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Mortality Rates From COVID-19 Are Lower In Unionized Nursing Homes

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ABSTRACT More than 40% of all reported coronavirus disease 2019 (COVID-19) deaths in the United States have occurred in nursing homes. As a result, health care worker access to personal protective equipment (PPE) and infection control policies in nursing homes have received increased attention. However, it is not known if the presence of health care worker unions in nursing homes is associated with COVID-19 mortality rates. Therefore, we used cross-sectional regression analysis to examine the association between the presence of health care worker unions and COVID-19 mortality rates in 355 nursing homes in New York State. Health care worker unions were associated with a 1.29 percentage point mortality reduction, which represents a 30% relative decrease in the COVID-19 mortality rate compared to facilities without health care worker unions. Unions were also associated with greater access to PPE, one mechanism that may link unions to lower COVID-19 mortality rates. [Editor's Note: *This Fast Track Ahead Of Print article is the accepted version of the peer-reviewed manuscript. The final edited version will appear in an upcoming issue of* Health Affairs.]

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Amidst the coronavirus disease 2019 (COVID-19) global pandemic, the severe respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused infections in more than 5 million people and more than 163,000 deaths in the United States.[1] Nursing home residents have been disproportionately affected and account for 43% of documented deaths in the country.[2,3] New York state has suffered over 6,500 COVID-19 deaths in nursing homes, more than any state besides New Jersey.[3]

Investigations into outbreaks in individual nursing homes have identified several factors leading to increased risk of infection and resulting death among nursing home residents.[4–7] First, nursing homes care for elderly individuals with medical comorbidities who have an increased risk of death from COVID-19 infection. Second, nursing home residents live close together and staff have direct contact with residents and each other. These staff provide direct care to multiple residents and may work in multiple facilities or provide homecare to earn additional income.[8,9] These cumulative direct contacts may increase risk for SARS-CoV-2 infection and spread. Third, asymptomatic spread of SARS-CoV-2 eluded early infection control strategies, which focused on isolating only staff and residents with symptoms.

Centers for Medicare and Medicaid (CMS) guidelines now recommend personal protective equipment (PPE), including N95 masks and eye shields for staff as well as universal testing in facilities with confirmed COVID-19 infections.[10] However, equipment and test shortages, as well as challenges with implementing infection control plans limited adoption of these recommendations.[11] Under such circumstances, labor unions representing health care workers per-

form several functions that may reduce SARS-CoV-2 transmission. Unions generally demand high staff-to-patient ratios, paid sick leave, and higher wage and benefit levels that reduce staff turnover.[12–14] They educate workers about their health and safety rights, work to ensure that such rights are enforced, demand that employers mitigate known hazards, and give workers a collective voice that can improve communication with employers.[14–17] In the specific context of the COVID-19 pandemic in New York, labor unions advocated for access to PPE and new infection control policies.[18]

Though health care worker unions have been shown to improve the occupational safety of health care workers and, in some cases, overall patient outcomes,[14,19] it is not known how the presence of health care worker unions affected COVID-19 mortality rates among residents in nursing homes. We hypothesized that labor union representation among health care workers in nursing homes would be associated with reduced resident mortality rates. Although labor unions may influence COVID-19 mortality rates in numerous ways, we hypothesized that two important mechanisms were successful demands for PPE and reduced COVID-19 infection rates. By increasing access to PPE, labor unions may reduce the spread of COVID-19 between health care workers and nursing home residents, thus reducing COVID-19 mortality rates for residents.

Study Data And Methods

STUDY DESIGN AND DATA SOURCES We conducted cross-sectional regression analyses to estimate the association between the presence of a health care worker union and COVID-19 mortality rates in nursing homes in New York State during the 2020 COVID-19 pandemic. We used publicly available data from the New York State Department of Health (NYSDOH) on COVID-19 mortality. We used proprietary data from 1199SEIU United Healthcare Workers East (1199SEIU), the International Brotherhood of Teamsters, and the Communication Workers of America (CWA), as well as publicly-available data from the New York State Nurses Association (NYSNA) to determine if a labor union represented health care workers in each facility.

STUDY SAMPLE We included all New York State nursing homes for which the NYSDOH reported data on confirmed COVID-19 deaths. Nursing homes that reported zero deaths were included in the cohort, while facilities for which NYSDOH did not report data were excluded. Facilities for which there was missing data on key covariates were also excluded.

MAIN OUTCOME The main outcome was the percentage of nursing home residents who died from COVID-19. To calculate this percentage, we used nursing home-level data on confirmed COVID-19 deaths made available by the NYSDOH for the period March 1 through May 31, 2020. This data includes all COVID-19 deaths that occurred inside of the facility, but not deaths that occurred after a resident was discharged to a hospital. The denominator was the total number of beds in each facility as a proxy for the number of residents in the facility.[20]

SECONDARY OUTCOMES The two secondary outcomes were nursing home access to PPE and nursing home COVID-19 infection rates. We obtained data from CMS on whether or not each facility reported having a one-week supply of N95 masks, eye shields, surgical masks, gowns, gloves, and hand sanitizer on May 24 and May 31, 2020 (the earliest two weeks available). Facilities were defined as having access to a given type of PPE if they reported having a one-week supply both weeks. We also obtained nursing home-level data on confirmed COVID-19 infections per 1,000 residents from CMS for the dates January 1 through May 31, 2020.

PRIMARY EXPLANATORY VARIABLE Facilities with NYSNA, 1199SEIU, Teamster, or CWA unions representing health care workers were defined as having a union in our cohort. NYSNA only represents registered nurses (RN), while the other unions represent workers throughout nursing homes, including nurse aides, dieticians, and sanitation workers. In every nursing home organized by 1199SEIU, the union represents certified nursing assistants (CNA) who provide direct care to residents (personal interview with 1199SEIU Regional Communications Director Mindy Berman, July 5, 2020). We gathered data on the union status of nursing homes through interviews with labor union representatives conducted between May 6 and July 8, 2020. The union status of all nursing homes remained constant throughout our period of study.

COVARIATES To address potential confounders, we gathered data on nursing home and area-level characteristics previously associated with poor outcomes from COVID-19.

We obtained nursing home-level data on the average age of residents, percent of residents who are obese, Resource Utilization Group Nursing Case Mix Index of resident acuity, total bed, occupied beds, occupancy rates, staff-hours-to-resident-days ratios (for RN, CNA, and licensed practical nurses (LPN)), percent of residents whose primary support comes from Medicaid or Medicare, Overall 5-Star Rating, and chain and for-profit status.

We gathered data on total and occupied beds

from the NYSDOH Nursing Home Profiles, based on the most recent occupancy reports (85% reported on March 25, 2020).[20] CMS provides data on the 5-Star Quality Rating (updated April 1, 2020), and all other nursing home-level characteristics are available from Brown University's Long-term Care: FOCUS project, which was last updated in 2017.[21]

We also obtained county-level data on confirmed cases of COVID-19 and population from USAFACTS (updated through May 31, 2020).[22]

STATISTICAL ANALYSES We first estimated descriptive statistics for the main outcome, primary explanatory variable, and all covariates, for four groups: facilities for which NYSDOH reported data, facilities for which NYSDOH did not report data, cohort facilities with unions, and cohort facilities without unions. Statistical differences by reporting and union status were ascertained using T-tests and Z-tests.

To examine the association between the proportion of residents who died from COVID-19 and the presence of health care worker unions, we then estimated cross-sectional ordinary least squares (OLS) regression models, with and without adjustment for county and facility-level variables.

In adjusted models, we included county-level confirmed COVID-19 cases per capita to adjust for the prevalence of disease in the surrounding county, and population to account for the possibility that more populous counties may contain more unidentified infections. Since COVID-19 mortality rates are known to increase along with age and comorbidities, we included the average age of residents, the percent of residents who are obese, average resident acuity, and the percent of residents whose primary support comes from Medicare, thus representing individuals receiving care following an acute in-patient hospitalization. Since COVID-19 has disproportionately affected low income individuals, we also adjust for the percent of residents whose primary source of insurance is Medicaid.

Since the quality of care may influence COVID-19 mortality rates, we also adjusted for staff-hours-to-resident-days ratios for RNs, CNAs, and LPNs.[23] We also adjusted for the Overall 5-Star Quality Rating, which is based on health inspections, staffing, and 15 different physical and clinical measures for nursing home residents, as previous research suggests that COVID-19 death rates may be lower in higher-rated facilities.[2,10] Similarly, we adjusted for chain and for-profit status, as previous research associates these ownership characteristics with the quality of care.[24,25] We also adjusted for each facility's occupancy rate, as empty beds may have facilitated the isolation of COVID-19 positive residents. Finally, we adjusted for the number of occupied beds, as unionization and COVID-19 infection may both be more likely in large facilities. Even with these adjustments, the available data and observational research strategy preclude strong causal interpretations due to bias from unmeasured confounders and selection into our study sample.

SECONDARY ANALYSES As secondary analyses, we used cross-sectional OLS regression analyses to explore two mechanisms that may link labor unions to lower COVID-19 mortality rates in nursing homes: access to PPE and reduced COVID-19 infection rates. First, we examined the association between facility union-status and access to six types of PPE: N95 masks, eye shields, surgical masks, gowns, gloves, and hand sanitizer. We adjusted for the same county and facility-level variables as the main analysis, with the exception of resident obesity, which is unlikely to confound access to PPE.

Second, we examined the association between union-status and COVID-19 infection rates while adjusting for the same county and facility-level variables as the main analysis.

We computed 95% confidence intervals derived from heteroscedasticity-robust standard errors for all regression models. All analyses were conducted using R version 1.0.153 and Stata 15.0.

SENSITIVITY ANALYSES Prior research suggests that there may be COVID-19 deaths in nursing homes for which the NYSDOH did not report data, raising concerns about selection bias in our cohort.[2,26] To address these concerns, we conducted two robustness checks. First, we used an OLS model to assess for factors associated with reporting COVID-19 death data to the NYSDOH. Second, we used inverse probability weighting to adjust for selection bias in the data from nursing homes that did report data on COVID-19 deaths. Specifically, we used estimates of the predicted probability of reporting to NYSDOH from logistic regression models in constructing inverse probability weights in our main regression model.

We also considered the possibility that nonreporting facilities did not have any COVID-19 deaths by coding these facilities to have zero deaths. This is likely a conservative assumption given that facilities were mandated to report to the state, even if they had no deaths from COVID-19.

To account for the possibility that COVID-19 deaths were correlated across nursing homes in the same labor market, we calculated commuting zone-level wild cluster bootstrap robust standard errors.[27] To address concerns about regional variation in COVID-19 risk factors, as well as to

account for the possibility that COVID-19 deaths were correlated across facilities within the same county, we included region-level fixed effects and calculated standard errors clustered at the county level. We also performed Oster's coefficient stability test, to assess the robustness of our results to other unmeasured confounders.[28] Last, we estimated the models from our secondary analyses using only the nursing homes from our original cohort that reported data on PPE and COVID-19 infection rates. These sensitivity analyses are further described in the online appendix.[29]

LIMITATIONS Our study has several limitations that motivate future work. First, even with the inclusion of a rich set of covariates and sensitivity analyses, the observational study design precludes causal interpretations. Second, our study was conducted during an early phase of the COVID-19 pandemic and the estimated associations may change over time. Similarly, our findings may not be generalizable to unions and other patient outcomes before or after the pandemic. Third, our study was limited by missing data on confirmed COVID-19 deaths in many nursing homes in the State of New York.[30] Data collection during the pandemic faces many obstacles, and it is not possible to know how many COVID-19 deaths occurred in facilities excluded from the NYSDOH data. Fourth, NYSDOH data only includes confirmed COVID-19 deaths that occurred inside facilities. We are therefore unable to adjust for the possibility that unionized health care workers may transfer residents to hospitals earlier and thereby reduce their facility's COVID-19 mortality rate.

Fifth, while our data on unionized facilities covers the largest health care worker unions in New York, a small number of facilities may have been misclassified. Sixth, due to the lack of data on PPE early in the pandemic we were unable to adjust our main results for access to PPE. Seventh, we were unable to gather data on the race and ethnicity of individuals who died from COVID-19 or for health care workers, thus limiting our ability to examine racial disparities.

Eighth, many of the nursing home-level covariates were last measured in 2017, which may introduce measurement error. Our main outcome also may suffer potential measurement error due to our reliance on total beds to proxy for nursing home residents. Measurement error in both cases may bias estimates of the association between unionization and COVID-19 death rates either downwards or upwards. Last, this study may not be generalizable outside of the State of New York.

Study Results

DESCRIPTIVE STATISTICS We identified 621 nursing homes in New York state, 385 of which are included in the NYSDOH's report on COVID-19 mortality. Thirty facilities were excluded due to missing data on covariates, resulting in a study sample of 355 nursing homes.

Health care worker unions were present in 246 out of 355 nursing homes in our sample (239 affiliated with 1199SEIU, 4 affiliated with NYSNA, 1 affiliated with the Teamsters, and 2 affiliated with both 1199SEIU and NYSNA). Facilities with health care worker unions had residents who were younger, less obese, with higher acuity scores, less likely to be white, and more likely to be insured by Medicare or Medicaid (supplemental exhibit 1).[29] Unionized facilities were also more likely to be for-profit, less likely to be associated with a chain, had lower LPN-to-resident ratios, and were located in more populous counties with higher per capita rates of confirmed COVID-19 cases (supplemental exhibit 1).[29] At the county-level, the percent of nursing homes that were unionized ranged from zero to 100 (supplemental exhibit 2).[29]

There were 3,298 confirmed COVID-19 fatalities in nursing homes in the state of New York through May 31, 2020. The facility with the highest number of confirmed COVID-19 deaths had 82 deaths and the highest proportion of deaths among residents was 62 of 160, or 38.8%. Eleven nursing homes in our sample reported 0 confirmed COVID-19 deaths. At the county-level, average COVID-19 mortality rates in nursing homes varied from a low of 0.0 to a high of 12.9 (supplemental exhibit 3).[29] In the 246 unionized nursing homes, 3.72% of residents died from COVID-19 while in the 109 non-unionized facilities 5.53% of residents died.

MAIN REGRESSION RESULTS In regression analyses, we found that the presence of a labor union representing health care workers was associated with a 1.29 percentage point reduction (95% Confidence Interval (CI): -2.405, -0.172; $p = 0.024$) in the proportion of facility residents who die from COVID-19. Estimated coefficients were similar in models with and without covariates (supplemental exhibit 4)[29] and the statistical significance of our findings were substantively unchanged regardless of how confidence intervals were calculated. Since the mean proportion of facility residents who died from COVID-19 during our study period was 4.279 percent, the covariate-adjusted estimates suggest that the presence of a labor union was associated with a 30% relative decrease in the COVID-19 mortality rate compared to facilities without health care worker unions.

SECONDARY ANALYSES

▶ **PPE:** In our secondary analysis on PPE access, we use data from a larger cohort of nursing homes. Of 418 facilities reporting data on PPE, 19 were excluded due to missing data on covariates, resulting in a sample of 399 nursing homes. In the resulting sample of facilities, 83% reported having N95 masks, 92% eye shields, 84% gowns, 95% hand sanitizer, 96% gloves, and 96% surgical masks (appendix exhibit A1).[29]

In regression analyses, we found that the presence of a labor union is associated with an 11.5 percentage point increase (95% CI: 2.1, 20.9; $p = 0.017$) in the probability of a facility having access to N95 masks and a 6.7 percentage point increase (95% CI: 0.3, 13.0; $p = 0.039$) in the probability of having access to eye shields. Unions were therefore associated with a 13.8% relative increase in access to N95 masks and a 7.3% relative increase in access to eye shields. Labor union status was not a significant predictor of access to other types of PPE (supplemental exhibit 5).[29]

▶ **COVID-19 INFECTION RATES:** In our secondary analysis of COVID-19 infection rates we use data from the 371 nursing homes in this cohort that reported data on COVID-19 infection rates. In the resulting sample, the average COVID-19 infection rate was 119.4 per 1,000 residents. 148 of these nursing homes had infection rates of zero, thus minimizing concerns that CMS dropped facilities without COVID-19 infections.

In regression analyses, we found that the presence of a labor union is associated with a 50.1-point decrease in the number of COVID-19 infections per 1,000 residents (95% CI: −96.2, −3.9; $p = 0.034$). Since the mean COVID-19 infection rate during our study period was 119.4, the covariate-adjusted estimates suggest that the presence of a labor union was associated with a 42% relative decrease in the COVID-19 infection rate (supplemental exhibit 5).[29]

SENSITIVITY ANALYSES In OLS models examining predictors of whether or not the NYSDOH reported data on COVID-19 deaths for a given facility, the presence of a health care worker union, was not found to be a statistically significant (appendix exhibit A2).[29] Analyses using inverse probability weighting to address potential non-random selection into reporting COVID-19 deaths yielded similar estimates of the association between COVID-19 deaths and unionization (−1.71, $p = 0.005$) (appendix exhibit A3).[29]

Our results remained statistically significant when estimating commuting zone-level wild cluster bootstrap robust standard errors (95% CI: −3.152, 0.767; $p = 0.074$) (appendix exhibit A4).[29] Findings were also robust when adjusting for region-level fixed effects and clustering standard errors at the county level (95% CI: −2.222, −0.204; $p = 0.019$) (appendix exhibit A5).[29] Our results are similar even when using the conservative assumption that all non-reported nursing homes experienced zero COVID-19 deaths (95% CI: −1.53, 0.09; $p = 0.08$) (appendix exhibit A6).[29] Simulating the potential effect of additional unmeasured confounders did not reverse the substantive finding (appendix exhibit A7).[29] Last, the results of our secondary analyses are similar when only using the nursing homes from our original cohort that also reported data on PPE and COVID-19 infection rates (appendix exhibits A8 & A9).[29]

Discussion

Among 355 nursing homes in New York State for which data on COVID-19 mortality rates were available, the presence of a health care worker union was associated with a 30% lower mortality rate from COVID-19 among nursing home residents. The findings were robust to adjustment for a range of covariates and specification checks for bias from missing data. We also found that nursing homes with labor unions had greater access to PPE and lower COVID-19 infection rates, two important mechanisms that may link unions to lower COVID-19 mortality rates.

Specifically, unions were associated with a 13.8% relative increase in access to N95 masks and a 7.3% relative increase in access to eye shields. We also found that unions were associated with a 42% relative decrease in COVID-19 infection rates among nursing home residents. However, more research is needed to understand the numerous mechanisms through which unions may influence COVID-19 mortality rates, such as staff training, reducing use of part-time workers, implementing infection protocols, and giving workers a collective voice in the workplace.[9,14–17,31]

As more than 40% of all COVID-19 deaths have occurred in nursing homes, there is an urgent need to understand factors that protect residents and staff. Amidst the COVID-19 pandemic, unions advocated for supplies and policies that protect staff and residents from SARS-CoV-2 infection. While our study design precludes causal interpretations, our results suggest that unions may have reduced COVID-19 deaths among nursing home residents by successfully demanding PPE for health care workers. These are especially important contributions given that early research on COVID-19 in nursing homes found that only facility size and location—rather than quality metrics—were associated with COVID-19 outbreaks.[2,11]

Our finding that unions are associated with reduced COVID-19 mortality rates in nursing homes is consistent with previous findings that unions improve safety and health standards for workers,[15,16,32] help to co-enforce those standards with employers,[33] and also reduce workplace injuries[34,35] and accidental deaths.[36] Health care worker unions, in particular, are also associated with improved patient outcomes.[14,19,37]

Our study also identified other individual and facility factors associated with increased COVID-19 mortality rates in nursing homes. COVID-19 mortality rates were negatively associated with CNA staffing ratios and positively associated with the average age of residents and the percent of facility residents that are white. However, this finding regarding race is not statistically significant when we include region-level fixed effects (appendix exhibit A5).[29] This suggests that the result may be driven by unmeasured confounders that vary across regions. Unfortunately, missing race and ethnicity data for individuals that died from COVID-19 limits our ability to further examine racial disparities. We also found that chain nursing homes were associated with higher COVID-19 mortality rates. Previous research similarly finds that nursing home chains are associated with lower quality care.[16,17,38]

Our study has three main strengths that improve our understanding of the relationship between labor unions, access to PPE, and COVID-19 infection and mortality in nursing homes. First, we combined several data sources in order to identify unionized nursing homes in New York while also adjusting for facility and community covariates. Second, we performed important sensitivity analyses to address NYSDOH's selective reporting of COVID-19 deaths in nursing homes. We found that the presence of a union was not associated with NYSDOH reporting data on COVID-19 deaths. Our results were also robust when using inverse probability weighting to address potential non-random selection and accounting for potential unmeasured confounders. Third, to our knowledge this study is the first to demonstrate that labor unions are associated with reduced COVID-19 infections and deaths in an essential industry. Lack of data on COVID-19 infections by occupation has thus far hindered research on whether unions can protect workers and the public.

Our results have significant implications for stakeholders concerned with COVID-19 mortality in nursing homes. Health care worker unions were associated with reduced mortality rates in the initial COVID-19 surge in the United States. Future surges of COVID-19 infections in regions with fewer unionized nursing homes are therefore particularly worrisome.

Conclusion

Residents in nursing homes have been disproportionately affected by COVID-19. The presence of a health care worker labor union was associated with a 30% relative decrease in the COVID-19 mortality rate compared to facilities without unions in the State of New York. Health care worker unionization may play an important role in ensuring access to appropriate PPE and implementing infection control policies that protect vulnerable nursing home residents. ■

Simeon Kimmel consulted for Abt Associates on a Massachusetts Department of Public Health–funded project to improve access to medications for opioid use disorder in skilled nursing facilities. [*Published online September 10, 2020.*]

NOTES

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