JAMDA 23 (2022) 1269–1273

JAMDA

journal homepage: www.jamda.com

Original Study

# Incidence and Outcomes of SARS-CoV-2 in Post-Acute Skilled Nursing Facility Care

Ashley Z. Ritter APRN, PhD [a,*], Cyrus M. Kosar PhD [b], Elizabeth M. White APRN, PhD [b], Richard A. Feifer MD, MPH [c], Carolyn Blackman MD [c], Vincent Mor PhD [b]

[a] *NewCourtland Center for Transitions and Health, University of Pennsylvania School of Nursing, Philadelphia, PA, USA*
[b] *Department of Health Services, Policy, and Practice, Brown University School of Public Health, Providence, RI, USA*
[c] *Genesis HealthCare, Kennett Square, PA, USA*

*Keywords:*
COVID-19
nursing home
post-acute care
SARS-CoV-2
skilled nursing

A B S T R A C T

*Objectives:* To examine the risk of contracting SARS-CoV-2 during a post-acute skilled nursing facility (SNF) stay and the associated risk of death.
*Design:* Cohort study using Minimum Data Set and electronic health record data from a large multistate long-term care provider. Primary outcomes included testing positive for SARS-CoV-2 during the post-acute SNF stay, and death among those who tested positive.
*Setting and Participants:* The sample included all new admissions to the provider's 286 SNFs between January 1 and December 31, 2020. Patients known to be infected with SARS-CoV-2 at the time of admission were excluded.
*Methods:* SARS-CoV-2 infection and mortality rates were measured in time intervals by month of admission. A parametric survival model with SNF random effects was used to measure the association of patient demographic factors, clinical characteristics, and month of admission, with testing positive for SARS-CoV-2.
*Results:* The sample included 45,094 post-acute SNF admissions. Overall, 5.7% of patients tested positive for SARS-CoV-2 within 100 days of admission, with 1.0% testing positive within 1-14 days, 1.4% within 15-30 days, and 3.4% within 31-100 days. Of all newly admitted patients, 0.8% contracted SARS-CoV-2 and died, whereas 6.7% died without known infection. Infection rates and subsequent risk of death were highest for patients admitted during the first and third US pandemic waves. Patients with greater cognitive and functional impairment had a 1.45 to 1.92 times higher risk of contracting SARS-CoV-2 than patients with less impairment.
*Conclusions and Implications:* The absolute risk of SARS-CoV-2 infection and death during a post-acute SNF admission was 0.8%. Those who did contract SARS-CoV-2 during their SNF stay had nearly double the rate of death as those who were not infected. Findings from this study provide context for people requiring post-acute care, and their support systems, in navigating decisions around SNF admission during the SARS-CoV-2 pandemic.


Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19), has drastically affected long-term care residents and staff, who accounted for 5% of US cases and a striking 31% of US deaths in 2020 before vaccines became available.[1] Skilled nursing facility (SNF) patients require high-touch care to meet their daily needs, limiting the feasibility of some infection control measures used in other settings such as maintaining physical distance and limiting time with other people. Additionally, SNF patients tend to be older, frail, and experience multiple chronic conditions, putting them at the highest risk of SARS-CoV-2 complications, including death.[2,3] The prevalence of SARS-CoV-2 infection and death in SNFs has prompted investment in and evaluation of modifiable factors to reduce transmission and associated morbidity and mortality.[4–6]

Skilled nursing facilities serve both people requiring long-term care and people requiring post-acute skilled nursing and rehabilitative care following a hospitalization. The COVID-19 pandemic

Funding: This research was supported by the National Institute on Aging (3P01AG027296-11S1, PI: Vincent Mor; and U54063546-S5, MPI: Vincent Mor).
The authors declare no conflicts of interest.
* Address correspondence to Ashley Z. Ritter, PhD, APRN, 6970 Germantown Avenue, Philadelphia, PA 19119, USA.
*E-mail address:* zampinia@nursing.upenn.edu (A.Z. Ritter).

https://doi.org/10.1016/j.jamda.2022.05.014
1525-8610/

complicates the benefits and burdens of post-acute care in an SNF. Individuals and families in need of post-acute care services may be reluctant to enter SNFs for short-term rehabilitation, given unclear risks of SARS-CoV-2 infection within SNFs. In the absence of clear data outlining the risk of SARS-CoV-2 infection and associated complications among patients receiving post-acute care, people requiring such care may forego an SNF admission despite an existing need.

A wide variety of people seek post-acute care in SNFs following hospitalization, with varying risk profiles for contracting SARS-CoV-2 and experiencing severe illness. Previous studies have identified person-level characteristics that increase risk of death from SARS-CoV-2 among the broader nursing home population, including advanced age, male sex, cognitive and functional impairment, chronic kidney disease, and overall frailty.[2,3,7] It is unknown whether these same factors influence infection risk for post-acute patients, who compared to long-stay residents, are a more transient but clinically acute SNF population.

The objective of this study was to determine the risk of testing positive for SARS-CoV-2 following a post-acute care admission to an SNF and the absolute risk of death. We examined temporal trends in SARS-CoV-2 infection and mortality rates, as well as person-level risk factors for infection during a post-acute SNF stay.

## Methods

### *Data Sources*

We used Minimum Data Set (MDS) and electronic health record data from a large provider of post-acute and long-term care operating close to 300 SNFs in 24 states at the time data were collected. The MDS includes a large and diverse set of demographic and clinical measures that are collected for all patients of Medicare- and Medicaid-certified SNFs. Clinical MDS assessments are completed on admission and regularly afterward until discharge or death. The EMR data elements used include daily census records to identify daily disposition and transfers, clinical diagnoses including COVID-19, and SARS-CoV-2 test results. The use of this data set to identify people with SARS-CoV-2 using diagnoses and test results has been used in other studies.[8–10]

### *Sample*

The sample consisted of patients admitted to any of the operator's SNFs for post-acute care between January 1 and December 31, 2020. Patients admitted from the hospital with an admission, 7-day, or 14-day MDS assessment were included in the sample. All patients were tracked until discharge or until 100 days postadmission, which is the last day Medicare reimburses for post-acute care and is a typical cutoff used to define when a patient has transitioned into a long-stay resident. Since the onset of the pandemic in March 2020, patients newly admitted to the operator's SNFs were quarantined for 14 days after admission in order to reduce the risk of introducing SARS-CoV-2 into a facility. During this quarantine, patients underwent daily nursing assessments to screen for any new symptoms. Residents were tested for SARS-CoV-2 multiple times after admission to the nursing home as test supply allowed. Test supplies increased substantially in April 2020. After the 14-day quarantine, the nursing assessments continued, but patients were subsequently tested only if they experienced new symptoms, had a potential exposure, or when there was a known outbreak in the facility.

Diagnosis coded in the EMR was used to identify patients with prior or active infection before the admission date or up to 1 day postadmission. Testing records in the EMR were used to identify SARS-CoV-2 infection during the admission.[8] SNF staff typically record SARS-CoV-2 diagnoses or recent test results captured from the hospital discharge summary and transfer records in the electronic health record. This method of identification could potentially undercount residents who entered the nursing home without a preadmission SARS-CoV-2 test and patients who were in the incubation phase of the infection and tested negative at the time of preadmission testing. Monthly overall infection rates are calculated using all patients admitted to SNFs during a given month as the denominator. The overall infection rate is then broken down into the share of all patients admitted during a given month infected during days 1-14, days 15-30, and days 31-100. We excluded patients admitted to any of 12 SNFs that were specifically designated for SARS-CoV-2 care only.

### *Outcomes*

We examined 2 outcomes: testing positive for SARS-CoV-2 during the post-acute stay, and the combined occurrence of testing positive for SARS-CoV-2 and dying any time during the post-acute stay up to 100 days postadmission. We relied on both polymerase chain reaction and rapid antigen test results to identify incident cases.[8] Deaths were captured from the daily census and MDS discharge assessments.[11] Deaths that occurred outside of the SNF (ie, in a hospital following transfer) were generally documented in the SNF daily census, but we are unable to ascertain the degree of missingness on dates of death occurring outside of the SNF because the electronic health record data cannot currently be linked to Medicare claims.

### *Explanatory Variables*

The set of explanatory variables included demographic characteristics, physical and cognitive functional measures, clinical conditions, and month of admission. The demographic characteristics were age, sex, and race (White, Black, and other). Functional status was captured by the 28-point Morris Activities of Daily Living (ADL) scale score and Cognitive Function Scale (CFS) score from the MDS admission assessment.[12,13] The Morris ADL measure ranges from 0 to 28, with higher scores indicating more impairment. The 4-point CFS measures cognitive function. A score of 1 indicates no cognitive impairment, whereas scores of 2, 3, and 4 denote mild, moderate, and severe cognitive impairment, respectively. For our analysis, we grouped patients into 4 functional categories based on the combination of CFS and ADL scores: high ADL impairment (ADL score $>18$, the 50th percentile value) with moderate to severe cognitive impairment (CFS score 3 or 4); high ADL impairment with no or mild cognitive impairment (CFS score 1 or 2); low ADL impairment (ADL score $\leq 18$) with moderate to severe cognitive impairment; and low ADL impairment with no or mild cognitive impairment.

We extracted diagnoses from the MDS admission assessment including chronic kidney disease, chronic obstructive pulmonary disease (COPD) or asthma, coronary artery disease, diabetes, heart failure, and hypertension. Calendar time was controlled for with a string of dummy variables representing SNF admission in each calendar month of 2020. Admission month is essential to account for because of the substantial temporal variation in virus prevalence, care practices, and broader health care system and community dynamics over the course of the pandemic, all of which may potentially influence infection and mortality risk.[10]

### *Statistical Analysis*

We used standard measures to describe our sample, including means and standard deviations for continuous variables and frequencies and proportions for categorical variables. We then computed the crude rate of each outcome according to calendar month of admission. Because the timing of SARS-CoV-2 infection is important for gauging how likely it was to have been acquired in the SNF, we calculated infection rates based on days since SNF admission:

1-14 days, 15-30 days (30 days is the median post-acute length of stay in this sample), and 31-100 days.

We examined the association between the explanatory variables and testing positive for SARS-CoV-2 using a parametric survival model with SNF random effects. The combined outcome of SARS-CoV-2 infection and subsequent mortality was not examined using this multivariable approach because the prevalence was particularly low (0.8% overall). We opted for a parametric approach rather than semiparametric Cox regression to overcome violation of proportional hazards. We assumed an exponential distribution for time to infection because of the relatively short follow-up period, and because in general the risk of contracting SARS-CoV-2 was unlikely to be different on any given day during the course of a post-acute stay.

Data were analyzed with Stata MP, version 16.0. Null hypotheses were tested with a 2-sided type I error rate of 0.05.

## Results

The sample included 45,094 adults admitted to one of 286 SNFs for post-acute care following a hospitalization. The median age of the sample was 76 years; 55% were female and 75% were White. Forty-six percent of the sample had ADL scores above 18, and 21%, 15%, and 3% had mild, moderate, and severe cognitive impairment, respectively. Additional patient characteristics are summarized in Table 1. The number of admissions decreased from 5284 in January 2020 to a low of 1981 in April 2020 during the first US wave of the pandemic. Admission volume trended upward after that, reaching 3435 in December 2020, still below prepandemic levels.

Table 2 summarizes temporal variation in SARS-CoV-2 infection rates. Across all months, 5.7% of patients tested positive within 100 days of admission, with 1.0% testing positive within 1-14 days, 1.4% within 15-30 days, and 3.4% within 31-100 days. We observed an initial peak in infection rates among patients admitted in April 2020, 7.9% of whom tested positive during their post-acute SNF stay, followed by a second peak among patients admitted in November 2020, 11.6% of whom subsequently tested positive. These peaks coincide with the first and third waves of the US pandemic.

Table 3 summarizes the hazard of SARS-CoV-2 infection by patient characteristics and month of admission. Patients in the 3 functional categories representing greater cognitive and functional impairment had between a 1.45 to 1.92 times higher risk of contracting SARS-CoV-2 compared with patients in the least-impaired category (all statistically significant at $P < .001$). Patients with diabetes had a 1.14 times higher risk of infection than those without diabetes ($P < .01$). We observed no significant differences in infection risk by age or other chronic conditions. Risk of infection among Black and White patients was similar, whereas patients of other races had slightly lower infection risk (hazard ratio 0.84 vs White, $P = .021$). Patients admitted in April 2020 and from October to December 2020 had higher risk of infection than those admitted in other months.

Table 4 shows a comparison of mortality rates following SNF admission for patients with and without known SARS-CoV-2 infection. Of all newly admitted patients, 0.8% contracted SARS-CoV-2 and died, with a range of 0.2% to 1.9% across months (peaking in November 2020). By contrast, 6.7% of all newly admitted patients died without known infection, with a more stable range of 6.2%-6.9% across all months except for April 2020, when a peak of 8.2% was observed.

**Table 1**
Sample Characteristics (N = 45,094)

| Characteristic | Value |
|---|---|
| Age, median (IQR) | 76 (67-85) |
| Age, n (%) | |
| <65 y | 9133 (20) |
| 65-69 y | 5256 (12) |
| 70-74 y | 6438 (14) |
| 75-79 y | 6621 (15) |
| 80-84 y | 6466 (14) |
| 85-89 y | 5804 (13) |
| ≥90 y | 5373 (12) |
| Female sex, n (%) | 24,883 (55) |
| Race, n (%) | |
| White | 33,685 (75) |
| Black | 4937 (11) |
| Other | 6470 (14) |
| ADL summary score, mean (SD) | 16.8 (5.4) |
| ADL score quartile, n (%) | |
| 0-13 | 12,309 (27) |
| 14-18 | 11,892 (26) |
| 19-20 | 11,254 (25) |
| 21-28 | 9639 (21) |
| CFS score, n (%) | |
| 1 (cognitively intact) | 26,472 (61) |
| 2 (mild impairment) | 9375 (21) |
| 3 (moderate impairment) | 6489 (15) |
| 4 (severe impairment) | 1376 (3) |
| Dementia, n (%) | 8854 (20) |
| Congestive heart failure, n (%) | 10,667 (24) |
| Coronary artery disease, n (%) | 10,953 (24) |
| Asthma or COPD, n (%) | 11,791 (26) |
| Chronic kidney disease, n (%) | 13,346 (30) |
| Hypertension, n (%) | 33,208 (74) |
| Diabetes, n (%) | 17,728 (39) |
| Month of admission, n (%) | |
| January-March | 19,308 (49) |
| April-June | 7687 (19) |
| July-September | 12,749 (32) |
| October-December | 11,608 (26) |

COPD, chronic obstructive pulmonary disease; IQR, interquartile range.

## Discussion

This study summarizes the risks of infection and death with SARS-CoV-2 among approximately 45,000 post-acute care patients admitted to SNFs in 2020 during the pandemic. Similar to the general population and coinciding with the first and third US waves of the SARS-CoV-2 pandemic, infection rates and subsequent risk of death in the post-acute SNF population were highest for patients admitted March to April 2020 and October to December 2020. The absolute risk of contracting SARS-CoV-2 during a post-acute care stay in a nursing home and also dying were relatively low. That said, the risk of death

**Table 2**
Percentage of New Post-Acute Care Patients Testing Positive, by Month of SNF Admission and Days Since Admission

| Admission Month | Admissions (n) | Patients Testing Positive (%) | | | |
|---|---|---|---|---|---|
| | | Overall | 1-14 d Since Admission | 15-30 d Since Admission | 31-100 d Since Admission |
| January | 5284 | 1.8 | 0.0 | 0.0 | 1.8 |
| February | 4438 | 4.7 | 0.0 | 0.0 | 4.7 |
| March | 4022 | 7.9 | 0.6 | 1.9 | 5.5 |
| April | 1981 | 7.7 | 1.6 | 3.5 | 2.6 |
| May | 2189 | 3.4 | 0.8 | 0.9 | 1.8 |
| June | 3332 | 2.9 | 0.6 | 0.9 | 1.3 |
| July | 3776 | 2.1 | 0.6 | 0.3 | 1.2 |
| August | 3970 | 3.4 | 0.6 | 0.4 | 2.5 |
| September | 4494 | 5.9 | 0.6 | 0.8 | 4.5 |
| October | 4353 | 8.8 | 1.2 | 1.7 | 6.0 |
| November | 3820 | 11.6 | 2.7 | 4.1 | 4.8 |
| December | 3435 | 9.6 | 3.8 | 3.9 | 1.9 |
| Total | 45,094 | 5.7 | 1.0 | 1.4 | 3.4 |

Note: Monthly overall infection rates were calculated using all patients admitted during a given month as the denominator. The overall infection rate is then broken down into the share of all patients admitted during a given month infected during days 1-14, 15-30, or 31-100.

**Table 3**
Hazard Ratio of SARS-CoV-2 Infection by Resident Characteristics and Month of Admission

| Covariate | Hazard Ratio (95% CI) | *P* |
|---|---|---|
| Age <65 y | 0.97 (0.84, 1.13) | .73 |
| Age 65-69 y | 1.09 (0.93, 1.28) | .28 |
| Age 70-74 y | 1.04 (0.88, 1.23) | .63 |
| Age 75-79 y | Referent | |
| Age 80-84 y | 1.05 (0.91, 1.22) | .50 |
| Age 85-89 y | 1.09 (0.94, 1.27) | .25 |
| Age ≥90 y | 1.15 (0.98, 1.35) | .09 |
| Female sex | 1.09 (1.00, 1.18) | .043 |
| Race, White | Referent | |
| Race, Black | 1.00 (0.85, 1.16) | .96 |
| Race, other | 0.84 (0.73, 0.97) | .021 |
| ADL < 19, CFS < 3 | Referent | |
| ADL ≥ 19, CFS < 3 | 1.45 (1.31, 1.60) | <.001 |
| ADL < 19, CFS ≥ 3 | 1.92 (1.64, 2.25) | <.001 |
| ADL ≥ 19, CFS ≥ 3 | 1.57 (1.38, 1.79) | <.001 |
| Congestive heart failure | 0.98 (0.89, 1.07) | .615 |
| Coronary artery disease | 1.01 (0.92, 1.11) | .76 |
| Asthma/COPD | 0.96 (0.88, 1.04) | .28 |
| Chronic kidney disease | 1.06 (0.97, 1.17) | .20 |
| Hypertension | 1.05 (0.95, 1.17) | .30 |
| Diabetes | 1.14 (1.04, 1.25) | <.01 |
| Admission month | | |
| January | 0.21 (0.14, 0.31) | <.001 |
| February | 0.54 (0.39, 0.76) | <.001 |
| March | 0.97 (0.73, 1.31) | .87 |
| April | Referent | |
| May | 0.45 (0.26, 0.78) | <.01 |
| June | 0.35 (0.21, 0.58) | <.001 |
| July | 0.24 (0.14, 0.40) | <.001 |
| August | 0.39 (0.23, 0.64) | <.001 |
| September | 0.68 (0.44, 1.07) | .10 |
| October | 1.13 (0.74, 1.71) | .58 |
| November | 1.59 (1.04, 2.44) | .031 |
| December | 1.38 (0.89, 2.12) | .15 |

COPD, chronic obstructive pulmonary disease.

among those who were infected during their nursing home stay was quite high. Residents who experience cognitive and functional impairment were at greatest risk of infection and death during the nursing home stay. These findings provide context for decision making among individuals and families in need of post-acute care services and the delivery of care within SNFs.

Nationally, the risk of infection during a post-acute care stay mirrors community transmission patterns. Regional trends in the community transmission of SARS-CoV-2 do influence transmission risk within the SNF.[6] For this reason, all efforts to decrease community transmission and increase vaccination rates within SNFs remain imperative to preserve options for post-acute care and the safety of SNF patients. Additionally, mitigation measures within nursing homes remain essential in preventing the spread of infection among residents should SARS-CoV-2 enter the building. Universal masking of staff and improved air filtration provide additional benefits to stopping infection transmission within nursing homes. Increased access to COVID-19 therapeutics could further decrease the morbidity and mortality experienced by nursing home residents who are infected.

Post-acute patients with more cognitive and functional impairment were at higher risk for infection compared with people who were more functionally intact. People with dementia may experience impairments in memory or insight that make it challenging for them to adhere to mitigation measures such as masking or physical distancing. People with cognitive and functional impairments often require assistance with personal care needs such as using the bathroom or getting dressed. Such activities are not conducive to social distancing, often placing staff and residents in close contact for extended periods of time. Widespread vaccination for staff and patients, symptom screening protocols, and surveillance testing to detect asymptomatic infection are all critical interventions to reduce transmission risk to people who require close contact to meet basic daily needs.

Becoming infected with SARS-CoV-2 during a post-acute care stay and subsequently dying was a relatively small risk when compared to the overall risk of death among post-acute care patients. Individuals who require post-acute care in an SNF following a hospitalization represent a population with complex underlying conditions that predispose them to death with or without SARS-CoV-2. At the same time, those who did contract SARS-CoV-2 during their SNF stay had nearly double the rate of death as those who were not infected. For people with complex conditions, options for post-acute care outside of SNFs are often insufficient to meet the significant medical and personal care needs after hospitalization. People with complex health needs will continue to require the acuity of care delivered in an SNF after hospitalization. We must invest in the workforce, environment, and skill sets required to provide quality SNF care to high-risk individuals in our communities.

Death with SARS-CoV-2 more than doubled from February to March and again from September to October of 2020. Improvements after the first peak in deaths may reflect improved infection control strategies and treatment modalities in SNFs following the initial presentation of SARS-CoV-2. Future study should examine SARS-CoV-2 infection rates during SNF post-acute care stays following subsequent peaks in community SARS-CoV-2 infection. Deaths without

**Table 4**
Mortality Rates Following SNF Admission for Patients With and Without Known SARS-CoV-2 Infection

| Admission Month | No. of Admissions | Patients With Outcome (%) | | |
|---|---|---|---|---|
| | | Alive at Discharge or After 100 d | Died, no Prior SARS-CoV-2 Infection | Died After SARS-CoV-2 Infection |
| January | 5284 | 93.0 | 6.9 | 0.2 |
| February | 4438 | 93.1 | 6.3 | 0.6 |
| March | 4022 | 91.7 | 6.9 | 1.4 |
| April | 1981 | 90.3 | 8.2 | 1.5 |
| May | 2189 | 92.8 | 6.9 | 0.4 |
| June | 3332 | 93.4 | 6.2 | 0.4 |
| July | 3776 | 93.3 | 6.5 | 0.2 |
| August | 3970 | 93.2 | 6.3 | 0.5 |
| September | 4494 | 92.5 | 6.8 | 0.7 |
| October | 4353 | 91.8 | 6.8 | 1.4 |
| November | 3820 | 92.0 | 6.1 | 1.9 |
| December | 3435 | 91.9 | 6.8 | 1.3 |
| Total | 45,094 | 92.4 | 6.7 | 0.8 |

All patients were tracked until discharge or until 100 days postadmission.

SARS-CoV-2 peaked in April of 2020. Many aspects of care were altered for all patients because of the emergence of SARS-CoV-2, such as visitation bans and changes in admission criteria that likely affected who was admitted to nursing homes for post-acute care and the type of care they received.

In our sample, more than half of SARS-CoV-2 infections occurred more than 30 days after SNF admission, yet the median post-acute length of stay was 30 days. This suggests that length of stay may be associated with infection risk. Patients requiring additional time in the SNF may experience a prolonged risk of exposure and more opportunities to become infected. Another potential explanation may be that people requiring longer lengths of stay also have increased needs that prevent physical distancing and adherence to infection mitigation strategies.

### *Limitations*

This study has important limitations. First, data were derived from a single SNF operator, and it is unclear how generalizable the findings are to patients admitted to SNFs nationally. Second, patients receiving post-acute care in SNFs during the pandemic may differ from usual post-acute patients in important ways. For example, post-acute patients during COVID-19 may be more functionally impaired than usual patients, who may have been more able to substitute SNF care with other types of post-acute care, such as home health care. We did not compare incidence and outcomes of SARS-CoV 2 in a comparable group of people who went to SNF for post-acute care vs home for post-acute care. Third, our intent was to describe the independent risk factors for adverse SARS-CoV-2 outcomes among post-acute SNF patients, so none of the estimates should be interpreted as causal. Fourth, lack of testing capacity during the early portion of the pandemic may have resulted in an undercounting of cases, specifically asymptomatic ones in the first few days of admission to SNF. Fifth, we could not ascertain prior SARS-CoV-2 infection and related death with certainty for all patients. For instance, patients may have previously experienced SARS-CoV-2 infection unrelated to the hospital or SNF stay. Last, our estimates likely undercount deaths that occurred outside the nursing home, such as in the hospital.

## Conclusions and Implications

The decision to pursue post-acute care in an SNF following hospitalization is multifaceted and has been further complicated by concerns about contracting SARS-CoV-2. This study demonstrated increased risk of SARS-CoV-2 infection for post-acute care recipients who remained in the SNF more than 30 days, those with cognitive and functional impairment, and those admitted in months of community surges. The absolute risk of infection and death with SARS-CoV-2 during a post-acute care stay remained small across the study in relation to the risk of death without SARS-CoV-2 in this high-risk population, though this pilot work requires further validation and study. This study provides additional context of the risks and benefits of a post-acute care stay in an SNF during the SARS-CoV-2 pandemic. Knowledge of the specific risk factors for SARS-CoV-2 infection and death among post-acute care residents in SNFs allows for individualized planning during a complex transition in care.

## Acknowledgments

We thank Cliff Boyd, Rich Castor, and Denine Hastings from Genesis HealthCare, and Jeff Hiris and Chris Santostefano from Brown University for their extensive technical support.

## References

1. Kaiser Family Foundation. State COVID-19 data and policy actions. 2021. Accessed February 17, 2021. https://www.kff.org/coronavirus-covid-19/issue-brief/state-covid-19-data-and-policy-actions/#longtermcare
2. Panagiotou OA, Kosar CM, White EM, et al. Risk factors associated with all-cause 30-day mortality in nursing home residents with COVID-19. *JAMA Intern Med*. 2021;181:439–448.
3. Shi SM, Bakaev I, Chen H, Travison TG, Berry SD. Risk factors, presentation, and course of coronavirus disease 2019 in a large, academic long-term care facility. *J Am Med Dir Assoc*. 2020;21:1378–1383.e1371.
4. Gorges RJ, Konetzka RT. Factors associated with racial differences in deaths among nursing home residents with COVID-19 infection in the US. *JAMA Network Open*. 2021;4:e2037431.
5. Grabowski DC, Mor V. Nursing home care in crisis in the wake of COVID-19. *JAMA*. 2020;324:23–24.
6. Konetzka RT, White EM, Pralea A, Grabowski DC, Mor V. A systematic review of long-term care facility characteristics associated with COVID-19 outcomes. *J Am Geriatr Soc*. 2021;69:2766–2777.
7. Thorsness R, Raines NH, White EM, et al. Association of kidney function with 30-day mortality following SARS-CoV-2 infection in nursing home residents: A retrospective cohort study. *Am J Kidney Dis*. 2022;79:305–307.
8. Santostefano CM, White BM, Feifer R, Mor V. Accuracy of ICD-10 codes for identifying skilled nursing facility residents with lab-confirmed COVID-19. *J Am Geriatr Soc*. 2021;69:3397–3399.
9. White EM, Kosar CM, Feifer RA, et al. Variation in SARS-CoV-2 prevalence in U.S. skilled nursing facilities. *J Am Geriatr Soc*. 2020;68:2167–2173.
10. Kosar CM, White EM, Feifer RA, et al. COVID-19 mortality rates among nursing home residents declined from March to November 2020. *Health Aff*. 2021;40:655–663.
11. Shen K, Loomer L, Abrams H. Estimates of COVID-19 cases and deaths among nursing home residents not reported in federal data. *JAMA Network Open*. 2021;4:e2122885.
12. Thomas KS, Dosa D, Wysocki A, Mor V. The Minimum Data Set 3.0 Cognitive Function Scale. *Med Care*. 2017;55:e68–e72.
13. Morris JN, Fries BE, Morris SA. Scaling ADLs within the MDS. *J Gerontol A Biol Sci Med Sci*. 1999;54:M546–M553.