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Antiepileptic Prescribing to Persons Living with Dementia Residing in Nursing Homes: A Tale of Two Indications

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Abstract

Background: Antiepileptics are commonly prescribed to nursing home residents with Alzheimer's disease and related dementias (ADRD) but there is little scientific support for their use in this population. It is unclear whether different antiepileptics are targeting different indications.

Methods: Using the Minimum Data Set and Medicare data, including Part D pharmacy claims, we constructed annual cohorts of residents with ADRD with long-term stays in nursing homes from 2015 to 2019. For each year, we measured the proportion of residents with ADRD in nursing homes nationwide with at least one antiepileptic prescription. We also measured trends in valproic acid, gabapentin, antipsychotic, and opioid prescribing. Finally, we examined how prescribing rates differed based on whether residents with ADRD had disruptive behaviors or reported pain.

Results: Our study sample includes 973,074 persons living with ADRD who had a long-term stay in a nursing home, which was defined as at least three months. The proportion of residents with ADRD with at least one antiepileptic prescription increased from 29.5% in 2015 to 31.3% in 2019, which was driven by increases in the rate of valproic acid and gabapentin prescribing. Conversely, antipsychotic prescribing rates declined from 32.1% to 27.9% and opioid prescribing rates declined from 39.8% to 31.7%. The risk of valproic acid prescribing was 10.9 percentage points higher among residents with ADRD with disruptive behaviors, while the risk of being prescribed gabapentin was 13.9 percentage points higher among residents with ADRD reporting pain.

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Conclusions: Antiepileptic prescribing among nursing home residents with ADRD is increasing, while antipsychotic and opioid prescribing is declining. Examining antiepileptic prescribing to residents with ADRD who had disruptive behaviors and/or reported pain suggests that two of the most common antiepileptics, valproic acid and gabapentin, are being used in clinically distinct ways. Antiepileptic prescribing of questionable risk-benefit for dementia care warrants further scrutiny.

Keywords

Dementia; antiepileptics; antipsychotics; opioids; nursing homes

Introduction

No medications are currently approved by the U.S. Food & Drug Administration to treat the behavioral and psychological symptoms of Alzheimer's disease and related dementias (ADRD), and clinicians often prescribe psychotropic medications off-label.[1,2] Many persons living with ADRD reside in nursing homes (NHs), where the use of psychotropic medications has received significant regulatory and research attention.[3] Antipsychotic prescribing has earned particular scrutiny following the 2005 and 2008 black box warnings regarding increased mortality from antipsychotics prescribed for behavioral disturbances among persons living with ADRD.[4,5] As a result, antipsychotic prescribing in NHs is now tracked systematically by the Centers for Medicare & Medicaid Services' National Partnership to Improve Dementia Care in Nursing Homes and are part of the NH quality rating system.[6,7]

Antipsychotic prescribing in NHs has been declining for over a decade, and such monitoring may create an incentive for clinicians to substitute other drug classes that receive less oversight.[8,9] In fact, the declines in NH antipsychotic prescribing appear to have been matched by similar increases in antiepileptic prescribing—valproic acid and gabapentin in particular.[10,11] In work examining psychotropic use since the National Partnership began in 2012, of the drug classes potentially used for the behavioral and psychological symptoms of ADRD that were examined, antiepileptics were the only class that was increasing.[11]

Promoting appropriate antiepileptic use among residents with ADRD in NHs requires a better understanding of why these medications are being prescribed. It may be that antiepileptics are being prescribed as an antipsychotic substitute for behavioral and psychological symptoms of ADRD. In a recent survey of NH clinicians, valproic acid was endorsed as the most likely antipsychotic substitute, though it showed no benefit over placebo and has a mortality risk similar to selected antipsychotics.[12,13] In a head-to-head comparison with individual antipsychotics, valproic acid's associated risk of mortality did not significantly differ from risperidone or olanzapine.[14]

It is less likely that gabapentin is being prescribed as an antipsychotic substitute. Despite being the most widely prescribed antiepileptic among persons living with ADRD,[1] there is a dearth of randomized controlled trials evaluating the effectiveness of gabapentin in treating behavioral and psychological symptoms of ADRD.[15] The increasing use may instead reflect the growth in gabapentin prescribing rates seen among the general population of older

adults, potentially driven by off-label prescribing for pain in the wake of the opioid epidemic and the recent and widespread declines in opioid prescribing.[16,17,18]

In this study, we examine antiepileptic, antipsychotic, and opioid prescribing to a national sample of NH residents with ADRD with fee-for-service Medicare and Part D prescription drug coverage between 2015 and 2019. In addition to measuring the overall proportion of residents with ADRD prescribed an antiepileptic, we examine prescribing to NH residents with the clinical symptoms potentially associated with their use, hypothesizing that the presence of disruptive behaviors (e.g., aggression) would be associated with valproic acid prescriptions, while reported pain would be associated with gabapentin prescriptions.

Methods

Study Design

In this observational study, we used the Minimum Data Set 3.0 (MDS) and Medicare Master Beneficiary Summary Files (MBSF), Carrier, Outpatient, Medicare Provider Analysis and Review (MedPAR), and Part D pharmacy claims from 2015 through 2019 to construct repeated cross sections that included nearly one million unique NH residents with ADRD. The analytical dataset was constructed by merging the MDS and Medicare files using a unique beneficiary identifier. This study was deemed exempt by the Institutional Review Board at the University of Pennsylvania.

Study Sample

The study sample comprised yearly cohorts from 2015 to 2019 of all persons living with ADRD in the U.S. with fee-for-service Medicare who resided in NHs. Beneficiaries were eligible for the cohort in a given year if: 1) they had an active diagnosis of ADRD in the MDS; 2) they were a long-stay NH resident, identified based on the presence of a quarterly or annual MDS assessment; and 3) they had Medicare fee-for-service (i.e., Parts A and B and no Medicare Advantage) and Part D coverage for the full calendar year or, when relevant, up until the month of their death. Because antiepileptic use is indicated for people with a seizure disorder, we removed 132,474 beneficiaries if they had at least one diagnosis of epilepsy or recurrent seizures in any encounter from the Carrier, Outpatient, and MedPAR files. We also excluded 2,619 beneficiaries who were missing demographic information.

Resident Characteristics

We derived demographic characteristics including gender, age, race/ethnicity (Asian, Black, Hispanic, White, and other race), and state of residence using MBSF files. To explore our hypothesis that antiepileptic prescribing was associated with specific indications, we used the MDS to derive two clinical symptoms of interest for each resident-year, which were not mutually exclusive: (1) disruptive behaviors, and (2) reported pain. Those with disruptive behaviors were identified using the following MDS items: at least one report of physical behavior symptoms directed toward others (e0200a), verbal behavior symptoms directed toward others (e0200b), other behavior symptoms not directed toward others (e0200c), or a rejection of care (e0800). If at least one of these items was reported during a quarterly and/or annual assessment during a given year, the resident was considered to have disruptive

behaviors. Those with pain were identified similarly using the MDS item “Have you had pain or hurting at any time in the last five days?” (j0300). Because the MDS pain item does not specify the source of pain, only one pain variable was created, which encompassed all subtypes.[19] These clinical symptoms (i.e., disruptive behavior and reported pain) were also used to create subgroups for each year: ADRD residents with disruptive behaviors and ADRD residents with reported pain.

Outcomes

In each yearly cohort, we considered antiepileptic, antipsychotic, or opioid prescribing to have occurred if there was ≥1 pharmacy claim for any medication within the drug class that was dispensed during their NH stay. Medications were identified using generic names in the Part D pharmacy claims (Supplementary Table S1). Within the antiepileptics drug class, we separately measured valproic acid (including valproate, divalproex, and valproic acid) and gabapentin prescribing.

Statistical Analyses

We first estimated and plotted the yearly proportion of NH residents with ADRD who were prescribed at least one antiepileptic, valproic acid, gabapentin, antipsychotic, or opioid prescription; this was repeated for residents with disruptive behaviors and residents with reported pain. Using 95% confidence intervals, we examined if the proportions changed significantly between 2015 and 2019; differences were deemed statistically significant if the confidence intervals did not overlap.

We then estimated linear probability models to examine whether clinical symptoms of interest (i.e., disruptive behavior, reported pain) were associated with antiepileptic (overall and separately for valproic acid and gabapentin), antipsychotic, or opioid prescribing. To allow for time trends, each model included year as a categorical variable. For each prescribing outcome (e.g., any antiepileptic prescribing in a given year), we began with a model that included clinical symptoms (i.e., disruptive behaviors and reported pain) and year and then estimated a second, fully-adjusted model that also accounted for a given resident’s demographic characteristics, including gender, age, race/ethnicity, and state of residence. In all models, we clustered standard errors at the state level.

To shed light on the clinical significance of our findings, we further examined which medications/drug classes had the strongest relationship with the two clinical symptoms of interest. This was determined by examining the magnitude of the coefficients for each symptom across the medication and drug class-specific models. Estimated coefficients from linear probability models represent risk differences; that is, for each one unit increase in a continuous variable (e.g., age), the coefficient represents the expected change in the risk difference in percentage points. For a categorical variable, the coefficient represents the difference in the risk of the outcome comparing those at a given level of the variable (e.g., reported pain) to those at the reference level (e.g., no reported pain). All analyses were conducted using Stata 16.1; tests were two-sided and alpha was set at 0.05.

Results

Our study sample included 973,074 persons living with ADRD with fee-for-service Medicare and Part D coverage with long-term stays in NHs, which amounted to 2,044,392 resident-year observations between 2015 and 2019. Yearly cohorts decreased in size, dropping from 460,770 residents with ADRD in 2015 to 361,837 in 2019. During the study period, 33.5% of the sample had disruptive behaviors and 29.9% had reported pain (Table 1). In terms of demographics, 79.9% of the sample was female and the average age was 84.2 years (SD: 9.4 years); 2.1% were Asian, 11.6% were Black, 5.8% were Hispanic, and 79.6% were White.

Of the 973,074 residents with ADRD, 30.0% (n=291,615) were prescribed at least one antiepileptic during the study period. Valproic acid and gabapentin were the most commonly prescribed antiepileptics—14.0% (n=136,328) of residents with ADRD were prescribed gabapentin at least once, and 12.4% (n=120,780) were prescribed valproic acid at least once. The frequency of other types of antiepileptic prescribing is available in a supplemental appendix (Supplementary Table S2). By comparison, 31.6% (n=307,820) of residents with ADRD were prescribed antipsychotics and 37.3% (n=362,671) were prescribed opioids at least once.

The proportion of NH residents with ADRD who were prescribed antiepileptics increased from 29.5% in 2015 to 31.3% in 2019 (Figure 1). During that time, the rate of gabapentin prescribing grew from 12.6% to 15.7%, while the valproic acid prescribing rate grew from 12.3% to 13.4%. Among those with disruptive behaviors, valproic acid prescribing was higher, increasing from 19.5% in 2015 to 21.0% in 2019. Gabapentin prescribing was higher among those with reported pain, increasing from 22.5% in 2015 to 27.2% in 2019. As a point of reference, antipsychotic prescribing fell from 32.1% in 2015 to 27.9% in 2019, while opioid prescribing fell from 39.8% to 31.7%. Confidence intervals indicated that all 2015–2019 differences were statistically significant.

The symptom-adjusted linear probability models also demonstrated that there was a statistically significant increase in the risk of prescribing antiepileptics, valproic acid, and gabapentin (Table 2). For example, in 2019 compared to 2015, the risk of a resident with ADRD in NHs being prescribed an antiepileptic was 2.1 percentage points higher ($p<0.001$). These changes were of similar magnitude in models that accounted for both symptoms and demographic characteristics. The 2015 vs. 2019 decline in the risk of antipsychotic prescribing in the symptom-adjusted and fully adjusted models were 3.8 and 3.9 percentage points ($p<0.001$ and $p<0.001$); for opioids, the respective declines were 7.8 and 7.5 percentage points ($p<0.001$ and $p<0.001$).

The increase in antiepileptic prescribing was driven by both valproic acid and gabapentin prescribing. In fully adjusted models, the risk of being prescribed valproic acid in 2019 was 1.2 percentage points higher than in 2015 ($p<0.001$); the risk of being prescribed gabapentin was 3.1 percentage points higher ($p<0.001$). As hypothesized, disruptive behaviors were associated with a higher risk of a valproic acid prescription, which was 10.9 percentage points higher ($p<0.001$) in the fully adjusted model. While the risk of a gabapentin

prescription was slightly lower, by 0.4 percentage points (p=0.141), the difference was insignificant. Residents with ADRD reporting pain had a 13.9 percentage point higher risk of receiving gabapentin (p<0.001), and a 2.3 percentage point lower risk of receiving valproic acid (p<0.001). Of note, the relationship between disruptive behaviors and drug classes was largest for antipsychotic prescribing (17.4 percentage points; p<0.001), while the relationship between reported pain and drug class was largest for opioid prescribing (31.0 percentage points; p<0.001).

We found that age was associated with lower rates of antiepileptic, valproic acid, gabapentin, and antipsychotic prescribing but was unrelated to opioid prescribing. Female residents were less likely to be prescribed antiepileptics at large and valproic acid but were more likely to be prescribed gabapentin and opioids. Race/ethnicity was also associated with prescribing: Asian and Black residents were less likely to have antiepileptic, valproic acid, antipsychotic, and opioid prescription fills relative to White residents, while Hispanic residents were less likely to have an opioid prescription fill and marginally more likely to have a gabapentin prescription fill compared to White residents.

Discussion

The rate of antiepileptic prescribing to nursing home (NH) residents living with Alzheimer's disease and related dementias (ADRD) increased between 2015 and 2019. Over the same time period, rates of antipsychotic and opioid prescribing to residents with ADRD declined. We found that valproic acid and antipsychotics were more likely to be prescribed to residents with ADRD and disruptive behaviors, while gabapentin and opioids were more likely to be prescribed to residents with ADRD and reported pain. While our study's focus was on the relationship between clinical symptoms and prescribing outcomes, we further demonstrated the important role that demographics, including age, gender, and race/ethnicity, play in prescribing.[20]

In addition to extending prescribing trends that have been previously documented to more recent years, our findings suggest that the two most-prescribed antiepileptics, valproic acid and gabapentin, are being used for different indications: disruptive behaviors were associated with a higher probability of valproic acid prescriptions, and reported pain was associated with a higher probability of gabapentin prescriptions. Despite sharing a drug class, the prescribing of valproic acid and gabapentin appear to represent separate phenomena. While we do not directly test whether substitution is occurring, this aligns with other research reporting that clinicians view valproic acid as an antipsychotic substitute for behavioral disturbances in dementia.[21] Gabapentin, which is approved for postherpetic neuralgia but commonly prescribed off-label, has been cited as a potential alternative to opioid therapy despite its limited evidence base for other pain conditions.[22,23,24]

In contrast to the widespread focus on antipsychotic and opioid prescribing, antiepileptic prescribing has received less attention. For NH populations, this may be a consequence of the fact that such prescribing is not part of Minimum Data Set (MDS) data collection and is therefore difficult to monitor. Additional scrutiny may be warranted, as there is little evidence of benefit when antiepileptics are used to treat behavioral and psychological

symptoms associated with ADRD, at least compared to antipsychotics, and antiepileptics are also associated with significant side effects, including increased mortality risk.[14,25,26]

The possibility that clinicians are prescribing valproic acid rather than antipsychotics, which are still considered appropriate for persons living with ADRD who have not responded to non-pharmacological interventions and exhibit behaviors that are potentially dangerous to themselves or others, is concerning. A placebo-controlled trial of valproic acid among persons living with ADRD found no delay in the emergence of agitation or psychosis, while the treatment group experienced greater loss in hippocampal and whole-brain volume.[27] The most recent Cochrane review states "[valproic acid] cannot be recommended for management of agitation in dementia."[28] This conclusion was based on five studies and 430 participants; three studies measuring cognitive function found little or no effect of valproic acid over six weeks, and two studies pointed to slightly worse functional outcomes in participants treated with valproic acid.[28] The authors note a higher incidence of adverse effects and serious adverse events for participants treated with valproic acid.[28]

The increase in gabapentin prescribing is less likely related to the downward pressure on antipsychotic prescribing; rather, it may reflect the broader secular trend away from opioid prescribing for pain management. Unlike the valproic-acid-for-antipsychotic switch, it is more difficult for policymakers to consider the appropriateness of the gabapentin-for-opioid switch, as there is some uncertainty regarding the ideal manner to manage pain in older adults.[29] Similar to the case for using valproic acid to treat behavioral and psychological symptoms of ADRD, the evidence base to support the use of gabapentin for many chronic pain conditions is minimal.[22]

These findings beg the question of whether additional practice and policy interventions related to antiepileptic prescribing are needed. In the case of valproic acid replacing antipsychotics, this potential substitution is likely worse on average than the treatment it is replacing due to the lack of evidence of benefit from valproic acid, its adverse effects on brain structure, and similar associated mortality risks.[28] In the case of gabapentin replacing opioids, there is a documented abuse potential (which may be less relevant in NH settings) and multiple states have amended rules and regulations in order to enhance the pharmacovigilance surrounding gabapentin.[30] However, it should be noted that the presence of disruptive behaviors was more predictive of antipsychotic use than valproic acid use, while the presence of reported pain was more predictive of opioid use than gabapentin use.

We face several limitations. With pharmacy claims, we do not know the actual prescribing indications, such as pain subtypes, and are only able to estimate associations between clinical symptoms and prescription fills. While we exclude individuals with a diagnosis of epilepsy and recurrent seizures, there could be other indications unrelated to disruptive behaviors and reported pain that antiepileptics are targeting. Of note, findings were consistent when we adjusted for anxiety and insomnia reported in the MDS, which are other indications that may be targeted with antiepileptics, and also when we included residents with an epilepsy diagnosis. The repeated cross-sectional study design means that we cannot directly measure whether clinicians are substituting one medication for another, which would be an important and unintended consequence of initiatives targeting antipsychotic and

opioid prescribing that requires further research.[31] We also note that our generalizability is limited to residents with ADRD in NHs who were enrolled in fee-for-service Medicare with Part D coverage; results may differ for other populations. Finally, our use of Part D pharmacy claims assumes that all prescription fills were actually administered to residents, and does not include medications that are not paid for by Part D (for example, residents with ADRD who enter hospice will have some medications that are not captured in Part D pharmacy claims).

Our study has important implications for dementia care, and points to potential downstream effects that policy interventions that target specific drug classes may have on clinicians' prescribing behavior, including their use of other drug classes. We found that there has been a statistically significant increase in antiepileptic prescribing overall, and of valproic acid and gabapentin prescribing in particular, among NH residents with ADRD amidst ongoing policy efforts focused on antipsychotic use and the opioid epidemic. As the downward pressure on antipsychotic and opioid prescribing continues, this substitution effect could continue as well.

Given the limited evidence base for antiepileptic prescribing in dementia care—whether for disruptive behaviors or for pain—these trends merit further attention, including a potential modification to the MDS to monitor this phenomenon. A better understanding of the clinical pathways that follow antipsychotic or opioid discontinuation is also needed, which will require following the sequence and timing of prescription fills upon entry to a NH. In the present study, we did not directly examine the pain subtypes associated with antiepileptic use among NH residents with ADRD, which would also enhance our findings. For example, a recently published study found that nearly 15% of NH residents nationwide had a neuropathy diagnosis, and that nearly half of those residents had an antiepileptic prescription fill, primarily gabapentin.[32] (However, researchers note that pain subtypes can be underreported in administrative data, at least compared to self-reports, and that there are low rates of sensitivity for some diagnoses, including neuropathy.[33,34,35]) Other methods of inquiry, including qualitative work and chart reviews, along with more claims-based analyses would help gain insights into the clinical decisions that are driving these trends.

In conclusion, the share of NH residents living with ADRD who were prescribed an antiepileptic is increasing, while antipsychotic and opioid prescribing rates decline. It is critical that antipsychotic and opioid prescribing not be considered in isolation, but rather in context of the broader range of medications prescribed—including antiepileptics—to persons living with ADRD.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Impact statement:

We certify that this work is novel. Its primary contributions to the literature are 1) providing the most recent trends in antiepileptic, antipsychotic, and opioid prescribing to residents with Alzheimer's Disease and related dementias (ADRD) in nursing homes; 2) accounting for clinical indications to show how different antiepileptics are being used for disruptive behaviors and reported pain among residents with ADRD; and 3) demonstrating why recent policy efforts, which have largely focused on antipsychotic and opioid prescribing, should consider other drug classes.

Key points:

- This paper examines trends in antiepileptic, antipsychotic, and opioid prescribing to nursing home residents with ADRD between 2015 and 2019.
- Using a sample of 973,074 nursing home residents with ADRD nationwide, we found that an increasing proportion are being prescribed antiepileptics; over the same time period, antipsychotic and opioid prescribing rates declined.
- We also find that residents with ADRD and disruptive behaviors are more likely to receive valproic acid, while those with reported pain are more likely to receive gabapentin.

Why does this matter?

Antiepileptic prescribing is on the rise among nursing home residents with ADRD but is being used in clinically distinct ways. Given the limited evidence base and side effect profile of antiepileptics, there is a questionable risk-benefit for treating ADRD that warrants further attention from researchers and policymakers, who have focused more on antipsychotic and opioid prescribing compared to antiepileptic prescribing.

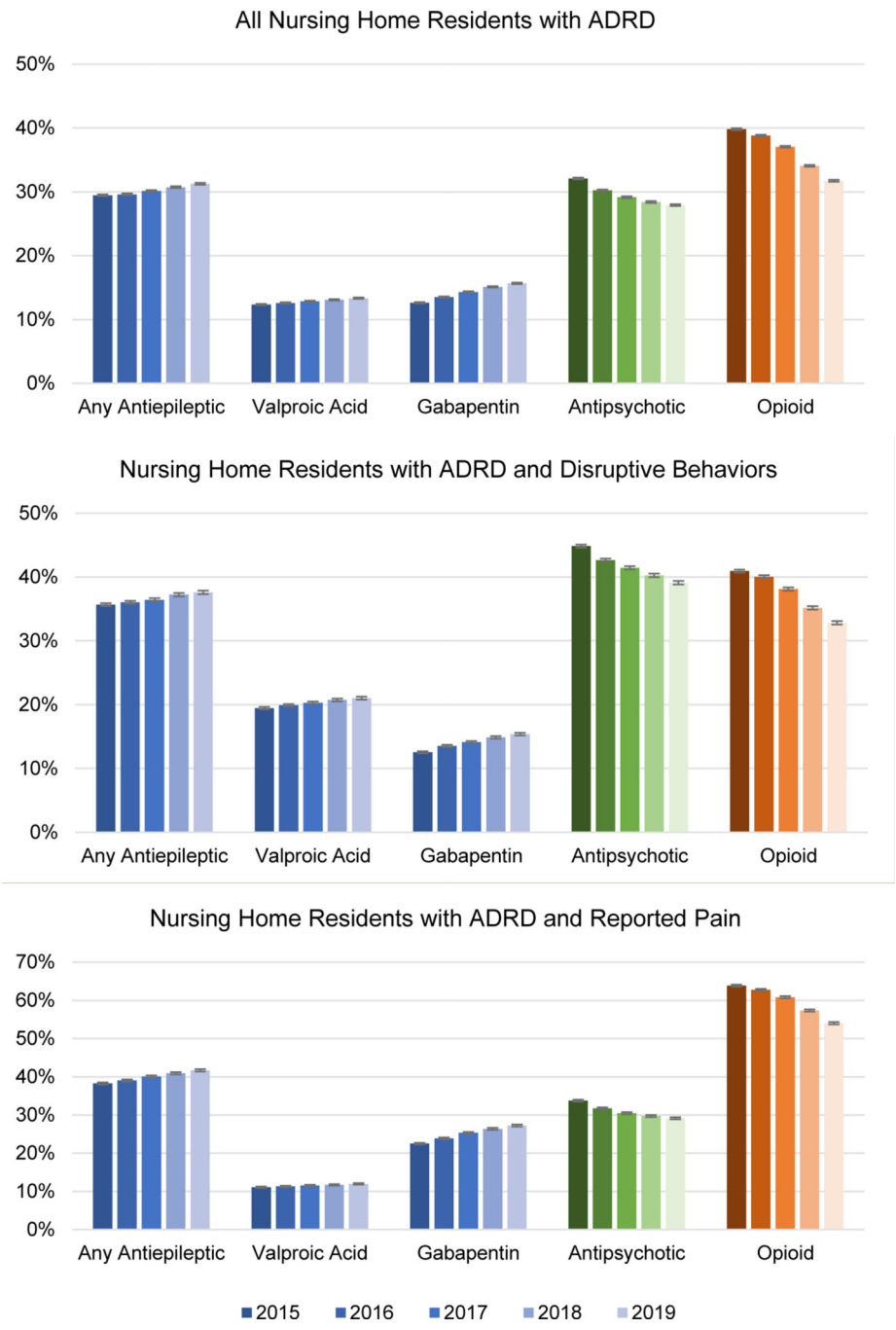

Figure 1.

Percentage of Nursing Home Residents with Alzheimer's Disease and Related Dementias with At Least One Antiepileptic, Gabapentin, Valproic Acid, Antipsychotic, or Opioid Prescription Fill, 2015 to 2019

Note. The darkest color bar is 2015, while the lightest color bar is 2019. Disruptive behaviors and reported pain are not mutually exclusive categories.

Table 1.

Characteristics of Nursing Home Residents Living with Dementia between 2015 and 2019, Overall and by Prescribing Outcome

	Overall		Any Antiepileptic		Gabapentin		Valproic Acid		Antipsychotic		Opioid	
	N=973,074		N=291,615		N=136,328		N=120,780		N=307,820		N=362,671	
	%	N	%	N	%	N	%	N	%	N	%	N
Age												
Mean	84.2	SD=9.4	81.2	SD=10.0	82.0	SD=9.6	80.0	SD=10.2	81.4	SD=9.9	84.1	SD=9.3
Gender												
Female	70.9	690,150	67.3	196,387	70.9	96,718	61.8	74,629	67.4	207,564	74.5	270,348
Male	29.1	282,924	32.7	95,228	29.1	39,610	38.2	46,151	32.6	100,256	25.5	92,323
Race/Ethnicity												
Asian	2.1	20,551	1.6	4,730	1.7	2,301	1.5	1,784	1.5	4,505	1.3	4,649
Black	11.6	112,547	12.0	34,864	11.6	15,819	11.7	14,152	11.2	34,623	9.8	35,721
Hispanic	5.8	56,148	6.2	18,069	6.1	8,323	6.4	7,772	6.1	18,874	4.7	17,136
Other race	0.9	8,959	1.0	2,776	1.0	1,329	0.9	1,090	0.9	2,871	0.9	3,233
White	79.6	774,869	79.3	231,176	79.6	108,556	79.5	95,811	80.2	246,947	83.3	301,932
Clinical Symptoms												
Disruptive Behavior	44.6	433,819	51.3	149,647	44.1	60,155	64.3	77,655	58.8	181,091	45.4	164,539
Reported Pain	37.6	366,340	45.8	133,702	59.1	80,526	32.9	39,756	37.9	116,673	55.5	201,293

Note. Demographic characteristics are based on the resident's first year in the study period. Clinical symptoms could occur during any year in the study period. SD refers to standard deviation.

Table 2.

Association Between Antiepileptic, Valproic Acid, Gabapentin, Antipsychotic, and Opioid Prescribing and Clinical Symptoms, Demographic Characteristics and Year among Nursing Home Residents Living with Dementia, 2015–2019

	Any Antiepileptic		Valproic Acid		Gabapentin		Antipsychotic		Opioid	
	Model 1	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**	**Model 1**	**Model 2**
Clinical Symptoms										
Disruptive Behavior	9.7***	9.0***	11.3***	10.9***	−0.4	−0.8**	18.5***	17.4***	1.8***	1.7***
Reported Pain	13.5***	12.3***	−1.8***	−2.3***	14.5***	13.9***	2.0***	0.7*	32.6***	31.0***
Demographic Characteristics										
Age	–	−0.9***		−0.5***	–	−0.3***	–	−1.0***	–	0.0
Female (ref: Male)	–	−1.2***	–	−2.6***	–	0.7***	–	−0.3	–	4.5***
Asian (ref: White)	–	−2.3***	–	−2.0***	–	−0.2	–	−5.4***	–	−11.2***
Black (ref: White)	–	−2.8***	–	−2.5***	–	−0.4	–	−4.1***	–	−5.4***
Hispanic (ref: White)	–	1.2	–	0.2	–	1.0*	–	0.6	–	−4.9***
Other race (ref: White)	–	−1.2	–	−1.6***	–	−0.0	–	−2.2**	–	−2.9**
Year										
2016 (ref: 2015)	0.3***	0.4*	0.3***	0.4**	0.9***	1.0***	−1.7***	−1.7***	−0.9***	−0.8***
2017 (ref: 2015)	1.0***	1.0***	0.7***	0.7***	1.8***	1.9***	−2.6***	−2.6***	−2.4***	−2.3***
2018 (ref: 2015)	1.6***	1.6***	1.0***	1.0***	2.6***	2.6***	−3.3***	−3.3***	−5.4***	−5.2***
2019 (ref: 2015)	2.1***	2.1***	1.2***	1.2***	3.2***	3.1***	−3.8***	−3.9***	−7.8***	−7.5***

Note. Linear probability models with state-clustered standard errors. Model 1 adjusts for clinical symptoms and year, while Model 2 adjusts for clinical symptoms, year, and demographic characteristics.