Patterns of Medication Use Before and After Fall-Related Injury in US Nursing Homes According to Facility Racial Composition

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Abstract
Introduction: Fall related injuries (FRIs) are sentinel events for nursing home (NH) residents and serve as an opportune time for medication review. Few studies have examined racial disparities in medication use between facilities. The objective of this study was to identify whether there are disparities in prescribing patterns of medications in NH residents following a hospitalized FRI according to the racial composition of the facility.
Methods: This cohort study included all long-stay US NH residents, aged 65 years or older enrolled in Medicare fee-for-service with a hospitalized FRI between 1/1/2016 and12/31/2016. Residents were categorized as new users, discontinuers, or continued users according to medication dispensing before and after FRI. Results were stratified by the percentage of Black residents in the facility.
Results: 27,134 NH residents with a hospitalized FRI were included. Mean age was 83.9 years (SD=4.08) and 75.7% were women. Use of sedatives was common (6.0% new users, 14.7% discontinuers, 14.0% continued users). Discontinuation of sedatives after a FRI was more likely to occur in facilities with a high Black population (high vs low Black population: 15.4% versus 13.4%, p-value 0.0003). Overall use, especially new users, of osteoporosis medications was low with no statistically significant difference across facilities.
Conclusions: Despite the known association with falls, sedatives remain commonly prescribed in NH residents before and after a FRI, whereas osteoporosis medications are less commonly prescribed. Our findings suggest that NHs of all racial composition could benefit from models of care that optimize medication reviews in NH residents after FRIs.

Keywords: Fall-Related Injuries, Nursing Home, Racial Disparities, Medication, Deprescribing, Aging

Introduction

Fall related injuries (FRI), including fracture and hemorrhage, are the leading cause of emergency department visits and hospitalizations for nursing home (NH) residents.[1] These injuries result in disability, diminished quality of life, and increased risk of subsequent injury and death.[1] Medications may be the most common, modifiable risk factor for falls and injury in older NH residents.[2,3] Therefore, FRIs should be considered a sentinel event that triggers a medication review.

Medication reviews after a FRI should consider deprescribing (i.e., reducing the dose or stopping under clinical supervision) medications associated with falls and initiating osteoporosis treatment. Sedative medications are a good target for deprescribing as strong evidence links these medications with falls, and deprescribing psychotropic medications may be an effective strategy to prevent falls. At the same time, FRIs often result in short-term pain and anxiety, with psychotropic medications added during hospitalization. These new medications may be unintentionally continued after hospital discharge without documented indication.[4]In contrast, osteoporosis medications increase bone mineral density and may protect against injury in the setting of a fall. Yet these medications are seldom used in NH residents, even after an FRI hospitalization.[5,6 7]

NHs are highly segregated along racial lines, with resource-poor facilities tending to have larger racial minority populations and lower rates of appropriate healthcare utilization.[8,10] Research indicates racial disparities in medication prescribing among residents *within* NHs, however, few studies have examined racial disparities in medication use *between* facilities according to racial composition.[11,12] It is important to identify disparities in prescribing practices across NHs to target quality improvement interventions.

The objective of this study was to identify whether there are disparities in prescribing patterns of medications in NH residents following a hospitalized FRI according to the racial composition of the facility. We hypothesized that in facilities with a high Black population there will be greater use of sedative medications and less use of osteoporosis medications after a FRI.

Methods

Data Source and Study Design

This was a retrospective cohort study of NH residents with a hospitalized FRI in 2016. Data were ascertained from Medicare fee-for-service claims (MedPAR, Carrier file, and Part D) linked with the Minimum Data Set (MDS). The MDS is a comprehensive, federally mandated resident assessment instrument that is completed on all US NH residents at admission and quarterly thereafter.[13] The Residential History File was used to provide a daily account of the location where the resident received health services.[14] This research was approved by the Institutional Review Board of Hebrew SeniorLife.

Study Population

The source population began with 2,795,409 Medicare beneficiaries aged 65 years or greater who received care in a NH for one or more days in 2016. We restricted the population to persons with a claim for a hospitalized FRI that occurred between 1/1/2016 and12/31/2016

and after their first NH admission. Among those injuries, we selected the first FRI for each participant as an initial sentinel event appropriate for medication review. Repeat FRIs were excluded. We next restricted to residents who were long-stay residents, defined as persons who spent at least 90 of 100 days in the same facility before the FRI admission date. Residents with a claim for hospice in the 90 days before the FRI, residents without Part D during the study period, and residents without one or more Part D dispensing in the 100 days before FRI were excluded. The final sample included 27,314 residents who had available MDS data regarding the racial composition of their facility (Figure 1). Residents were followed starting from the date of the hospitalized FRI discharge or for patients who received SNF care following hospitalization, from the date of SNF discharge.

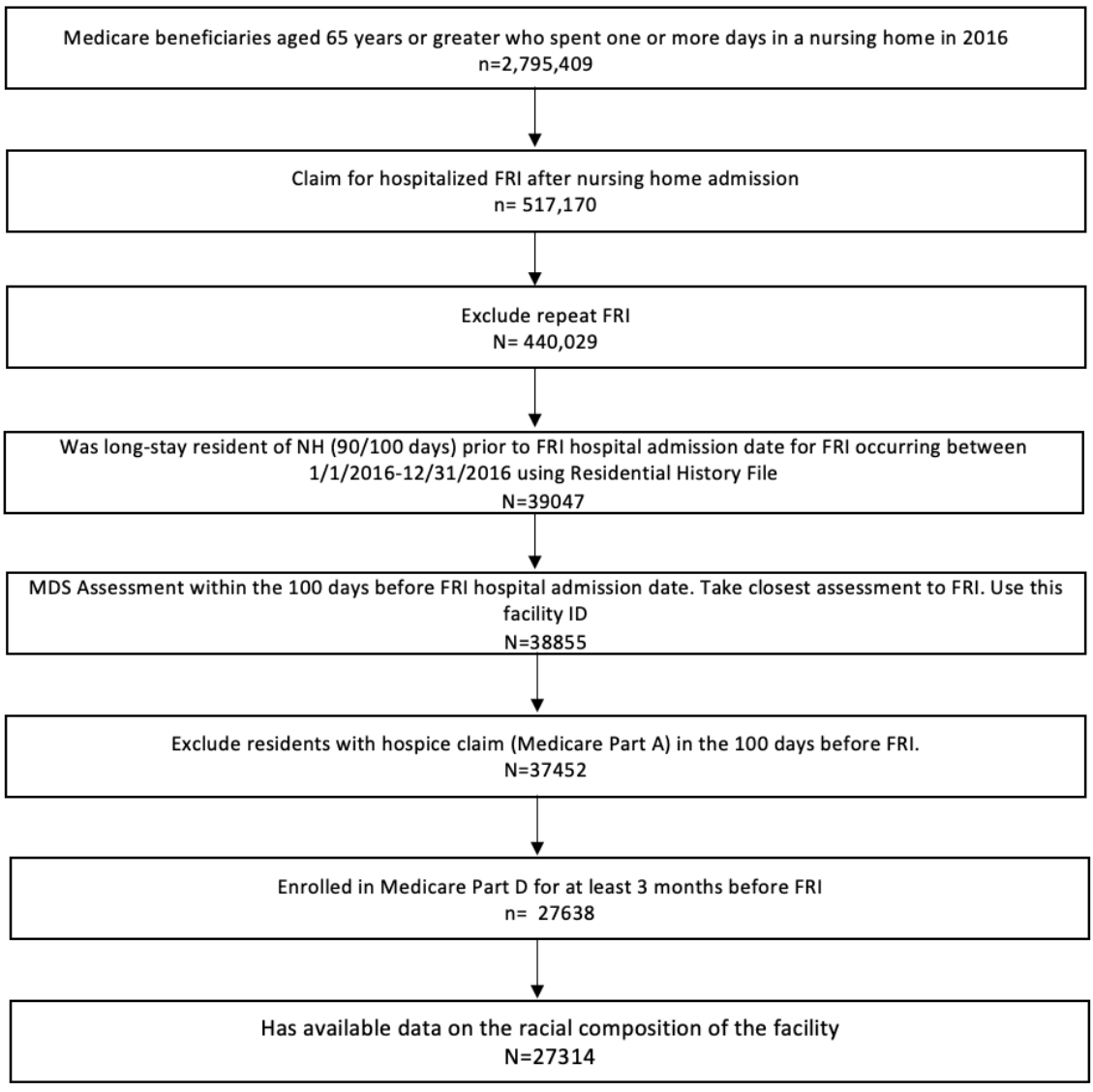

Figure 1: Study Population selection

Fall Related Injuries

FRIs, defined as a hospitalized fracture, dislocation, intracranial hemorrhage, concussion, or other hemorrhages, were identified using an established algorithm that relies upon Medicare claims.[15]

Prescriptions

Dispensing of individual medications associated with FRIs were ascertained using Part D prescription medication claims in the 100 days before and 100 days after hospital (or SNF) discharge. This length of medication use was intended to exclude new medications that might not be considered in a post-FRI medication review. Sedatives included benzodiazepine and non-benzodiazepine sedatives, whereas osteoporosis treatment included oral bisphosphonates. A list of medications included in these classes is in Supplement 1.

Among residents with a dispensing of a sedative or osteoporosis medication before FRI, we categorized residents as continued users and discontinuers. Continued users had a medication claim in 100 days before the FRI and in the 100 days after discharge. Discontinuers had a claim in 100 days before the FRI but not in 100 days after discharge. Among residents with post-FRI medication use, we categorized new users as anyone with a claim in the 100 days after discharge, but not in the 100 days before the FRI.

Facility Characteristics

Using the MDS Race/Ethnicity variable (A1000) from a valid MDS assessment (admission or quarterly assessment), we calculated the percentage of Black residents in each facility during the study period. Percentage of Black residents was chosen to represent facility racial composition as the percentage of other racial minority groups was very low in all NHs.

Using tertiles, we classified facilities as having a as low (zero to 1.5%), medium (1.6%-10.5%), or high (≥ 10.5%) percentage of Black residents.

Statistical Analysis

Chi-square tests were used to compare percentage of sedative discontinuation in facilities with a low Black population versus facilities with medium or high Black populations. Percentage of new osteoporosis medication users was also compared according to racial composition of the facility.

Results

27,134 NH residents with a hospitalized FRI were included. Mean age was 83.9 years and 75.7% were women. The racial composition of the cohort was 84.8% White, 6.6% Black, 1.4% Asian, and 7.2% other race. Approximately half of residents (49.3%) were moderately or severely cognitively impaired. The mean 28-point ADL score was 14.8 (±SD 6.3). Psychiatric comorbidities were common: anxiety disorder was documented for a third (35.6%) of residents and depression for over half (55.7%).

Overall, 34.7% of residents were prescribed sedatives (6.0% new users, 14.7% discontinuers, and 14.0% continued users) (figure 2). Sedative use before an FRI was more common in facilities with a high Black population as compared with a low Black population (30.0% vs 26.8%). Discontinuation of sedatives after a FRI was more likely to occur in facilities with a high Black population (high vs low Black population: 15.4% versus 13.4%, p-value 0.0003) and medium Black population (medium vs. low Black population 15.1% versus 13.4% p-value 0.0017). The number of discontinuers (14.7%) was higher than new users (6.0%) across the strata of racial composition of facilities.

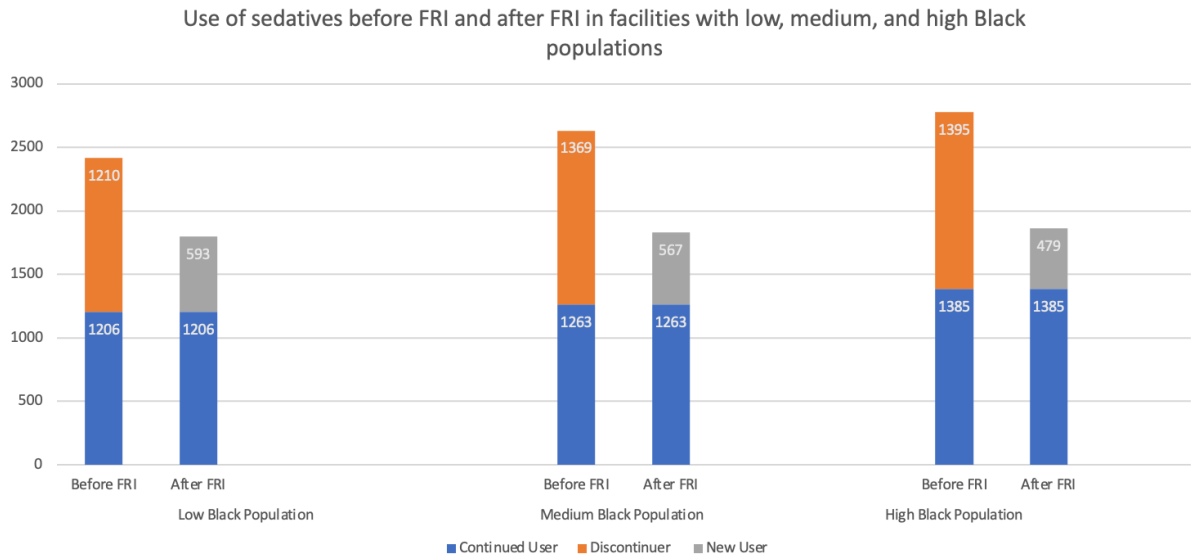

Figure 2: Use of sedatives before FRI and after FRI in facilities with low, medium, and high Black populations

Overall use of osteoporosis medications was low with little variation according to facility racial composition (figure 3). Discontinuation of a sedative or osteoporosis prescription occurred more frequently than a new sedative or osteoporosis prescription across facilities with low, medium, and high Black residents. New users of osteoporosis medications after a FRI were similar across facilities regardless of racial composition (0.9% in low Black population facilities versus 1.0% in high Black population facilities, p-value 0.28).

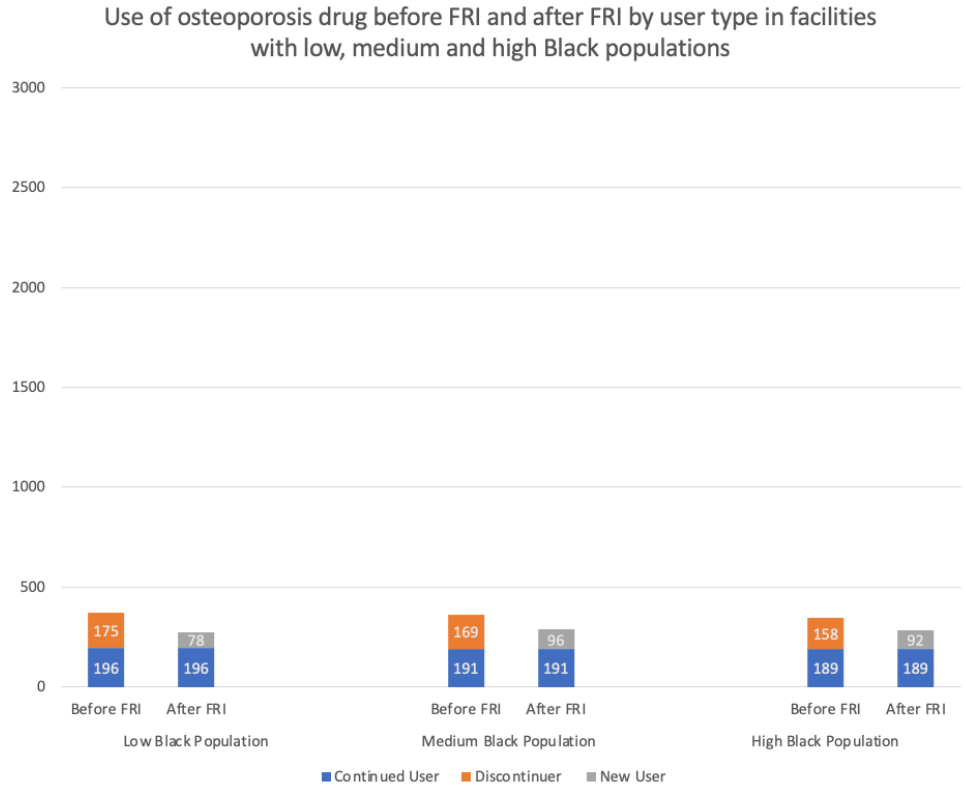

Figure 3: Use of osteoporosis medication before FRI and after FRI by user type in facilities with low, medium and high Black populations

Discussion and Conclusion

FRIs are sentinel events that serve as an opportune time for medication review. We found that sedative use was common, whereas osteoporosis medications were seldom prescribed in US NH before and after an FRI. For both sedatives and osteoporosis medication users, NH residents were more likely to discontinue the medication after an FRI than start as new users, regardless of the racial composition of the facility. Overall sedative use was greater in facilities with a large Black population, and so discontinuation of sedatives after a FRI was more likely to occur in facilities with a medium or high Black population compared to facilities with a low Black population.

Racial and ethnic disparities in NH care are widely described, existing both within facilities (between racial/ethnic groups) and between facilities.[10] Within facility racial and ethnic disparities in care can be grounded in bias of NH providers and staff.[10] Studies examining disparities *within facilities* found that Black residents are less likely to receive newer, first-line psychotropic medications as compared with White residents.[11,12] Additionally, Black NH residents are less likely to receive warfarin after a stroke or osteoporosis medications after fracture than White residents of the same NH.[16,17] Less research exists exploring whether facility racial composition impacts disparities in prescribing practices between facilities. Vaccination rates are lower in facilities with higher racial minority populations, suggesting less optimal healthcare utilization in such low-resourced facilities.[18] Vaccinations require less resources to administer as compared with medication review. A series of case studies of tribal NHs with primarily racial minority residents revealed nearly three fourths of residents were identified as having suboptimal prescribing patterns.[19] A previous study comparing antipsychotic use as a chemical restraint found no difference in inappropriate antipsychotic use in facilities according to racial composition, the results instead showing differences in facilities according to resources with Medicaid-reliant NHs having a higher use of antipsychotic medications. It is key when studying disparities in NHs to consider whether bias is driven by practices *within facilities* because of race or *between facilities* due to limited resources.[20]

Evidence suggests that medications associated with falls and injury are seldom deprescribed in older community-dwelling adults after a fragility fracture, and osteoporosis medications are seldom initiated after an injury due to barriers to conducting effective medication reviews in NHs.[3,11] In our study sedative discontinuation was more likely to occur in facilities with a high Black population, likely because sedative use was higher in facilities with a high Black population. The high sedative use may suggest that facilities with larger Black populations have less ability to use non-pharmacological interventions to improve sleep or control the behavioral and psychological symptoms of dementia. The higher sedative discontinuation in NHs with high Black population should be considered in conjunction with the low rates of new users of osteoporosis medications across all facilities after a FRI. If sedative discontinuation is thought to be a result of effective medication review, then it would be expected to see more new users of osteoporosis medications in NHs with high Black population. These incongruous findings suggest sedative discontinuation may be the consequence of unintentional prescribing changes rather than intentional, evidence-based practices. Previous studies have found that one of the only predictors of whether a NH is treated for osteoporosis is whether the resident was taking the medication at admission.[17] Our results concord with these findings and suggest that the majority of NHs with hospitalized FRI return to their facility without medication changes.

Despite pharmacy reviews being mandated in all NHs, there are a number of barriers to conducting effective medication reviews in this setting. First, care is fragmented and siloed across hospitals, NHs, and other care settings leading to uncertainty as to which provider should make medication changes.[21] Second, staff turnover in NHs is high such that it is challenging for the frontline staff to recognize and communicate clinical changes to the prescribing providers.[22] Third, the consultant pharmacists who conduct medication reviews typically work remotely.[23] While the intent of these reviews is to reduce adverse effects from medications, experience suggests that these reviews seldom result in deprescribing or new osteoporosis medication prescribing because the pharmacists do not interact with front-line staff, patients, or proxies. Finally, physician presence is limited in NHs with many providers feeling as though they only have time to manage acute medical problems that is communicated by frontline nursing staff, rather than preventative care such as deprescribing or osteoporosis treatment.[23] Novel models of care that support interprofessional collaboration and patient/proxy engagement are needed to enact meaningful medication reviews across all NHs.

Our study has limitations. The MDS Race/Ethnicity variable is not specifically an indicator of Black race. This study examines potential disparities between facilities. We cannot examine potential disparities within facilities with high Black populations as there were too few events within individual facilities. We cannot separate purposeful deprescribing from discontinuation, nor are we able to determine whether the rates of prescribing represent clinically appropriate or optimal use. Results were similar for a class of medications that is associated with harms and a class of medications associated with benefits, suggesting that there are opportunities to improve post-FRI medication reviews.

In conclusion, despite the known harms associated with sedatives, these medications remain commonly prescribed in NH residents before and after an FRI, whereas osteoporosis medications are seldom prescribed. Our findings suggest that most NHs could benefit from models of care that optimize medication reviews in NH residents after FRIs.

Supplement

The following short and long-acting benzodiazepine sedatives were included in this study: Alprazolam, amitriptyline, chlordiazepoxide, chlordiazepoxide, chlordiazepoxide-clidinium, chlordiazepoxide-hydrochloride, clonazepam, clorazepate, estazolam, flurazepam, lorazepam, oxazepam, temazepam, and triazolam. Non-benzodiazepine sedative hypnotics included Eszopiclone, suvorexant, zaleplon, and zolpidem. Osteoporosis medications included the following oral bisphosphonates: Alendronate, Alendronate-cholecalciferol, Denosumab, Ibandronate, Pamidronate, and Risedronate.

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