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Benzodiazepine and Antipsychotic Use Among Hospitalized Older Adults Before Versus After Restricting Visitation: March to May 2020

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Abstract

Background: Hospital visitation restrictions during the COVID-19 pandemic prompted concerns about unintended consequences for older patients, including an increased incidence of delirium and agitation. While first-line interventions for these conditions are non-pharmacologic, a lack

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Conflict of Interest:

The authors have no conflicts.

of family support could result in increased use of benzodiazepines and antipsychotics, which are associated with poor outcomes in older adults. Little is known about the association of visitation policies with use of these medications among older adults.

Methods: We conducted a retrospective cross-sectional study among adults age ≥65 hospitalized from March 1 through May 31, 2020 at four hospitals in the Mid-Atlantic. The dates of onset of visitation restrictions (i.e., hospital-wide guidelines barring visitors) were collected from hospital administrators. Outcomes were use of benzodiazepines and antipsychotics, assessed using patient-level electronic health record data. Using multivariable logistic regression with hospital and study-day fixed effects, the quasi-experimental study design leveraged the staggered onset of visitation restrictions across the hospitals to measure the odds of receiving each medication when visitors were vs were not allowed.

Results: Among 2,931 patients, mean age was 76.6 years (SD, 8.3), 51.6% were female, 58.6% white, 32.5% Black, and 2.6% Hispanic. Overall, 924 (31.5%) patients received a benzodiazepine and 298 (10.2%) an antipsychotic. The adjusted odds of benzodiazepine use was lower on days when visitors were vs were not allowed (adjusted odds ratio [AOR], 0.62; 95% CI, 0.39, 0.99). Antipsychotic use did not significantly differ between days when visitors were vs were not allowed (AOR, 0.98; 95% CI, 0.43, 2.21).

Conclusions: Among older patients hospitalized during the first wave of the pandemic, benzodiazepine use was lower on days when visitors were allowed. These findings suggest that the presence of caregivers impacts use of potentially inappropriate medications among hospitalized older adults, supporting efforts to recognize caregivers as essential members of the care team.

Keywords

Potentially inappropriate medications; visitation restrictions; acute care hospitals; older adults

INTRODUCTION

To limit the spread of coronavirus during the COVID-19 pandemic, acute care hospitals rapidly adopted visitation restrictions for hospitalized patients.[1,2] These restrictions prompted concerns about unintended consequences for patients, especially older adults.[3,4] For older adults, isolation from family members and caregivers while hospitalized may lead to increased incidence of delirium, agitation, and anxiety.[4,5] First-line interventions for these conditions are non-pharmacologic, such as having a family member or caregiver present at the bedside who can help improve orientation and reduce agitation.[6–8] A lack of family support may increase the use of medications to control these symptoms,[9] such as benzodiazepines and antipsychotics.[10] It is unknown whether visitation restrictions among hospitalized older adults are associated with use of these medications.[11]

Studies conducted in other care settings show that prescribing of psychotropic medications increased during the pandemic. Among Ontario nursing home residents, prescribing of antipsychotics and antidepressants increased.[12] In England, the proportion of patients with dementia who were prescribed antipsychotics increased.[13] However, these studies were not designed to examine the impacts of visitation restrictions on medication use. As the pandemic continues to affect hospital visitation policies, understanding this association is

important to inform policies and interventions to limit use of potentially inappropriate medications among hospitalized older adults.

METHODS

Design overview

We conducted a retrospective cross-sectional study of patients ages 65 and older hospitalized between March 1 and May 31, 2020, at four acute care hospitals affiliated with a large health system in the Mid-Atlantic. Three hospitals were urban and one was suburban. The hospitals were in close geographic proximity with similar community COVID transmission rates. We extracted patients' electronic health records (EHRs), including demographics, diagnoses, hospital admission and discharge dates, and medication administration records. We examined the association of visitation policies at each hospital with use of benzodiazepines and antipsychotics. The Institutional Review Board of the University of Pennsylvania reviewed and approved the study protocol with a waiver of informed consent.

Setting and participants

We included all patients aged 65 and older who were hospitalized during the study period in any of the four hospitals. Because criteria for use of benzodiazepines and antipsychotics differ for patients in the intensive care unit (ICU) and at the end of life, we excluded patients who were admitted to the ICU and those who died during the hospital stay. We excluded medication orders that were prescribed but not given (e.g., cancelled orders).

Measures

Outcomes—The co-primary outcomes were the use of two classes of potentially inappropriate medications, benzodiazepines and antipsychotics. Benzodiazepines and antipsychotics are FDA-approved for the treatment of certain psychiatric conditions,[14,15] but are often used off-label among older adults to treat delirium, agitation, anxiety, and behavioral symptoms associated with dementia.[16,17] We defined "potentially inappropriate medications" using the American Geriatrics Society (AGS) 2019 Updated Beers Criteria (i.e., medications that should typically be avoided in older adults because the risk of harms outweighs the potential benefits).[9]

Time of medication administration was measured for each 24-hour patient-day of the hospital stay. Each outcome was a dichotomous indicator set to "1" if the patient received any doses of the medication during the 24-hour period and "0" if they did not receive any doses.

Exposure—The primary exposure was the presence of visitation restrictions on each hospital-day, defined as official hospital-wide guidelines that barred visitors to hospitalized patients. Visitation restrictions were implemented on different dates at the four hospitals. Restrictions were similar across hospitals and specified that no visitors were allowed, except for one designated healthy visitor for patients with special needs (defined as patients with disabilities involving compromised communication, such as dementia or developmental delays, whose caregiver is essential to their care). Exceptions were granted via an

application process by patients' families to the hospital care team; applications were rare during the study period. We collected information on dates of visitation restrictions from e-mails and interviews with hospital administrators. We used these sources to create a timeline of policies for each hospital. We validated timelines by sending them to administrators for review and correction.

Other measures—Patient characteristics included self-reported age (categorized as 65–74 years, 75–84, ≥85), race (white, Black, Asian, or other), ethnicity (Hispanic, non-Hispanic, unknown), gender, and comorbid conditions, measured using the Charlson Comorbidity Index based on hospital ICD-10 codes.[18,19] To increase the sensitivity of the Charlson measure for dementia, we included ICD-10 dementia diagnoses from HEDIS measures[20] and dementia-specific medications (i.e., donepezil, rivastigmine, galantamine, memantine).[21] Other variables included hospital length of stay, total medications administered each day, day, and hospital.

Statistical analysis

To compare the characteristics of patients who were hospitalized when visitors were versus were not allowed, we used χ^2 and Cochran-Mantel-Haenszel tests. To measure the association of visitation policy with use of each medication class, we estimated multivariable logistic regression models with an indicator for visitors allowed (yes/no) as the primary exposure and administration of a medication in each class as the outcome, at the level of the patient-day. To implement the staggered difference-in-difference design, models included hospital and study-day fixed effects. We adjusted analyses for age category, gender, race, ethnicity, Charlson comorbidities, total medications administered, and length of stay. Because the analysis was performed at the level of the patient-day and each patient could have multiple observations, we estimated cluster-robust standard errors at the patient level. All statistical testing was 2-tailed, with $p\text{-}value < 0.05$ considered statistically significant. We conducted analyses using Stata 17 (College Station, TX).

RESULTS

Participant characteristics

Among the 2,931 patients, mean age was 76.6 years (SD, 8.3), 51.6% were female, 58.6% were white, 32.5% Black, 2.1% Asian, and 6.8% other race, and 2.6% were Hispanic (Table 1). Five hundred twenty-four patients (17.9%) were hospitalized while visitors were allowed, 2206 (75.3%) while visitors were not allowed, and 201 (6.9%) while hospital policies changed from visitors allowed to not allowed.

The patients spent a total of 14,497 days hospitalized during the study period: 2,358 (16.3%) while visitors were allowed and 12,139 (83.7%) while visitors were not allowed (Table 2). A higher proportion of days when visitors were not allowed occurred among patients who were Black, Hispanic, had a Charlson Comorbidity Score of ≥3, received a higher mean number of medications, and had a longer length of stay.

Patterns of medication use

Overall, 924 patients received a benzodiazepine, of whom 164 (17.1%) were hospitalized while visitors were allowed, 672 (72.7%) while visitors were not allowed, and 88 (9.5%) while policies changed. Two hundred ninety-eight patients received an antipsychotic, of whom 35 (11.7%) were hospitalized while visitors were allowed, 241 (80.9%) while visitors were not allowed, and 22 (7.4%) while policies changed. One hundred eighteen patients (4.0%) received both medication classes; most received a benzodiazepine first (72 [61.0%]).

Association of visitation policies and other characteristics with medication use

The adjusted odds of benzodiazepine use was lower on days when visitors were allowed versus not allowed (AOR, 0.62, 95% CI, 0.39–0.99; Figure 1A). The adjusted odds of benzodiazepine use was lower among patients aged 75–84 and ≥85 versus those aged 65–74 (AOR 75–85 years, 0.74, 95% CI, 0.62–0.88; AOR ≥85 years, 0.70, 95% CI, 0.56–0.87) and patients who were Black versus white (AOR 0.55, 95% CI, 0.44–0.68). The adjusted odds of benzodiazepine use was higher among patients who were Hispanic (AOR, 1.64; 95% CI, 1.06–2.54) and received a higher number of medications (AOR 1.06; 95% CI, 1.05–1.07).

Antipsychotic use did not significantly differ between days when visitors were versus were not allowed (AOR 0.98; 95% CI 0.43, 2.21; Figure 1B). The adjusted odds of antipsychotic use was higher among men compared to women (AOR 1.38; 95% CI, 1.00–1.88). The adjusted odds of antipsychotic use was higher among patients with a higher number of medications (AOR, 1.04; 95% CI, 1.03–1.05) and a longer length of stay (AOR, 1.03; 95% CI, 1.01–1.05).

DISCUSSION

In this study of older adults hospitalized during the first wave of the COVID pandemic, allowing visitors was associated with lower odds of benzodiazepine and antipsychotic use, though only the odds of benzodiazepine use was significantly lower. These findings support efforts to limit visitation restrictions for hospitalized older adults and to recognize caregivers as essential members of the care team.

The association of visitation restrictions with benzodiazepine use is consistent with prior studies showing that prescribing of psychotropic medications increased during the pandemic among patients in nursing homes.[12,13] While prior studies did not examine visitation policies, restrictions were prevalent in nursing homes during the pandemic. The mechanism through which visitation restrictions may be associated with benzodiazepine use is unclear. A lack of caregiver support may lead to increased incidence of delirium, agitation, or anxiety,[22] which in turn leads to increased benzodiazepine use. Unfortunately, delirium is not well-documented in EHRs and we were unable to measure delirium in our dataset.

We did not observe significantly lower odds of antipsychotic use associated with visitation. Several factors may explain this finding. First, due to incomplete historical medication reconciliation data at hospital admission, we were unable to distinguish between medications prescribed before versus during hospitalization. It is possible that benzodiazepines were more often prescribed “as-needed” in the hospital and thus for

their use to be sensitive to the presence of visitors, while antipsychotics were more often prescribed “standing” before admission. In additional analyses, we found that lorazepam and haloperidol were the most-used medications in each class. These are commonly prescribed as-needed, not long-term. However, quetiapine and olanzapine, which are commonly used long-term, comprised more than half of antipsychotic patient-days. Second, antipsychotics were used less frequently in our sample than benzodiazepines. Because our analytic approach was designed around visitation policies that changed over several days, infrequent antipsychotic use may have exacerbated the small-sample bias.

The role of caregivers for improving orientation and reducing agitation is a key component of evidence-based, multi-component interventions to reduce delirium among hospitalized older adults.[6,23,24] Our findings suggest that the presence of caregivers also impacts quality of medication prescribing. The Caregiver Advise, Record, Enable (CARE) Act has been adopted by most states and requires some hospitals to involve caregivers in discharge planning, providing a platform to better integrate caregivers into care teams.[25] Our findings emphasize the importance of the caregivers’ role throughout hospitalization, not just at discharge. Our findings also suggest that patients without caregivers should be recognized as a higher-risk group.

This study has several limitations. First, the observational design precludes conclusions about causality. Our quasi-experimental study design leveraged the differing onset of visitation restrictions at each hospital to measure change in medication use over time and relative to other hospitals. While change in medication use is potentially attributable to visitation restrictions, other events that occurred simultaneously may confound our findings. Second, we did not distinguish between medications used before hospitalization versus started during hospitalization. Nevertheless, benzodiazepines are not first-line agents for managing chronic conditions among older adults. Third, we were unable to identify medication use for procedural sedation. We excluded patients admitted to the ICU, who likely required sedation while intubated. Fourth, data were collected during spring 2020, when visitation restrictions were stringent and caregivers may have been less likely to advocate for visitation due to fears of COVID transmission; while our dataset did not include information on which patients received exemptions to visitation restrictions, exceptions were rarely requested during the study period. Since then, many hospitals have loosened visitation restrictions. These considerations limit the generalizability of our findings over time and to other settings.

Among older patients hospitalized during the first wave of the pandemic, benzodiazepine use was lower on days when visitors were allowed. This finding is consistent with the hypothesis that the presence of visitors improves orientation and reduces agitation among older adults, leading to reduced use of potentially inappropriate psychotropic medications.[8] These medications are not only associated with adverse inpatient outcomes, but frequently lead to problems when continued after discharge.[26,27] Our findings underscore the importance of caregivers for ensuring quality care for older adults and support efforts to better integrate caregivers into care teams.

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Sponsor's Role:

The sponsors had no role in the design, methods, subject recruitment, data collections, analysis, or preparation of the manuscript. Dr. Brown is an employee of the Corporal Michael J. Crescenz VA Medical Center. The opinions expressed in this manuscript may not represent those of the Department of Veterans Affairs.

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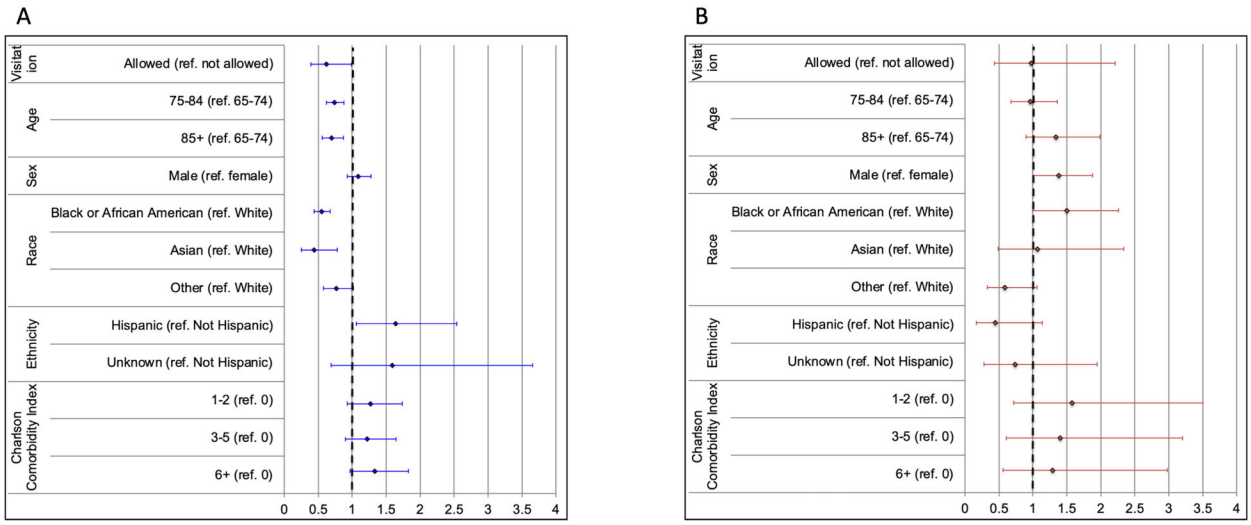
Key points:

1. Among older adults hospitalized during the first wave of the COVID-19 pandemic, the adjusted odds of benzodiazepine use was lower on days when visitors were versus were not allowed
2. Antipsychotic use did not significantly differ between days when visitors were versus were not allowed

Why does this matter?

These findings suggest that the presence of caregivers impacts use of psychoactive medication use among hospitalized older adults, supporting efforts to recognize caregivers as essential members of the care team



Odds of potentially inappropriate medication use by class calculated using logistic regression. Model adjusted for the above characteristics plus total medications per day, length of stay in days, and fixed effects for facility and day of study.

Figure 1. Association of Visitation Policies with Benzodiazepine and Antipsychotic Use per Patient-Day Among Hospitalized Older Adults

The figure shows the odds ratios and 95% confidence intervals for the association of visitation policies and other participant characteristics with benzodiazepine use (panel A) and antipsychotic use (panel B) per patient-day.

Table 1.

Baseline Characteristics of 2931 Hospitalized Older Adults

Characteristic	Participants, No. (%)[a] (N=2931)
Age range, years	
65–75	1428 (48.7)
75–84	964 (32.9)
>=85	539 (18.4)
Gender	
Male	1419 (48.4)
Female	1512 (51.6)
Race	
White	1717 (58.6)
Black or African American	953 (32.5)
Asian	62 (2.1)
Other race	199 (6.8)
Ethnicity	
Not Hispanic	2817 (96.1)
Hispanic	76 (2.6)
Unknown	38 (1.3)
Charlson Comorbidity Index	
0	334 (11.4)
1–2	929 (31.7)
3–5	958 (32.7)
6+	710 (24.2)

[a]Percentages may not sum to 100% due to rounding

Table 2.

Characteristics of Patient-Days in the Two Groups: Visitors Allowed vs. Visitors not Allowed (n=14,497 patient-days)

Characteristic[a]	Patient-days when visitors were allowed (n=2358)	Patient-days when visitors were not allowed (n=12139)	P-value
Patient Demographics, No. (%)			
Age range, years			
65–75	1075 (45.6%)	6163 (50.8%)	<.001
75–84	822 (34.9%)	3889 (32.0%)	
>=85	461 (19.6%)	2087 (17.2%)	
Gender			
Male	1238 (52.5%)	6213 (51.2%)	.24
Female	1120 (47.5%)	5926 (48.8%)	
Race			
White	1479 (62.7%)	6553 (54.0%)	<.001
Black or African American	661 (28.0%)	4616 (38.0%)	
Asian	44 (1.9%)	214 (1.8%)	
Other	174 (7.4%)	756 (6.2%)	
Ethnicity			
Not Hispanic	2285 (96.9%)	11673 (96.2%)	<.001
Hispanic	33 (1.4%)	331 (2.7%)	
Unknown	40 (1.7%)	135 (1.1%)	
Clinical Characteristics, No. (%)			
Charlson Comorbidity Index			
0	234 (9.9%)	963 (7.9%)	<.001
1–2	730 (31.0%)	3041 (25.1%)	
3–5	768 (32.6%)	4344 (35.8%)	
6+	626 (26.5%)	3791 (31.2%)	
Hospitalization characteristics			
Total medications, mean (SD)	9.3 (11.4)	7.5 (8.8)	<.001
Length of stay, mean (SD)	6.8 (5.8)	10.0 (9.1)	<.001

Abbreviations: SD, standard deviation.

[a]Percentages may not sum to 100% due to rounding.