continuous curve; Hispanic — black dotted curve; Other — gray dotted curve. Other includes American Indian or Alaska Native, Asian, Multiple, Unknown, Missing, or Declined. Note that the y-axis starts at 0.5. Comparing the survival curves with an omnibus log-rank test yielded a \( P \) value of .01.]
appear to have worse outcomes compared with White non-Hispanic people.

The literature describing differences in outcomes prior to the availability of vaccines among nursing home residents from racial and ethnic minorities is mixed. Among nursing home residents with symptomatic COVID-19 infections, Panagiotou et al found a lower risk of 30-day all-cause mortality among non-White residents.\textsuperscript{10} Mehta et al noted an increased risk of hospitalization, but not death, among Black, Asian, and Hispanic or Latino nursing home residents with a COVID-19 infection.\textsuperscript{3} Both teams indicated that risk of mortality among nursing home residents with COVID-19 increased with age, impaired cognition, and limited physical function. Three other studies assessed the communities in which nursing homes are located and found that residents of nursing homes with the highest proportion of non-White residents also had the highest rates of COVID-19 related mortality.\textsuperscript{4-6} Together, these findings suggest that the racial segregation that continues to affect the communities surrounding nursing homes has a negative influence on the health of nursing home residents from racial and ethnic minorities.\textsuperscript{20}

The results reported here may also reflect characteristics of the VA health care system. Although most nursing homes care for people that came from the same local community, VA CLCs typically have a much larger geographic catchment area and reside on a large campus that also offers acute and ambulatory care services. In addition, although VA CLCs also experienced staffing shortages and challenges related to obtaining adequate testing supplies and personal protective equipment, being part of an integrated health care system with a unionized nursing staff may have mitigated some of these shortfalls.\textsuperscript{21} Specifically, within each VA institution, staff from other areas could be reassigned to care for CLC residents. In addition, regional networks within the VA system, termed Veterans Integrated Service Networks, could help direct personnel protective equipment to the VA medical centers with the greatest need.

Our study has important limitations. First, our cohort consists of VA health care users, a predominantly male and White non-Hispanic population with a high burden of comorbidities.\textsuperscript{22,23} Although all-

### Table 3

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Adjusted OR</th>
<th>95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (reference: &lt;60 y)</td>
<td>2.790</td>
<td>(0.629,12.382)</td>
<td>.177</td>
</tr>
<tr>
<td>60-69 y</td>
<td>5.981</td>
<td>(1.407,25.433)</td>
<td>.015</td>
</tr>
<tr>
<td>70-79 y</td>
<td>9.559</td>
<td>(2.215,41.254)</td>
<td>.002</td>
</tr>
<tr>
<td>80-89 y</td>
<td>9.008</td>
<td>(3.409,83.854)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>≥90 y</td>
<td>0.546</td>
<td>(0.195,1.535)</td>
<td>.251</td>
</tr>
<tr>
<td>Male sex (reference: female)</td>
<td>1.267</td>
<td>(0.567,2.832)</td>
<td>.565</td>
</tr>
<tr>
<td>Race and ethnicity (reference: White, non-Hispanic)</td>
<td>0.720</td>
<td>(0.466,1.111)</td>
<td>.138</td>
</tr>
<tr>
<td>Black, non-Hispanic</td>
<td>0.473</td>
<td>(0.156,1.439)</td>
<td>.187</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.726</td>
<td>(0.384,1.371)</td>
<td>.323</td>
</tr>
<tr>
<td>Other</td>
<td>1.217</td>
<td>(0.567,2.685)</td>
<td>.552</td>
</tr>
<tr>
<td>Frailty (reference: non- or prefrail)</td>
<td>1.267</td>
<td>(0.980,2.089)</td>
<td>.142</td>
</tr>
<tr>
<td>Mild frailty</td>
<td>1.174</td>
<td>(0.539,2.558)</td>
<td>.687</td>
</tr>
<tr>
<td>Moderate frailty</td>
<td>1.266</td>
<td>(0.581,2.758)</td>
<td>.552</td>
</tr>
<tr>
<td>Severe frailty</td>
<td>1.371</td>
<td>(0.912,1.144)</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Conclusions and Implications

Among residents of VA CLCs with a positive SARS-CoV-2 PCR test, Black and Hispanic residents did not experience higher all-cause 30-day mortality compared with White non-Hispanic residents. Rather, factors such as advanced age, high comorbidity burden, conditions and infection early in the epidemic were independently associated with increased mortality. The VA is the largest integrated health care system in the United States and differs from other health care organizations in that eligibility is based on prior military service, rather than age, socioeconomic status, or location. Greater understanding of aspects of the VA health care system that have the potential to abate racial and ethnic disparities among VA CLC residents with COVID-19 may help inform efforts to mitigate systemic racism on outcomes across non-VA nursing homes and other health care sectors.

### References

2. NCVS—Provisional Death Counts for COVID-19—Executive Summary.
14. R Core Team. R: A Language and Environment for Statistical Computing. Published online 20210101.


## Table 1

Comparisons (Including P Values) of Age, Frailty Index, and CCI According to Race/Ethnicity Between VA CLC Residents With a Positive SARS-CoV-2 PCR Test, April 14–December 10, 2020

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>White Non-Hispanic (WNH) N = 758</th>
<th>Black Non-Hispanic (BNH) N = 246</th>
<th>Hispanic N = 42</th>
<th>Other N = 87</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD)</td>
<td>77.0 (10.2)</td>
<td>72.4 (9.7)</td>
<td>70.6 (11.9)</td>
<td>75.4 (11.3)</td>
</tr>
<tr>
<td>Frailty Index, mean (SD)</td>
<td>0.42 (0.1)</td>
<td>0.40 (0.1)</td>
<td>0.40 (0.1)</td>
<td>0.39 (0.1)</td>
</tr>
<tr>
<td>Charlson Comorbidity Index, mean (SD)</td>
<td>4.53 (2.7)</td>
<td>5.12 (3.1)</td>
<td>4.60 (2.9)</td>
<td>4.31 (2.3)</td>
</tr>
</tbody>
</table>

*P values of <.05 were considered statistically significant; when F-test omnibus P value of <.05, paired differences tested with Tukey adjustments; significant results are noted in bold text within the table.

Other includes American Indian or Alaska Native, Asian, Multiple, Unknown, Missing, or Declined.