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An investigation of new medications initiation during ambulatory care visits in patients with dementia

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ABSTRACT

Background: There is currently insufficient data describing how new medications are provided to older adult ambulatory patients with dementia in the United States (US).
Objectives: To describe characteristics of ambulatory care visits for adults ≥65 years old and investigate differences in prescribing of new medications between patients with and without dementia.
Methods: We conducted a population-based cross-sectional study using the 2016 National Ambulatory Medical Care Survey (NAMCS) in the US. Non-perioperative ambulatory care visits of patients ≥65 years old with sampling weights were used to provide national estimates of visits. Baseline characteristics were compared between visits for patients with and without dementia using Pearson's chi square or Student's *t*-tests. We used multivariable logistic regression to estimate the odds of receiving a new medication.
Results: 218,182,131 non-perioperative ambulatory care visits of patients ≥65 years old were included, 2.1% of which were for patients with dementia; these patients were older on average and had more comorbidities and higher ambulatory care utilization than those without dementia. New medications were provided at 26.3% of visits for patients with dementia. After adjusting for confounders, there was no statistically significant difference in odds of a new medication being provided between visits for patients with and without dementia (odds ratio [OR], 0.555; 95% confidence interval [CI], 0.183–1.678). Differences were seen in the provision of cholinesterase inhibitors, antipsychotics, and central nervous system agents at visits for patients with dementia ($p = 0.0011$, <0.0001, and 0.0011 respectively).
Conclusion: While fewer visits for patients with dementia provided new medications compared to patients without dementia, after adjusting for confounders no significant difference were identified. Significant differences were seen in the classes of new medications provided. Further investigation is needed to evaluate new medication usage and the utility of pharmacists in the care of patients with dementia at an outpatient setting.

1. Introduction

Dementia, a condition that results in memory or cognitive decline leading to functional loss, is a serious concern for individuals 65 years and older, with an estimated global prevalence of 50 million, and more than five million older Americans reported to have dementia in 2020.[1–3] In addition to the high burden of dementia among older adults (~10% of people 65 years and older are afflicted),[4] dementia impacts women and racial and ethnic minorities disproportionately. This is evidenced by the fact that almost two thirds of older Americans with dementia are women,[5] and despite the majority of Americans identifying as non-Hispanic ethnicity, older African Americans and Hispanics are up to twice as likely to have dementia, and are more likely to have a missed dementia diagnosis.[5,6] As the number of older Americans rapidly grows, the population with dementia is expected to rise almost three fold by 2050,[5,7,8] thus further increasing the social and economic burden of this disease state.[9]

A disease of aging, dementia often impacts patients with numerous comorbid conditions. This multimorbidity among patients with dementia has many effects, including increased healthcare utilization before and after diagnosis[10–12] and use of many medications. Total healthcare payments in 2020 for people with dementia ages 65 years and older were estimated to be $305 billion,[2] significantly higher than costs for older adults without dementia. Existing evidence suggests that patients with dementia had significantly higher annual Medicare and Medicaid expenditures at $10,814 and $6234 compared with those without dementia at $5953 and $1962, respectively, using cohort-based simulation models from diagnosis until

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death.[13,14] The complex medication regimens to treat patients with dementia and their associated comorbidities,[13,14] may result in the need for longer ambulatory care visits and the expertise of multiple providers.[11–15] While specialist care is important in managing the complex medical care of older adults with dementia, it can also lead to the receipt of more medications.[15] Use of five or more medications concurrently is known as polypharmacy, and older adults more commonly report polypharmacy than their younger counterparts (ranging from about 20–80%[9,23,25]). Even though use of multiple medications may be appropriate to treat multiple conditions, polypharmacy has been associated with increased odds of potentially inappropriate prescribing in patients with dementia.[16–18]

Thus, without adequate healthcare coordination, patients with dementia are at a heightened risk for preventable medical errors.[19–21] Utilizing the full spectrum of available healthcare providers can alleviate physician burden,[22] and given that medication management is a significant component to improving care in this population, pharmacists are well-suited to augment the healthcare team for patients with dementia. For chronic disease such as diabetes and hypertension, pharmacists already provide services including improving medication adherence, providing patient education, monitoring laboratory values or adverse effects of medications to ensure safety and effectiveness, and conducting prior authorizations in hospital, ambulatory, and community settings.[23] Additionally, recent studies have demonstrated pharmacists' positive impact on other chronic disease state management in the ambulatory care setting.[24,25] Outside of the U.S, research has recognized the potential benefits of pharmacists in dementia care in both hospital and community settings.[26,27] While the role of pharmacists in dementia care may already be defined in other countries and for other chronic conditions, the active pharmacist involvement in dementia care in the U.S. is not well established, especially in the outpatient setting. Unlike other chronic conditions, dementia is unique in the fact that treatment often requires caretaker assistance. Thus, pharmacists could be a critical and underutilized resource to add to the ambulatory healthcare team for patients with dementia.

Understanding the detailed characteristics of ambulatory healthcare utilization such as frequency, length of visit, and types of medications prescribed among patients with dementia is thus the first step in designing targeted interventions to reduce inappropriate medication use among older patients with dementia. Pharmacists specifically can improve care by shortening lengthy visits, managing and reconciling high risk medications, ordering medication-related laboratory values, and executing follow up visits relating solely to medication education and adjustment.

To date, there is a lack of information about new medications provided to older adults with dementia at ambulatory care visits in the U.S. As a result, it is unknown what types of medication related services pharmacists could be most efficient in providing in ambulatory care settings for patients with dementia to improve the current standard of care. The objectives of this study were to 1) determine whether differences exist in the ordering and providing of new medications at ambulatory care visits for older patients with dementia compared to visits for those without dementia after controlling for known confounders, 2) evaluate whether specific therapeutic classes of medications are differentially ordered or provided to patients with and without dementia, and 3) describe characteristics of these visits for older patients with and without dementia to provide information on how these patients might differentially use ambulatory care services.

2. Methods

2.1. Patient population

In this study, we used the 2016 National Ambulatory Medical Care Survey (NAMCS) for data on new prescription and non-prescription medications that were ordered and/or provided at ambulatory care visits for older adults with and without dementia. At the time this study was conducted, 2016 was the most recent dataset provided by NAMCS. Data included in NAMCS are collected by the National Center for Health Statistics as a nationally representative electronic survey completed annually by non-federally employed office-based physicians in a variety of specialties.[28] To ensure high specificity,[29] the NAMCS uses a stratified two stage sample design, selecting physicians, and then patient visits as the unit of analysis. Each selected physician is randomly assigned a one-week reporting period, during which a random sample of visits are entered into a computerized form.[28] Because NAMCS is deidentified and publicly available, the study was exempted from institutional review board review at the University of *[removed for blinding purposes]*.

We included visits for patients ≥65 years of age. Visits were also excluded if the major reason for the visit was peri-surgical, due to situational medication use that could confound national estimates for regular medication use.[30]

2.2. Identification of patients with dementia

In this cross-sectional study, visits for patients with dementia were compared to visits for patients without dementia. Visits for patients with Alzheimer's Disease and additional related dementias were identified from the data collection form using the free-text diagnosis fields provided by physicians, the binary indicator for Alzheimer's Disease/dementia, as well as the presence of an ICD-10 code indicating dementia (G30.0, G30.1, G30.8, G309. F01.50, F01.51, F02.80, F02.81, F03.90, F03.91, F10.27, F10.97, F13.27, F13.97, F18.27, F18.97, F19.27, and F19.97). Because the survey is deidentified, it is technically possible the same patient had multiple visits included in the 2016 NAMCS. However, this situation is unlikely because the survey requires that the same patient would have had to be randomly selected and seen twice during the one-week period of physician report.

2.3. Medication information

As part of the NAMCS standard form, physicians record up to 30 medications from the patient's Electronic Health Record. The NAMCS Drug Database Coordinator then codes all medication items using Lexicon Plus®, a proprietary database of Cerner Multum, Inc.[31] In addition to medication names, NAMCS collects information on whether the reported medication is a new medication or has been continued from a previous visit.

The primary outcome of interest in this study was the presence of one or more new medications at the ambulatory care visit. A visit was considered to lack new medication(s) if: 1) no medications were listed for a visit, 2) all medications listed were continued from previous visits, or 3) medication new/continued status was unknown.

We also describe the therapeutic class of new medications using the Lexicon Plus® nomenclature. Multum categorizes medications into a three-level nested system, where level 1 is the broadest therapeutic classification and level 3 is the most detailed classification. In this study, most medications are described using level 1 therapeutic classes, except central nervous system (CNS) agents (Level 1 = 057), psychotherapeutic agents (Level 1 = 242), and metabolic agents (Level 1 = 358), which were described using the more detailed level 2 categories because these medications are especially relevant to the population of interest. While the grouping of medications into Multum therapeutic classifications is proprietary, more information including all level 1, 2, and 3 classifications can be found in the NAMCS documentation.[31]

2.4. Statistical analysis

To investigate whether new medications were differentially provided at outpatient visits for patients with dementia compared to visits for patients without dementia, multivariable logistic regression was used to estimate the adjusted odds ratio (aOR) and 95% confidence interval (CI), with $p < 0.05$ considered statistically significant. Due to the epidemiologic framework, covariates included in the regression were not evaluated for their effect on new medication provision but rather as a control for confounding and to describe baseline differences in visit and patient characteristics. Demographic characteristics included age, sex, ethnicity, race, region, tobacco

use, source of payment, and whether the patient had been seen before at the practice. Visit characteristics included length of visit, multiple providers seen, whether the physician was a primary care provider, and whether the major reason for visit was related to a new problem or infection (see Supplementary Table S1). Patient characteristics included the number of chronic conditions, presence of ≥5 continued medications (polypharmacy), and comorbidities (cancer, cerebral vascular disease, coronary artery disease, depression, diabetes, chronic obstructive pulmonary disease, sleep apnea, and asthma) (see Supplementary Table S2 for definitions). In order to adjust for bias, covariates included in the model were selected based on the existing literature and using directed acyclic graphs. Additionally, we investigated whether the therapeutic classes of new medications ordered or provided at visits differed for patients with and without dementia utilizing Chi-squared or Student's *t*-tests.

We described ambulatory care visit and patient characteristics for adults 65 years and older using the sampling weights provided by NAMCS to provide national estimates. The CDC's National Center for Health Statistics creation of sampling weights is composed of four parts including 1) inflation by reciprocals of the probabilities of selection, 2) adjustment for nonresponse, 3) a ratio adjustment to fixed totals, and 4) weight smoothing.[29,32] Normality for covariates of interest was assessed visually with Q-Q plots, and normally distributed continuous variables were described using the mean and standard deviation (SD), while the median and interquartile range (IQR) were used to describe non-normally distributed variables. Chi-squared or Student's *t*-tests were used to compare characteristics between groups as appropriate.

All statistical analyses were performed in SAS version 9.4 and reviewed by three separate researchers.

3. Results

3.1. Visit and patient characteristics

In total, we included 13,165 of the recorded visits, amounting to a nationally weighted 218,182,131 ambulatory care visits (see Fig. 1; all future references are to weighted estimates). The majority of total ambulatory care visits were in metropolitan areas for white, female patients between 65 and 74 years old whose primary insurance was Medicare (see Table 1).

Similarities between outpatient visits of patients with and without dementia included white race, Medicaid and private payer status, location in a metropolitan area, never utilizing tobacco, time with the physician, and whether the visit was for a new patient or with multiple providers.

2.1% of the visits were for patients with dementia, who were on average older ($p = 0.0002$), more underweight ($p = 0.02$), had more comorbidities ($p = 0.01$) such as depression ($p = 0.0004$), and higher ambulatory care utilization than those without dementia ($p = 0.002$). Specifically, over half of the visits for patients with dementia recorded that the patient had five or more ambulatory care visits in the last 12 months. Additionally, significantly more visits for patients with dementia were with a primary care physician ($p = 0.001$) and located in the southern region ($p = 0.01$) compared to visits for patients without dementia. The majority of these visits were for a chronic, routine reasons (49.3%), while only 15.0% were for a new problem. More visits for patients with dementia reported polypharmacy (58.1 vs 44.0%), but this was not statistically significant ($p = 0.0944$). Finally, visits for patients with dementia more commonly recommended an “unspecified” follow up time ($p = 0.01$).

In contrast, the majority of visits of patients without dementia had a greater focus on preventative care (15.9% vs. 13.7%), and a quarter of these visits were related to a new problem. The average number of chronic conditions and total medications reported at visits of patients without dementia were 1.7 ($p = 0.01$) and 2.8 ($p = 0.12$), respectively. Although the number of total medications was not statistically significant, both estimates were lower in comparison to visits of patients with dementia. Additional details about the visits of patients with and without dementia can be found in Table 1.

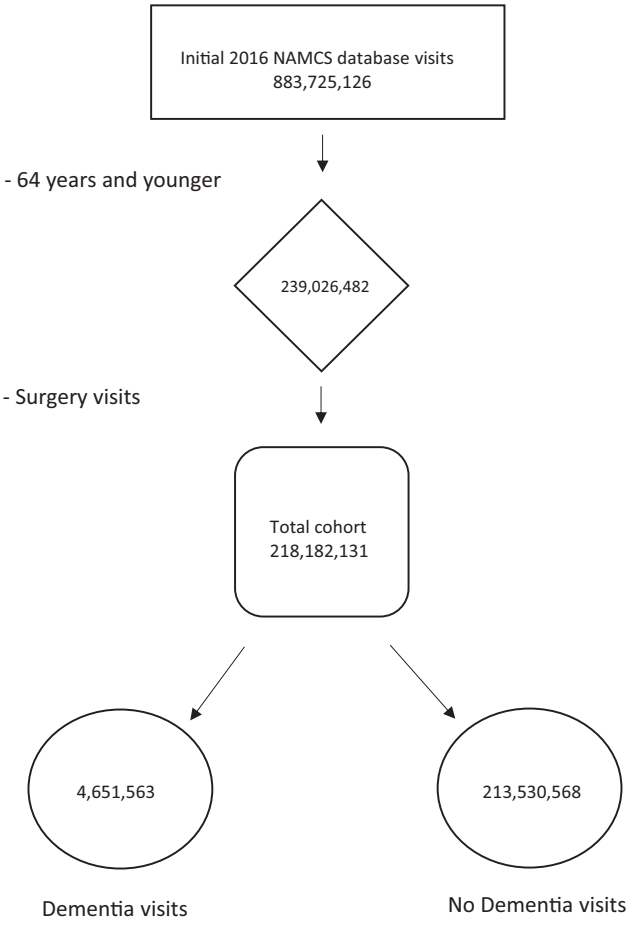

Fig. 1. 2016 NAMCS investigated cohort (weighted).

3.2. New medication(s)

In 2016, new medications were ordered or provided at 26.3% of visits for older patients with dementia, compared to 35.1% of visits for older patients without dementia. After adjusting for known confounders (as noted above), there was no difference in the odds of a new medication being ordered or provided between visits for patients with dementia and visits for patients without dementia (aOR [95% CI] 0.555 [0.183–1.678]).

3.3. Most common new medication categories

The most common new medications ordered or provided to patients with dementia were immunostimulants (vaccines), cardiovascular agents, cholinesterase inhibitors, and coagulation modifiers (27.4, 17.2, 14.5, 8.3% respectively; see Fig. 2). In contrast, the four most common classes of new medications for patients without dementia were topical agents, cardiovascular agents, anti-infectives, and respiratory agents (17.7, 14.1,10.9, and 7.2% respectively; see Fig. 2). More visits for patients with dementia recorded ordering or providing antipsychotics, cholinesterase inhibitors, and miscellaneous central nervous system agents compared to visits for patients without dementia ($p = 0.0011$, < 0.001, and 0.0011 respectively). Topical agents were more often provided at visits for patients without dementia ($p = 0.0084$).

4. Discussion

Current literature investigating the dementia population focuses on potentially inappropriate medications (PIMs), prescribing errors, and medication adherence in multiple settings, such as nursing homes and the

Table 1
Baseline demographics.

Characteristics	Total N (%)	Dementia N (%)	No Dementia N (%)	*P*-value
Sample size, n				
Weighted visits	218,182,131	4,651,563	213,530,568	
Unweighted visits	**13,165**	73	13,092	
Demographics				
Age				**0.0002**
65–74 years old	119,691,873(54.85)	1,121,032(24.10)	118,570,842(55.53)	
75–84 years old	71,964,003(32.98)	2,184,451(46.96)	69,779,552(32.68)	
85+ years old	26,526,254(12.16)	1,346,080(28.94)	25,180,174(11.79)	
Female Sex	123,362,558(56.54)	2,793,992(60.07)	120,568,566(56.46)	0.6455
Race/Ethnicity				0.8871
Not Hispanic/ Latino White	170,625,834(78.20)	3,753,919(80.70)	166,871,915(78.15)	
Not Hispanic/ Latino Black	15,134,379(6.94)	374,512(8.05)	14,759,867(6.91)	
Hispanic/Latino	23,084,695(10.58)	396,851(8.53)	22,687,844(10.63)	
Not Hispanic/ Latino Other	9,337,223(4.28)	126,281(2.71)	9,210,942(4.31)	
Region				**0.0122**
Northeast	41,053,103(18.82)	262,535(5.64)	40,790,568(19.10)	
Midwest	52,272,814(23.96)	1,106,409(23.79)	51,166,405(23.96)	
South	76,391,877(35.01)	2,534,743(54.49)	73,857,134(34.59)	
West	48,464,336(22.21)	747,876(16.08)	47,716,461(22.35)	
Metropolitan Area	196,392,814(90.01)	4,042,907(86.92)	192,349,907(90.08)	0.6126
Tobacco Use				0.1812
Never Smoker	87,623,630(40.16)	1,613,468 (34.69)	86,010,162 (40.28)	
Former Smoker	60,274,320(27.63)	959,072(20.62)	59,315,248 (27.78)	
Current Smoker	15,692,996(7.19)	214,861(4.62)	15,478,135 (7.25)	
Missing	54,591,184(25.02)	1,864,161(40.08)	52,727,022(24.69)	
Body Mass Index (BMI)				**0.0214**
Underweight (less than 18.5)	2,106,812(0.97)	158,568(3.41)	1,948,244(0.91)	
Normal (18.5–24.99)	38,362,724(17.58)	1,544,997(33.21)	36,817,728(17.24)	
Overweight (25–29.99)	48,816,527(22.37)	662,226(14.24)	48,154,301(22.55)	
Obese (30 or greater)	50,239,274(23.03)	529,860(11.39)	49,709,413(23.28)	
Missing	78,656,793(36.05)	1,755,911(37.75)	76,900,881(36.01)	
Payment Type				
Private Payer	89,587,855(41.06)	2,286,259(49.15)	87,301,595(40.88)	0.3100
Medicare	171,608,550(78.65)	4,115,495(88.48)	167,493,054(78.44)	**0.0337**
Medicaid	11,287,487(5.17)	405,128(8.71)	10,882,359(5.10)	0.3489
Self Pay	1,785,307(0.82)	30,063(0.65)	1,755,243(0.82)	0.8144
Other Payer	4,740,893(2.17)	4,671,292(2.19)	69,601(1.50)	0.5873
Visit Description				
New patient	26,426,307(12.11)	424,702(9.13)	26,001,605(12.18)	0.4083
Number of Past Visits in Last 12 months				**0.0002**
0 visits	15,088,737(6.92)	75,390 (1.62)	15,013,347(7.03)	
1 visit	33,711,220(15.45)	302,081(6.49)	33,409,139(15.65)	
2–4 visits	75,304,145(34.51)	1,177,015(25.30)	74,127,131(34.71)	
5+ visits	67,651,721(31.01)	2,672,375(57.45)	64,979,346(30.43)	
Missing	26,426,307(12.11)	424,702(9.13)	26,001,605(12.18)	
Major Reason For Visits				n/a
New problem	54,493,619(24.98)	697,051(14.99)	53,796,568 (25.19)	
Chronic, routine	99,203,843(45.47)	2,294,218(49.32)	96,909,625(45.38)	
Chronic, flare up	22,536,123(10.33)	861,131(18.51)	21,674,992(10.15)	
Preventative Care	34,672,953(15.89)	637,975(13.72)	34,034,977 (15.94)	
Unknown	7,275,593(3.33)	161,187(3.47)	7,114,405(3.33)	
Visit Related to a New Problem				0.1785
No	156,412,919(71.69)	3,793,324(81.55)	152,619,595(71.47)	
Yes	54,493,619(24.98)	697,051(14.99)	53,796,568(25.19)	
Missing	7,275,593(3.33)	161,187(3.47)	7,114,405(3.33)	
Other Provider	67,142,842 (30.77)	1,437,468 (30.90)	65,705,374 (30.77)	0.9866
Multiple Providers Seen at Visit	110,084,453(50.46)	2,565,047(55.14)	107,519,406(50.35)	0.5994
Was the Physician the PCP				**0.0001**
No	133,663,742(61.26)	1,719,696(36.97)	131,944,046(61.79)	
Yes	79,444,291(36.41)	2,909,986(62.56)	76,534,305(35.84)	
Missing	5,074,097(2.33)	21,880(0.47)	5,052,217(2.37)	
Time with Physician				0.6422
0–14 min	32,556,749(14.92)	530,521(11.41)	32,026,229(15.00)	
15–29 min	128,113,928(58.72)	2,856,899(61.42)	125,257,030(58.66)	
30–59 min	52,812,851(24.21)	1,044,719(22.46)	51,768,132(24.24)	
60+ minutes	4,698,602(2.15)	219,424(4.72)	4,479,178(2.10)	
Chronic Conditions				
Pulmonary Disease	36,063,402(16.53)	48,995(1.05)	36,014,406(16.87)	**<0.0001**
Diabetes	50,882,684(23.32)	764,639(16.44)	50,118,045(23.47)	0.2330
Depression	21,705,963(9.95)	1,175,478(25.27)	20,530,485(9.61)	**0.0004**
Cerebrovascular disease	10,675,765(4.89)	259,219(5.57)	10,416,546(4.88)	0.8100
Arthritis	48,876,054(22.40)	1,271,480(27.33)	47,604,573(22.29)	0.4900
Cancer	37,456,830(17.17)	612,672(13.17)	36,844,158(17.25)	0.5600
Coronary Artery Disease	33,514,131(15.36)	617,412(13.27)	32,896,719(15.41)	0.6900
Number of Chronic Conditions, Median (IQR)	1.70 (0.46–3.01)	2.40(1.20–3.60)	1.70(0.44–3.00)	**0.0126**

Table 1 (*continued*)

Characteristics	Total N (%)	Dementia N (%)	No Dementia N (%)	*P*-value
*1.33% of this total variable is missing				
Total Number of Medications, Median (IQR)	2.83 (0.13–7.80)	6.10(0.72–9.60)	2.80(0.11–7.70)	0.1238
*0 can represent no medications listed				
Total Number of New Medications, Median (IQR)	0.00 (0.00–0.46)	0.00(0.00–0.06)	0.00(0.00–0.47)	**0.0109**
*0 can represent no medications listed				
Total Number of Continued Medications Median (IQR)	1.92 (0.00–7.22)	5.30(0.43–9.50)	1.90(0.00–7.10)	0.0566
*0 can represent no medications listed				
Polypharmacy (5+ medications)	95,991,946 (44.00)	2,701,727 (58.08)	93,290,218 (43.67)	0.0944
Was a New Medication Provided	76,077,194(34.87)	1,224,355(26.32)	74,852,839(35.05)	0.2116
Was Any Medication Provided	167,610,449(76.82)	4,057,834(87.24)	163,552,615(76.59)	0.0974
Visit Follow Up				
Return to referring physician/provider	6,711,143(3.08)	106,821(2.30)	6,604,322(3.09)	0.7000
Return to other physician/provider	16,944,412(7.77)	328,217(7.06)	16,616,195(7.78)	0.8500
Return in less than 1 week	6,541,087(3.00)	22,253(0.48)	6,518,835(3.05)	**0.0400**
Return in 1 week to less than 2 months	56,444,638(25.87)	1,907,217(41.00)	54,537,421(25.54)	0.0600
Return in 2 months or greater	93,176,292(42.71)	2,379,736(51.16)	90,796,556(42.52)	0.3400
Return at unspecified time	8,950,524(4.10)	36,268(77.97)	8,914,256(4.17)	**0.0100**
Return as needed	38,963,028(17.86)	230,459(4.95)	38,732,569(18.14)	**0.0016**

Combined unknown and blank variables as missing.
IQR = interquartile range.
Note: For NUMNEW and NUMCONT, the value '0' can reflect the following situations: for NUMNEW, a) no drug listed; b) drug listed as continued medication only; or c) drug listed but unknown whether new or continued; for NUMCONT, a) no drug listed; b) drug listed as new medication only, or c) drug listed but unknown whether new or continued.

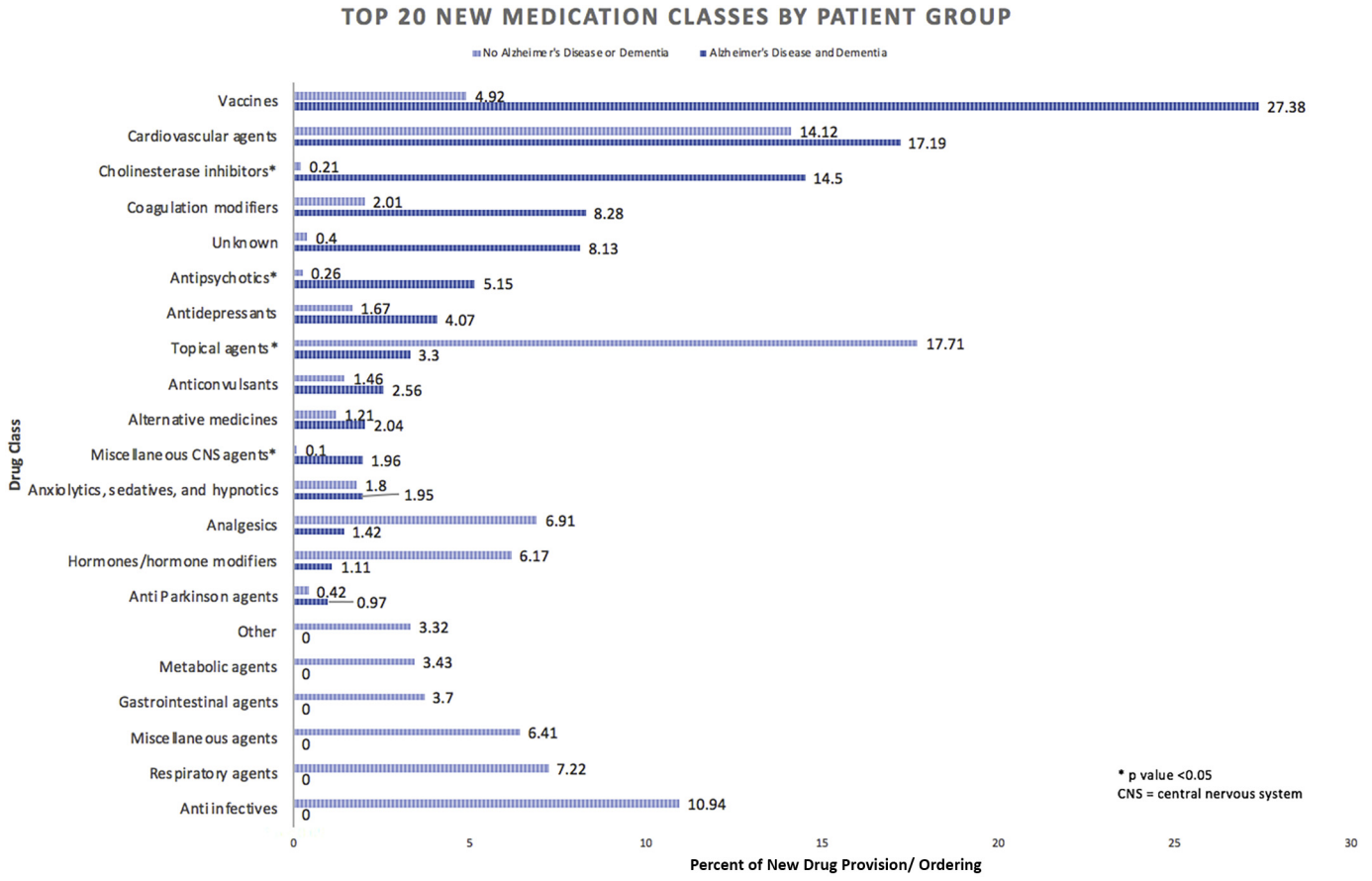

Fig. 2. Top 10 new medication classes. Miscellaneous agents (Multum Lexicon categories 106–111, 114, 192, 270, 284, 320, 460, 491, and 497) include: antidotes, chelating agents, cholinergic muscle stimulants, local injectable anesthetics, miscellaneous uncategorized agents, psoralens, illicit drugs, antirheumatics, antipsoriatics, viscosupplementation agents, smoking cessation agents, phosphate binders, local injectable anesthetics with corticosteroids, and cation exchange resins. See NAMCS documentation for more details on Multum Lexicon Therapeutic Classification Schema. Unknown (Multum Lexicon category 999): medications that could not be assigned a Therapeutic Classification by the NAMCS Drug Database Coder. Other medications (Multum Lexicon Category): anorexiants (253), anticholinergic agents (312), antiemetic/antivertigo agents (065), antineoplastics (020), biologicals (028), CNS stimulants (071), drugs used in alcohol dependence (378), general anesthetics (072), genitourinary tract agents (113), immunological agents (254 except 437), muscle relaxants (073), nutritional products (115), radiologic agents (331), VMAT2 inhibitors (496).

community, rather the addition of new medications in an outpatient setting.[33–35] As seen in previous studies that used data from NAMCS, this study has potentially important healthcare policy implications.[29] Patients with dementia had significantly more ambulatory care visits and contact with general practitioners than patients without dementia.[10,11] There was a nearly 50% decrease in the odds of ordering or providing a new medication at ambulatory visits for patients with dementia in 2016. Although there were no statistically significant differences in odds of new medications being provided between visits for patients with and without dementia, there were several statistically and clinically significant differences in the therapeutic classes of medications that were ordered or provided to these two patient groups(see Fig. 2).

At ambulatory visits for patients without dementia, topical agents, anti-infectives, and respiratory agents were included in the most common medication categories provided, but these agents were not provided as often to patients with dementia (see Fig. 2). Of these medication categories, topical agents were significantly different between visits of patients with and without dementia. These medication differences, specifically with the respiratory agents, are likely driven by the fact that nearly 17% of visits for patients without dementia reported a pulmonary disease comorbidity compared to only 1% of visits for patients with dementia, a significant finding. In addition, although statistically insignificant, approximately one fourth of patients without dementia,10% greater than patients with dementia, were being seen for a new problem. Authors hypothesize this may be an influential factor increasing anti-infective and topical therapies in patients without dementia due to provider fears of undertreatment and symptom ambiguity between bacterial and viral new, acute infections.[36]

Vaccines, cardiovascular agents, cholinesterase inhibitors, and coagulant modifiers were the most common new medications prescribed to patients with dementia at outpatient visits, many of which, except cardiovascular agents, were prescribed much less often in visits for patients without dementia. Unsurprisingly, cholinesterase inhibitors, indicated for treatment of dementia-related symptoms,[37] were significantly different between visits of patients with and without dementia. Additionally, more visits for patients with dementia provided antidepressants, antipsychotics, and miscellaneous central nervous system agents compared to visits for patients without dementia. Many of these differences may be explained by a difference in baseline risk for the comorbidities treated by these medications. For instance, agitation (commonly treated with antipsychotics) is often comorbid with dementia,[38] and depression has been reported in nearly half of individuals with certain types of dementia.[39]

What is concerning, however, is the fact that many antipsychotics and central nervous system agents are considered potentially inappropriate for all older adults (see the Beers Criteria[40]), and the Food and Drug Administration specifically recommends against managing dementia-related psychosis with antipsychotics.[41] In addition to the finding that PIMs are being ordered or provided at visits for patients with dementia more commonly than at visits for patients without dementia, it is also important to highlight that some of the more commonly provided new medications at visits for patients with dementia require close monitoring and dosage adjustments. Anticoagulants, antipsychotics, and antidepressants can cause prolonged hospitalizations, life threatening conditions, and disability due to medication errors.[42–44] The role of a pharmacist in the outpatient setting to improve the management of these potentially inappropriate or high-risk medications may include patient education, adherence promotion, dosage adjustments, adverse effect management, and laboratory and toxicity monitoring.[45–49]

Outside of the dementia population, existing evidence supports the pharmacist's role in each of these therapeutic areas, discussed prior. For instance, a review of pharmacist-managed outpatient anticoagulation services demonstrated a reduction in healthcare utilization and major thromboembolic events.[50] A pharmacist-psychiatrist collaborative team reported prescribing fewer antipsychotics and psychotropics, and an increased number of nonpharmacologic interventions documented when pharmacists were involved in patient care.[45] Even when PIMs are necessary for patients with dementia in residential aged care facilities, pharmacists in Australia have been shown to effectively reduce the dosages of PIMs.[51]

Though the role of pharmacists in the outpatient care of patients with dementia in the U.S. has yet to be defined, there is evidence suggesting that pharmacist-led medication therapy management (MTM) interventions in the community setting can effectively reduce inappropriate medication use for people with and without cognitive impairment.[52,53] As the drug experts, pharmacist could ensure appropriate medication therapy is chosen for individuals with dementia along with providing alternative or augmentative solutions, such as nonpharmacological options to combat psychosis.[41] Monitoring drug appropriateness, adherence, interactions, toxicity, cost, safety, and efficacy could assist combating the differences seen in visit utilization, comorbidities, payment type, and unspecified follow up time. These findings coupled with the observed differences in new medication classes prescribed to older adults with dementia suggest that there is a need for pharmacist-led services in the management of dementia at an ambulatory care setting.

To the authors' knowledge, this is the first study to evaluate the ordering and provision of new medications, regardless of appropriateness, in the outpatient setting among older adults with dementia in the U.S. However, this study is not without limitations. Although this study is purely descriptive and no causal relationships can be concluded, exploratory research is an important assessment tool because it reveals baseline associations that are required for further investigation. For instance while the cross-sectional nature of this study and the evaluation period of only one year may limit causal inference and generalizability, it provides convincing evidence that there is a significant need for pharmacists to intervene and improve patient care in the U.S. Future studies should evaluate trends over time, which could improve accuracy of these results (for instance, in 2016 only 73 unweighted visits for patients with dementia were recorded in NAMCS, explaining the wide confidence intervals seen for the primary outcome in this study).

Our study has notable strengths. First, the NAMCS is a valuable source to produce nationally weighted estimates of new medication orders and provisions in the U.S. outpatient setting, and has been validated in prior studies.[29,32] Another strength of this study was the careful adjustment of covariates, specifically for visits related to infection diagnosis or common symptoms of infection. A prior study utilizing the NAMCS data found antibiotics were prescribed in 13.2% of ambulatory visits, and 18% of these antibiotics were without a documented indication.[54] In this study, anti-infectives were reported as the third most common medication category in older adult patients without dementia, while in patients with dementia anti-infective therapy was not even within the top ten most common medication categories. After adjustment for infection, it did not significantly impact whether a new medication was provided to patients with or without dementia. Because patients with dementia struggle with adherence to medications, infection's lack of influence on whether dementia patient's receive a new medication at an ambulatory care visit serves as evidence that pharmacists could also be helpful managing complex antibiotic regimens.[55,56]

5. Conclusion

We were not able to detect a difference in provision of new medications at ambulatory care visits for patients with and without dementia after adjustment for confounders. Nevertheless, there were significant differences in the types of new medications those with and without dementia were provided. Further investigation is needed to evaluate prescribing trends for ambulatory patients with dementia, as well as the role of pharmacists in the care of patients with dementia at an outpatient setting. Future opportunities exist to evaluate the utilization and appropriateness of specific, new medications in older adults with dementia over a period of time. Finally, the benefits of pharmacist lead services on patients with dementia' medication efficacy, education, adherence, and safety in this setting have yet to be explored.

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Declaration of Competing Interest

The authors declare no relevant conflicts of interest or financial relationships.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.rcsop.2021.100058.

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