January 2021

Impact Of Serial Point Prevalence Covid-19 Testing On Severe Disease Outcomes In Connecticut Nursing Home Residents

Lauren Marie Campbell
laurencampbell@md.metrocast.net

Impact of serial point prevalence COVID-19 testing on severe disease outcomes in Connecticut nursing home residents

Lauren Campbell

A thesis completed in April 2021 in partial fulfillment of the requirements for 2021 conferral of the degree of

Master of Public Health,

Yale School of Public Health

First Reader: Dr. Linda Niccolai

Second Reader: Dr. Vivian Leung

Abstract

Introduction: COVID-19 is a respiratory disease caused by infection with the virus, SARS-CoV-2. Transmission of the virus can occur in both symptomatic and asymptomatic cases making controlling the spread challenging. Point prevalence testing in long term care facilitates has been found to be a useful strategy in detecting cases and managing COVID-19 outbreaks. The impact of this control strategy on severe outcomes of disease in residents of these facilities has not been fully characterized.

Methods: Active surveillance of COVID-19 in long term care facilities in Connecticut began in April 2020, with point prevalence surveys beginning in May 2020. Data was collected for 34 facilities from a statewide surveillance system and confirmed through Connecticut's Electronic Disease Surveillance System. Data from April 2020 to December 2020 was analyzed to assess the association between point prevalence testing and severe outcomes.

Results: Overall, there were 2,244 PCR positive residents in 34 facilities between April 2020 and December 2020. Of this group 18.4 % were hospitalized and 25.9% died. Increasing age and hospitalization were significantly associated with an increased risk of mortality ($p<0.001$) while males had a significantly higher risk of hospitalization ($p<0.001$). The number of point prevalence surveys conducted by a facility was not significantly associated with either the case fatality ratio or hospitalization rate within the facility.

Conclusions: Understanding the benefits of point prevalence surveys in LTCFs is important when looking at the cost effectiveness of the survey and creating recommendations and policies. There was no association found between the number of point prevalence studies and severe disease outcomes of residents. Future studies could further investigate the association between the reason for testing a resident and severe disease outcomes.

Table of Contents

Abstract …… 2

List of Tables ……..…….... 4

List of Figures ……..…….... 5

Background ……..…. 6

Methods ……..……... 7

Results ……..…….....9

Discussion ……... 11

References……...… 15

Tables & Figures ……. 19

Tables

Table 1: Description of the Sample, by Mortality Status

Table 2: Unadjusted associations between study variables and hospitalization

Table 3: Multivariable logistic regression model of factors associated with hospitalization

Table 4: Unadjusted associations between study variables and mortality

Table 5: Multivariable logistic regression model of factors associated with mortality

Figures:

Figure 1: Correlation of Facility Hospitalization Rate to Number of PPS Complete

Figure 2: Correlation of Facility Case Fatality Ratio to Number of PPS Complete

Introduction

Outbreaks in long term care facilities (LTCF) pose a unique challenge to public health interventions and infection control. Resident factors and facility characteristics contribute to an increase in spread of infectious diseases and severe outcomes in infected individuals[1]. Symptom screening, testing of residents, linkage to care, isolation and good infection control are all strategies that can be used to manage outbreaks in these settings[2,3]. Detection based on symptoms, however, is not as reliable of a strategy when transmission is occurring through asymptomatic individuals.

First recognized in December 2019, COVID-19 is a respiratory disease caused by infection with the virus, SARS-CoV-2. Infection with the virus has been shown to be both symptomatic and asymptomatic with transmission occurring in both[4]. Symptomatic cases typically manifesting with fever, cough, congestion, and fatigue[4]. Atypical symptoms, such as altered mental status and gastrointestinal symptoms, are frequently seen in elderly patients[5]. During the COVID-19 pandemic, approximately 40% of infections in LTCFs have been asymptomatic, indicating the need to use additional methods to detect and isolate cases[5-7]. Point prevalence testing has been found to be a useful strategy in detecting cases and managing COVID-19 outbreaks[6,8-10].

Residents of LTCFs are typically elderly with multiple comorbid conditions making them highly vulnerable to COVID-19[1,2,11]. These facilities have been disproportionately impacted by COVID-19, accounting for 61.6% of deaths in Connecticut during the first two months of the pandemic[3,6]. The first case of COVID-19 in a Connecticut LTCF was reported on March 15, 2020 and statewide surveillance for COVID-19 in long term care facilities was established in

Connecticut by April 15, 2020 via the Facility Licensing and Investigations Section (FLIS) reportable events portal of the Connecticut Department of Public Health (CT DPH). The CT DPH began to recommend point prevalence testing (PPS) of LTCF residents on May 11, 2020[12]. In accordance with CDC guidelines, facilities were encouraged to test previously negative residents weekly until there were no new positives for at least 14 days[13]. At this time, facilities with active outbreaks were trained on proper infection control and cohorting of positive residents.

Previous analyses of these point prevalence surveys (PPS) found a high proportion of asymptomatic infections[6] and a significant association of PPS to decreased incidence rates[14]. Studies have found support for decreased mortality rates by increased case detection from frequent testing[15] and better outcomes for residents found through PPS compared to symptomatic testing[16]. The impact of serial PPS on severe outcomes has largely gone unevaluated, except for a few studies conducted on a small sample of nursing homes[15,16]. This study seeks to build evidence for the protective nature of serial resident PPS against hospitalization and mortality among LTCF residents. This information could be beneficial in understanding the utility of repeated prevalence testing and informative of decisions related to policy and cost-effectiveness.

Methods

Point prevalence testing for SARS-CoV-2 in long term care facilities began in May 2020 with delivery of specimen collection kits beginning on May 2nd. Kits were distributed with the help of the Connecticut National Guard and CDC. The testing for the PPS consisted of molecular SARS-

CoV-2 testing through nasopharyngeal (NP) swabs of all residents who had not tested positive within 90 days and all staff within a facility. Due to limited resources early in the pandemic, 34/212 LTCFs in Connecticut (16%) were prioritized for testing based on the current number of cases they had, licensed bed size, and ability to impact the spread within the facility[6]. These 34 facilities comprised the sample for this analysis.

A statewide surveillance system for COVID-19 in all LTCFs was initiated by CT DPH on April 15, 2020. Staff in each facility were required to answer daily questionnaires regarding facility level data and input individual level data on all cases in a web-based portal (FLIS) maintained by DPH. Baseline information on the surveys was obtained from this portal and confirmed by phone for any PPS conducted from May 2020–December 18th 2020. December 18th, 2020 was chosen as the end date for this analysis to control for any impact vaccination may have had on hospitalization and mortality. Individual-level demographic information, hospitalization and mortality status were also extracted from the portal. The demographic information and test results reported by the LTCF staff were then confirmed in Connecticut's Electronic Disease Surveillance System (CTEDSS). Death information reported by the Office of the Chief Medical Examiner (OCME) is imported into CTEDSS as well and any deaths reported by the LTCF were checked against this database.

Cases for analysis were restricted to only residents with a PCR positive test result. Case fatality ratios (CFRs) for each facility were calculated by summing the number of PCR positive test results and deaths reported to the line list of each facility. Published counts on DPH weekly reports did not always match the ones pulled from FLIS due to the exclusion of suspect and

probable cases from this analysis. The hospitalization rate was calculated for each facility by dividing the number of positive residents that were hospitalized by the total number of positive residents. Mortality was described and compared with respect to demographic characteristics and hospitalization status utilizing ANOVA and chi-square tests. Multivariable logistic regression to assess the association of age, race, and gender with hospitalization and mortality were conducted. Hospitalization status was also included in the multivariable logistic regression for mortality. A correlation analysis was also conducted to examine the relationship between the number of PPS conducted and the CRF and hospitalization rates at the facilities. Analyses and figures were performed in RStudio version 1.2.1335 using R version 3.6.1.

Results

Between April 15th and December 18th 2020, there were 2,244 PCR positive residents in the 34 LTCFs. Overall, 18.4% of the PCR positive residents were hospitalized and 25.9% of PCR positive residents died (Table 1). Age and hospitalization were significantly associated with mortality status ($p<0.001$). Of those with available demographic information, 83% were non-Hispanic white, 12% were Black or African American, and 3% were Hispanic. The majority of positive residents in the sample were female (65%) and the average age was 80.8 ± 12.1 years Within the 34 facilities, a median of 10 point prevalence surveys were conducted (range 3 to 17).

Demographic characteristics associated with hospitalization

The number of hospitalizations per facility ranged from 0 cases to 27 cases with a median of 11 cases. In an unadjusted logistical regression, there was a significant association between Black or

African American race and hospitalization, with this group having 2.59 (95% CI 1.93, 3.45) times the odds of being hospitalized compared to whites (Table 2). There was no significant association seen among the other race/ethnicity groups. A statistically significant increased risk of hospitalization was also seen among males, with men having 1.78 (95 % CI: 1.43, 2.21) times the odds of being hospitalized compared to females (Table 2). A statistically significant association between two age groups and hospitalization was also seen. Those aged 81–90 years old had 0.73 (95% CI: 0.55, 0.98) times the odds of hospitalization compared to those less than 70 years or younger while those 91 years and older saw 0.30 (95% CI: 0.21, 0.43) times the odds of hospitalization compared to those 70 years or younger. Individuals aged 71-80 did not see a significant difference in hospitalization compared to those 70 years or younger. Odds ratios were adjusted using a multivariable logistic regression model. The full model included age, sex, and race/ethnicity. When adjusted for these variables, older age, male, and Black or African American remained statistically associated with hospitalization (Table 3). Of these, being male and Black or African American were associated with an increased risk of hospitalization compared to being female or White while being older was associated with a decreased risk.

Demographic characteristics associated with mortality

Age and hospitalization were both significantly associated with mortality ($p<0.001$, Table1). Gender and race/ethnicity were not significant. As age groups increased, the odds of dying increased as well. Those 90 years or older had the highest odds, with this group experiencing 3.83 (95% CI 2.78, 5.36) times the odds of death compared to those 70 years or younger (Table 4). Residents that were hospitalized had 3.5 (95% CI 2.80, 4.38) times the odds of death compared to those who were not hospitalized (Table 4). Upon adjustment for age, sex,

race/ethnicity and hospitalization using a multivariable logistic regression model, a statistically significant association was seen between sex and death. Males had 1.49 (95% CI 1.16, 1.80) times the odds of death compared to females (p=0.001) (Table 5). Hospitalization and age remained significantly associated with death upon adjustment (Table 5).

Impact of point prevalence surveys

In order to analyze age in relation to point prevalence surveys, the median age at each of the 34 facilities was calculated. The median of facility median ages was 82 years (range 71 to 90 years). The median case fatality ratio (CFR) among the 34 facilities was 26.3% (range 5.4 to 45%) and the median percent of residents hospitalized among cases was 16.8% (range 0.0 to 38.5%). A slight downward trend was observed between the number of PPS conducted and the rate of hospitalization (R= -0.17) but this was not significant (p=0.32) (Figure 1). No significant relationship was observed between CFR and the number of PPS conducted (R=0.052, p=0.77) (Figure 2). A Poisson regression model showed no significant relationship between the number of PPS conducted and the percent hospitalized. Additionally, no significant relationship was seen between the number of PPS conducted and the CFR.

Discussion

This analysis looked at both individual and facility level hospitalization and mortality information among COVID-19 positive residents in a subset of LTCFs. The median case fatality ratio (26.3%) was similar to those seen in other studies, however the median rate of hospitalization (16.8%) among positive residents was lower[17]. These rates varied largely by

facility, with some having substantially higher rates. The facility with the highest case fatality ratio, 45%, had a higher median age of residents compared to other facilities at 90 years. Age may have been a contributing factor to the increased mortality rate in this facility compared to others.

Age was not consistently associated with hospitalization and mortality among PCR-positive residents. Decreasing odds of hospitalization was observed with increasing age while there were increasing odds of death. This contrasts with what has been seen in the general population with COVID-19 where the risk of death and hospitalization both increase with age[18,19]. This difference in risk levels may be specific to long-term care facility residents. These residents are often older and suffering from more comorbidities compared to the general population, putting them at risk for more severe COVID-19 outcomes[20]. The decision about whether or not to send a resident out to the hospital may be influenced by other factors in addition to how severe their illness is[21]. Residents who are older may already be receiving end of life care or families and residents may decline hospitalization, leading to decreased rates. A more qualitative analysis may be beneficial in identifying the driving factors behind this relationship. Mehta et al. also found this opposing pattern of death and hospitalization rates in their study of US nursing home residents[22].

Looking at other demographic characteristics, males saw significantly higher odds of hospitalization compared to females. This finding was consistent with previous studies[18,19,22]. Males also experienced significantly higher odds of mortality compared to females when adjusted for age, race, and hospitalization status. These findings may be partially explained by

immune differences and could provide evidence for the need to further study the differences in outcomes by sex[23]. Consistent with other studies, Black or African American residents experienced higher odds of hospitalization but not death[19,22]. The hospitalization of a resident was associated with significantly increased odds of mortality in both adjusted and unadjusted models. Residents that are transferred to the hospital are more likely to be have severe disease compared to those who remain in the facility. Studies have also shown transfers to be associated with a higher rate of complications compared to residents remaining in the facility, which may also play a role in the increased odds of mortality[24].

Point prevalence surveys are one way for facilities to improve infection prevention during outbreaks of infectious diseases where a high number of infectious cases are unable to be detected symptomatically. Previous studies have provided evidence that these surveys are have associated with decreased incidence rates and mortality rates, as well as better outcomes among residents[6,15,16]. This analysis did not find any association between point prevalence surveys and decreased case fatality ratios or hospitalization rates among positive residents. This may be due to the inability to account for factors such as comorbidities or the change in rates of mortality and hospitalizations over time. Nursing homes were severely affected early in the pandemic, and a large number of cases were found in the first point prevalence study. Over time, treatment and detection of cases was improved as an understanding of the disease developed. This may have led to improved case fatality ratios and hospitalization rates over time that may have been averaged out by earlier rates.

One limitation of this analysis is missing or incomplete data due to inconsistent and delayed reporting by nursing homes. Additionally, testing of residents was difficult early in the pandemic due to lack of available resources. This contributed to an underestimation of cases, related hospitalization, and related deaths as this analysis was restricted to only PCR-positive individuals. Future analysis could compare the outcomes of suspect and probable cases to those who were confirmed to further explore the relationship between case detection through testing and COVID-19 outcomes. The homes selected for analysis were prioritized early on due to high numbers of unknown cases and were all of average size and quality. Future studies could look at a random sample to increase variation and investigate the impact of PPS under varying conditions. Information on the reason for testing of each resident was not available for all residents, so residents found through symptomatic testing or point prevalence surveys were not able to be separated. This distinction would be important in further analysis.

As the pandemic continues, it will be important to fully understand the benefits of point prevalence surveys in LTCFs, particularly when looking at the cost effectiveness of the survey and creating policies. Current information on the benefit is mixed with some studies finding improvements in outcomes while this one found no impact. Future studies are warranted to help guide recommendations on when and for what purpose LTCFs should conduct PPS. These studies could look more closely at reasons for testing individual residents and include information on comorbidities.

References

1. Strausbaugh, L. J., Sukumar, S. R., Joseph, C. L., & High, K. P. (2003). Infectious disease outbreaks in nursing homes: an unappreciated hazard for frail elderly persons. Clinical infectious diseases, 36(7), 870-876.
2. Lee, M. H., Lee, G. A., Lee, S. H., & Park, Y. H. (2020). A systematic review on the causes of the transmission and control measures of outbreaks in long-term care facilities: back to basics of infection control. PloS one, 15(3), e0229911.
3. Danis, K., Fonteneau, L., Georges, S., Daniau, C., Bernard-Stoecklin, S., Domegan, L., ... & Van der Heyden, J. (2020). High impact of COVID-19 in long-term care facilities, suggestion for monitoring in the EU/EEA, May 2020. Eurosurveillance, 25(22), 2000956.
4. Velavan, T. P., & Meyer, C. G. (2020). The COVID-19 epidemic. Tropical medicine & international health, 25(3), 278.
5. Graham, N. S., Junghans, C., Downes, R., Sendall, C., Lai, H., McKirdy, A., ... & Sharp, D. J. (2020). SARS-CoV-2 infection, clinical features and outcome of COVID-19 in United Kingdom nursing homes. Journal of Infection, 81(3), 411-419.
6. Parikh, S., O'Laughlin, K., Ehrlich, H. Y., Campbell, L., Harizaj, A., Durante, A., & Leung, V. (2020). Point Prevalence Testing of Residents for SARS-CoV-2 in a Subset of Connecticut Nursing Homes. JAMA, 324(11), 1101-1103.
7. Feaster, M., & Goh, Y. Y. (2020). High proportion of asymptomatic SARS-CoV-2 infections in 9 long-term care facilities, Pasadena, California, USA, April 2020. Emerging Infectious Diseases, 26(10), 2416.
8. Escobar, Daniel J., et al. "Mitigation of a COVID-19 Outbreak in a Nursing Home Through Serial Testing of Residents and Staff." Clinical Infectious Diseases (2020).

9. Sanchez, G. V. (2020). Initial and repeated point prevalence surveys to inform SARS-CoV-2 infection prevention in 26 skilled nursing facilities—Detroit, Michigan, March–May 2020. MMWR. Morbidity and mortality weekly report, 69.
10. Telford, C. T., Onwubiko, U., Holland, D. P., Turner, K., Prieto, J., Smith, S., ... & Williams, S. (2020). Preventing COVID-19 Outbreaks in Long-Term Care Facilities Through Preemptive Testing of Residents and Staff Members—Fulton County, Georgia, March–May 2020. Morbidity and Mortality Weekly Report, 69(37), 1296.
11. Eckardt, P., Guran, R., Hennemyre, J., Arikupurathu, R., Poveda, J., Miller, N., ... & Frum, J. (2020). Hospital affiliated long term care facility COVID-19 containment strategy by using prevalence testing and infection control best practices. American Journal of Infection Control.
12. Lamont N. Executive Order No. 7UU: Protection of public health and safety during COVID-19 pandemic and response – Staff testing for nursing homes and assisted living; definition of suitable work. 2020.
13. Centers for Disease Control and Prevention. Testing guidelines for nursing homes: interim SARS-CoV-2 testing guidelines for nursing home residents and healthcare personnel. Jan. 07, 2021 [cited 2021 Apr 16. https://www.cdc.gov/coronavirus/2019-ncov/hcp/nursing-homes-testing.html
14. Ehrlich, H. Y., Harizaj, A., Campbell, L., Colt, M., Yuan, K., Rabatsky-Ehr, T., ... & Parikh, S. Early Release-SARS-CoV-2 in Nursing Homes after 3 Months of Serial, Facilitywide Point Prevalence Testing, Connecticut, USA.

15. Bigelow, B. F., Tang, O., Barshick, B., Peters, M., Sisson, S. D., Peairs, K. S., & Katz, M. J. (2021). Outcomes of universal COVID-19 testing following detection of incident cases in 11 long-term care facilities. JAMA internal medicine, 181(1), 127-129.
16. Montoya, A., Jenq, G., Mills, J. P., Beal, J., Diviney Chun, E., Newton, D., ... & Mody, L. (2021). Partnering with local hospitals and public health to manage COVID-19 outbreaks in nursing homes. Journal of the American Geriatrics Society, 69(1), 30-36.
17. Hashan, M. R., Smoll, N., King, C., Ockenden-Muldoon, H., Walker, J., Wattiaux, A., ... & Khandaker, G. (2021). Epidemiology and clinical features of COVID-19 outbreaks in aged care facilities: A systematic review and meta-analysis. EClinicalMedicine, 100771.
18. Soares, R. D. C. M., Mattos, L. R., & Raposo, L. M. (2020). Risk factors for hospitalization and mortality due to COVID-19 in Espírito Santo State, Brazil. The American journal of tropical medicine and hygiene, 103(3), 1184-1190.
19. Price-Haywood, E. G., Burton, J., Fort, D., & Seoane, L. (2020). Hospitalization and mortality among black patients and white patients with Covid-19. New England Journal of Medicine, 382(26), 2534-2543.
20. Bagchi, S., Mak, J., Li, Q., Sheriff, E., Mungai, E., Anttila, A., ... & Bell, J. M. (2021). Rates of COVID-19 among residents and staff members in nursing homes—United States, May 25–November 22, 2020. Morbidity and Mortality Weekly Report, 70(2), 52.
21. Mehta, H. B., Li, S., & Goodwin, J. S. (2021). Risk Factors Associated With SARS-CoV-2 Infections, Hospitalization, and Mortality Among US Nursing Home Residents. JAMA Network Open, 4(3), e216315-e216315.
22. Shanley, C., Whitmore, E., Conforti, D., Masso, J., Jayasinghe, S., & Griffiths, R. (2011). Decisions about transferring nursing home residents to hospital: highlighting the roles of

advance care planning and support from local hospital and community health services. Journal of clinical nursing, 20(19-20), 2897-2906.

23. Takahashi, T., Ellingson, M. K., Wong, P., Israelow, B., Lucas, C., Klein, J., ... & Iwasaki, A. (2020). Sex differences in immune responses that underlie COVID-19 disease outcomes. Nature, 588(7837), 315-320.
24. Lemoyne, S. E., Herbots, H. H., De Blick, D., Remmen, R., Monsieurs, K. G., & Van Bogaert, P. (2019). Appropriateness of transferring nursing home residents to emergency departments: a systematic review. BMC geriatrics, 19(1), 1-9.

Tables and Figures:

Table 1. Description of the Sample, by Mortality Status*

Characteristic	Not deceased (n = 1,663)	Deceased (n = 581)	p†
Age (years), mean ± SD	79.4 ± 12.4	84.7 ± 10.4	<0.001
Sex, n (%)			0.088
Female	1106 (66.5)	363 (62.5)	
Male	557 (33.5)	218 (37.5)	
Race, n (%)			0.197
White	1314 (82.3)	480 (83.6)	
Black or African American	181 (11.3)	71 (12.4)	
Hispanic	59 (3.7)	12 (0.2)	
Other	42 (2.6)	11 (1.9)	
Hospitalized, n (%)			<0.001
Yes	214 (12.9)	198 (34.1)	
No	1449 (87.1)	383 (65.9)	

* Numbers may not sum to totals due to missing data, and column percentages may not sum to 100% due to rounding.
† P-value for analysis of variance F-test (continuous variable) or χ^2 test (categorical variable).

Table 2. Unadjusted associations between study variables and hospitalization

Characteristic	N*	n (%) Hospitalized	OR (95% CI)
Race/ethnicity			
White	1,794	295 (16.4)	1.00
Black or African American	252	85 (33.7)	2.59 (1.93, 3.45)
Hispanic	71	16 (22.5)	1.48 (0.81, 2.55)
Other	53	12 (22.6)	1.49 (0.74, 2.78)
Age (years)			
<70	448	111 (24.8)	1.00
71-80	546	113 (20.7)	0.79 (0.59, 1.07)
81-90	724	141 (19.5)	0.73 (0.55, 0.98)
>90	526	47 (8.93)	0.30 (0.21, 0.43)
Sex			
Female	1469	224 (15.2)	1.00
Male	775	188 (24.3)	1.78 (1.43, 2.21)

* Numbers may not sum to total due to missing data.

Table 3. Multivariable logistic regression model of factors associated with hospitalization (N=2,244)

Characteristic	Adjusted OR (95% CI)	p
Race/ethnicity		
White	1.00	---
Black or African American	2.32 (1.72, 3.11)	<0.001
Hispanic	1.18 (0.64, 2.06)	0.584
Other	1.27 (0.63, 2.41)	0.479
Age	0.98 (0.97, 0.99)	<0.001
Sex		
Female	1.00	---
Male	1.59 (1.27, 2.00)	<0.001

Table 4. Unadjusted associations between study variables and mortality

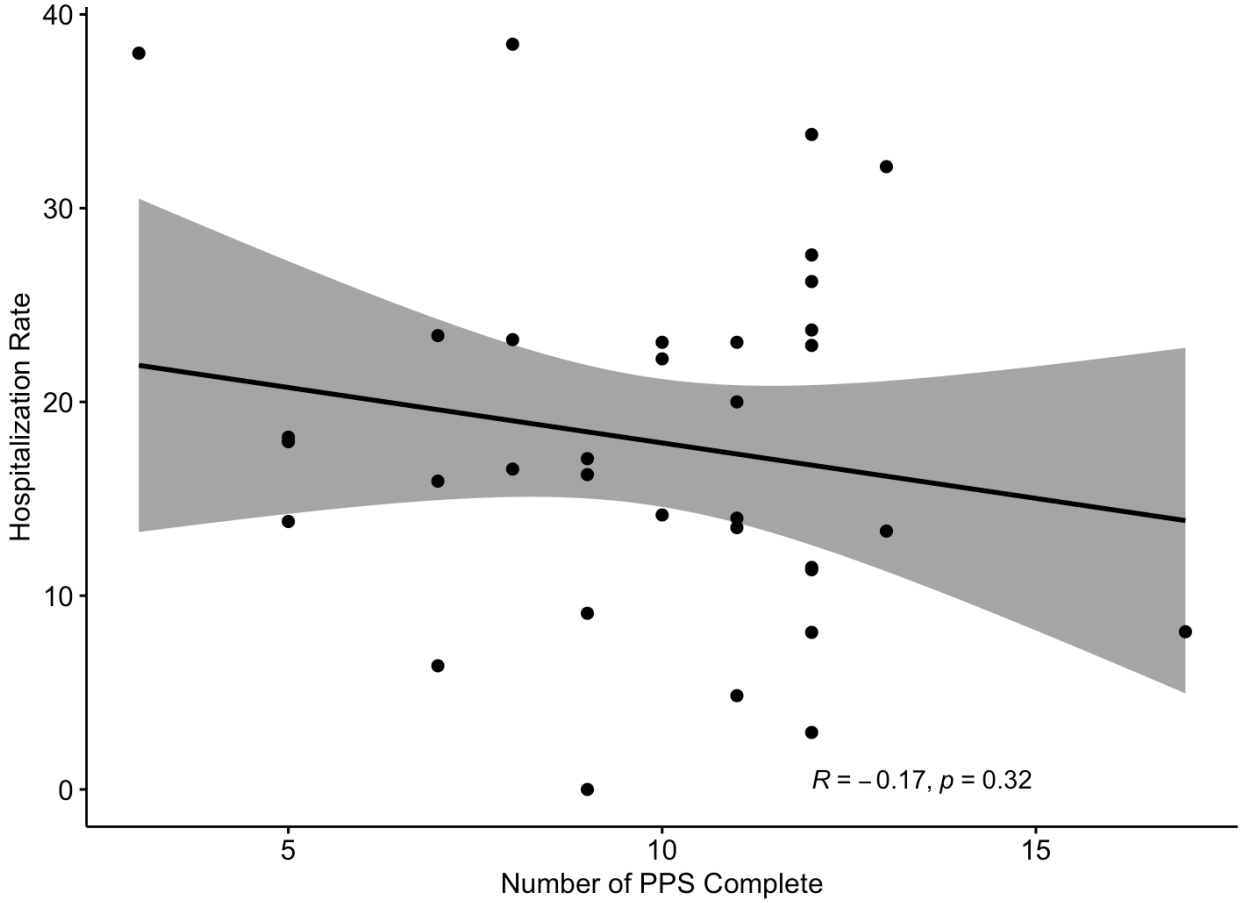
Characteristic	N*	n (%) Deceased	OR (95% CI)
Race/ethnicity			
White	1,794	480 (26.8)	1.00
Black or African American	252	71 (28.2)	1.07 (0.796, 1.43)
Hispanic	71	12 (16.9)	0.56 (0.28, 1.01)
Other	53	11 (20.8)	1.72 (0.35, 1.35)
Age (years)			
<70	448	58 (12.9)	1.00
71-80	546	120 (22.0)	1.89 (1.35, 2.68)
81-90	724	212 (29.3)	2.78 (2.04, 3.86)
>90	526	191 (36.3)	3.83 (2.78, 5.36)
Sex			
Female	1469	363 (24.7)	1.00
Male	775	218 (28.1)	1.19 (0.98, 1.45)
Hospitalized			
No	1,832	383 (20.9)	1.00
Yes	412	198 (48.1)	3.5 (2.80, 4.38)

* Numbers may not sum to total due to missing data.

Table 5. Multivariable logistic regression model of factors associated with mortality (N=2,244)

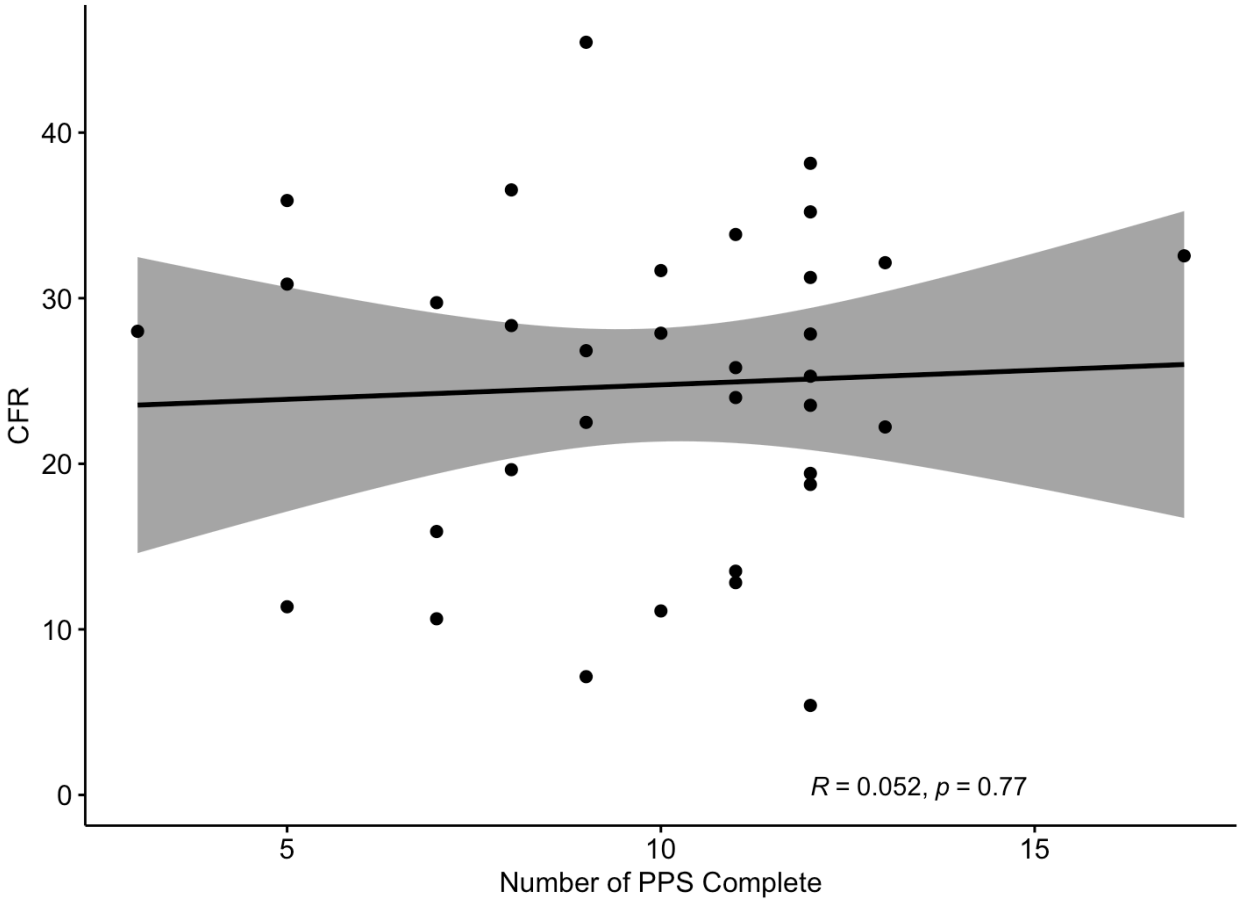
Characteristic	Adjusted OR (95% CI)	P
Race/ethnicity		
White	1.00	---
Black or African American	1.04 (0.75, 1.43)	0.797
Hispanic	0.62 (0.30, 1.15)	0.151
Other	0.77 (0.35, 1.51)	0.452
Age	1.06 (1.05, 1.07)	<0.001
Hospitalized		
No	1.00	---
Yes	4.59 (3.59, 5.90)	<0.001
Sex		
Female	1.00	---
Male	1.44 (1.16, 1.80)	0.001

Figure One: Correlation of Facility Hospitalization Rate to Number of PPS Complete



*Shading represents 95% CI

Figure 2: Correlation of Facility Case Fatality Ratio to Number of PPS Complete



*Shading represents 95% CI