




RESEARCH LETTER

Assessing healthcare outcomes among patients with dementia requiring hospitalization for COVID-19: An observational study

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INTRODUCTION

Dementia is common in older adults, and persons with dementia (PWD) have 2 times higher incidence and 2–5 times higher risk of death from COVID-19 compared to older adults without dementia.^{1–3} Given the established disease burden associated with COVID-19 in PWD, there is an urgent need to better understand other key outcomes, like cognitive and physical debility following severe COVID-19, to inform strategies that enhance management and recovery from COVID-19 in PWD. The current study compared acute delirium incidence, length of hospital stay, and weight loss outcomes between PWD and older adults without dementia who were hospitalized with COVID-19. We hypothesized that PWD have higher rates of poor outcomes during and after COVID-19 hospitalization.

METHODS

We conducted a retrospective cohort study of adults aged ≥65 years who were hospitalized with COVID-19 between March 2020 and June 2021 at 17 Atrium Health hospitals in North Carolina. We analyzed electronic medical record (EMR) data to assess the association between prevalent dementia (defined by ICD-10 diagnosis codes) and hospitalization outcomes. This study was approved by the Atrium Health Institutional Review Board.

PWD were propensity-score matched 1:2 with a caliper distance of 0.2 to older adults without dementia; propensity scores were calculated using a logistic regression model that included age, gender, race/ethnicity, baseline comorbidities, oxygen saturation level at admission, and area-level socioeconomic status. The primary outcome was acute delirium diagnosed during hospitalization for COVID-19 (defined by ICD-10 diagnosis codes for delirium [R41.0], encephalopathy [G93.4] or altered mental status [R41.82]). Two secondary outcomes were (1) length of hospital stay (LOS) and (2) percentage weight change between 6-months pre- and post-hospitalization for

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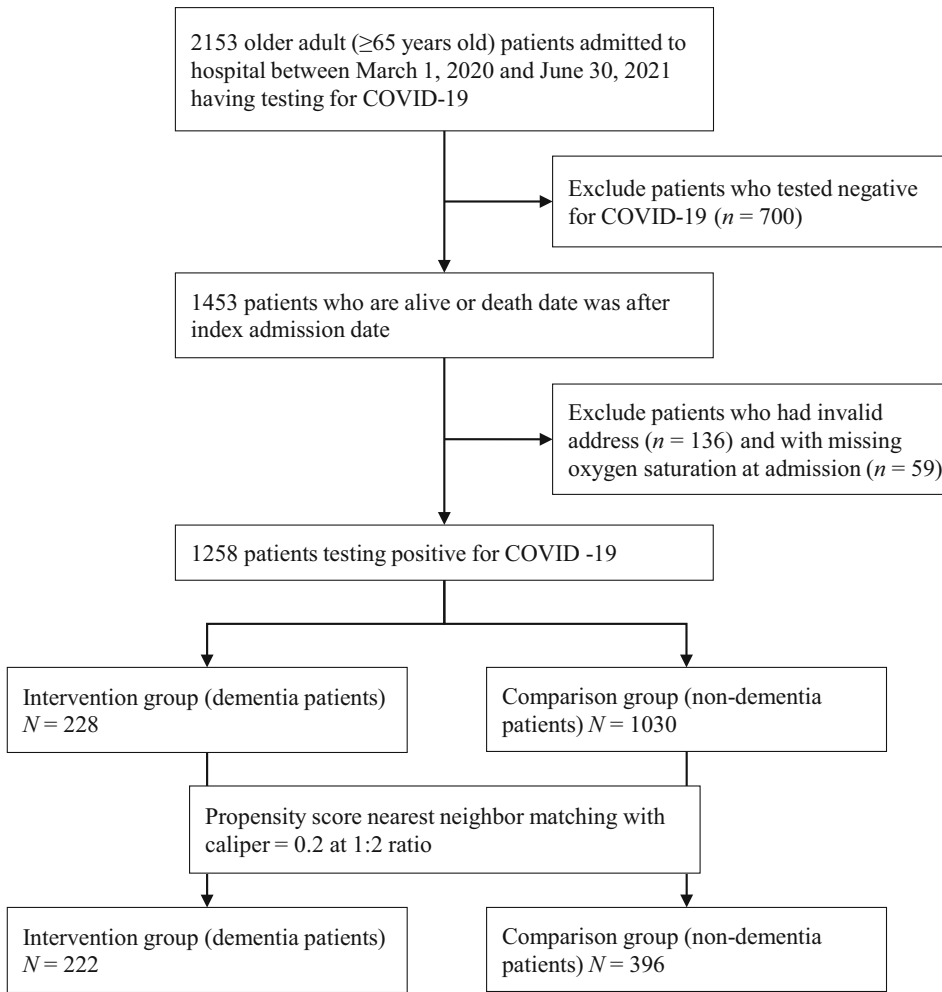
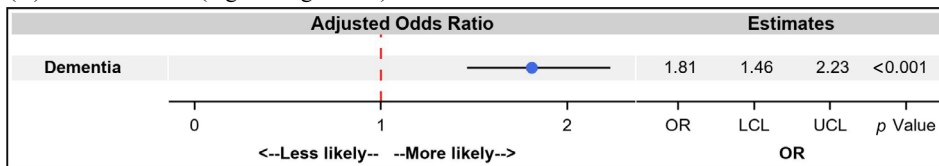
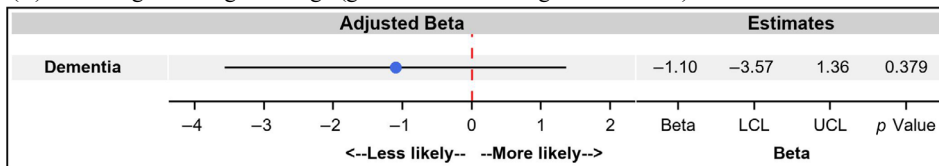


FIGURE 1 Patient selection flowchart

(A) Acute Delirium (logistic regression)



(B) Percentage of Weight Change (generalized linear regression model)



(C) Length of Stay (quantile regression model)

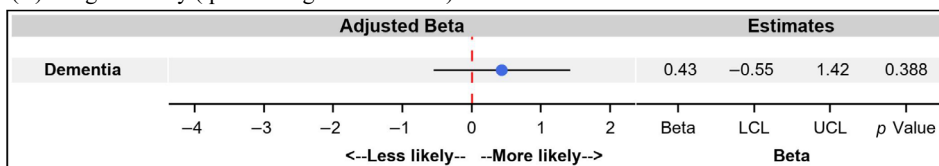


FIGURE 2 Association between dementia and delirium, percentage of weight change, and length of stay among hospitalized patients with COVID-19. Adjusted effect estimates are depicted. The (royal blue color) circle represents the point estimate obtained from the multivariable regression models, signifying the estimated association between dementia status and the individual outcomes of interest. The (black color) horizontal line indicates the upper and lower bounds of the 95% confidence interval around the point estimate. The (red color) dashed vertical line indicates the line of null effect.

COVID-19. Logistic regression was used to estimate the odds of acute delirium in PWD versus other older adults; generalized linear models and quantile regression were

used to evaluate differences in weight change and LOS between the two groups. Analyses were conducted using SAS Version 9.4 (SAS Institute, Cary, NC).

RESULTS

Among 618 patients in the matched cohort (Figure 1 and Table S1), 73 of 222 PWD (32.9%) and 57 of 396 other older adults (14.4%) had acute delirium (adjusted OR = 1.8, 95% CI = 1.46–2.23; Figure 2 and Table S2). Other factors independently associated with acute delirium included ICU admission during hospitalization (OR = 1.42, 95% CI = 1.02–1.97) and primary care utilization in the year before hospitalization (OR = 0.91, 95% CI = 0.84–0.98). Overall, median LOS was 5.6 days, and did not differ significantly between PWD and other older adults ($\beta = 0.43$, 95% CI = -0.55 to 1.42). LOS was longer for patients who experienced acute delirium compared to those who did not ($\beta = 2.2$, 95% CI = 0.77–3.64). Among 318 patients with pre- and post-hospitalization weights documented, 89 (28.0%) had $\geq 5\%$ weight loss from baseline to 6-months post-hospitalization. Mean weight loss was similar between PWD (-2.0%) and other older adults (-1.7% ; adjusted weight loss difference: $\beta = -1.10$, 95% CI = -3.57 to 1.36).

DISCUSSION

In this retrospective matched cohort study, we found that dementia status was associated with increased odds of acute delirium during COVID-19 hospitalization—extending existing evidence for dementia as an established risk factor for developing delirium.⁴ Previous studies have also shown delirium is associated with other poor outcomes, including functional and cognitive decline.^{5–8} Thus, our findings emphasize the importance of monitoring and timely management of acute delirium among older hospitalized adults, especially patients with increased susceptibility like PWD. Additionally, the observed association between increased prior primary care use and reduced acute delirium highlights the potential of routine outpatient management to help mitigate acute cognitive problems.

Contrary to our hypothesis, we did not observe statistically significant differences in LOS or weight loss between PWD and other older adults. However, clinically significant weight loss was common overall, similar to prior research in COVID-19 hospital survivors, and merits attention in the context of this already frail, vulnerable PWD population.^{9,10} Weight loss is an important physiologic marker for dementia risk and worsening dementia status that warrants additional evaluation among PWD. Integration of dietary education and structured malnutrition screening into multidimensional PWD care has shown promise and should be considered within the context of post-COVID monitoring.

Study limitations include unclear generalizability of findings to other health systems and geographic settings, inherent inability to establish causal relationships, and common challenges to leveraging EMR data, such as misdiagnosis or coding errors. Nonetheless, our study addresses a fundamental gap in evidence regarding COVID-19 outcomes for PWD. Our findings align with current clinical and epidemiologic understanding of dementia, COVID-19, and hospital outcomes and provide practical data to guide COVID-19-related hospital and recovery care for older adults with dementia. Further research is needed to develop and test strategies to address the recovery needs and improve outcomes and support for this vulnerable group.

AUTHOR CONTRIBUTIONS

Study concept and design: Tsai-Ling Liu and Yhenneko J. Taylor. *Acquisition of subjects and/or data:* Bella Gutnik. *Analysis and interpretation of data:* Tsai-Ling Liu and Marc Kowalkowski. *Preparation of manuscript:* All authors.

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CONFLICT OF INTEREST

All authors received no support from any organization for the submitted work, have no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years, and have no other relationships or activities that could appear to have influenced the submitted work.

SPONSOR'S ROLE

Sponsors had no role in the design, methods, subject recruitment, data collections, analysis, or preparation of the paper.

FINANCIAL DISCLOSURE

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

Table S1. Demographics of patients hospitalized due to COVID-19 before and after matching

Table S2. Association between dementia and delirium, percentage of weight change, and length of stay among hospitalized patients with COVID-19

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