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Prevalence of Psychotropic and Opioid Prescribing Among Hospice Beneficiaries in the U.S., 2014-2016

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KEY POINTS

- National estimates of medication prescribing among Medicare beneficiaries receiving hospice care have not previously existed because medication use was not captured in Medicare claims.
- However, starting in 2014, hospices were required to list medications as part of the hospice bill to Medicare, permitting new research to evaluate medication prescribing in hospice.

Why does this study matter? This study demonstrates that over 75% of older hospice beneficiaries are prescribed psychotropic or opioid medications during hospice care with patterns of medication prescribing varying by sex, race, and principal hospice diagnosis.

ABSTRACT

Background/Objectives: Psychotropic and opioid medications are routinely prescribed for symptom management in hospice, but national estimates of prescribing are lacking. Changes in Medicare hospice payment in 2014 provide the first opportunity to examine psychotropic and opioid prescribing among hospice beneficiaries, and the factors associated with use of specific medication classes.

Design: Cross-sectional analysis of a 20% sample of traditional and managed Medicare with Part D enrolled in hospice, 2014-2016.

Setting: Beneficiaries enrolled in the Medicare hospice benefit.

Participants: Medicare beneficiaries ≥ 65 newly enrolled in hospice between 7/1/2014 to 12/31/2016 (N=554,022).

Main Outcome: Prevalence of psychotropic and opioid medication prescribing by class and factors associated with prescribing.

Results: 70.3% of hospice beneficiaries were prescribed a psychotropic and 63.3% were prescribed an opioid. The most common psychotropic classes prescribed were: benzodiazepines (60.6%), antipsychotics (38.3%), antidepressants (18.4%), and antiepileptics (10.2%). Lorazepam (56.4%), morphine (52.8%), and haloperidol (28.6%) were received by the most beneficiaries. Prevalence of any psychotropic and opioid prescription was highest among beneficiaries who were female (76.7%), non-Hispanic white (76.6%), and those with cancer (78.9%). Compared to white beneficiaries, non-Hispanic black beneficiaries were less likely to receive nearly every class of medication, with significantly lower odds of receiving opioids (64.1% vs. 57.9%; AOR 0.75, 95% CI 0.72-0.77) and benzodiazepines (61.6% vs. 52.2%; AOR 0.66, 95% CI 0.64-0.68). Differences were seen across hospice diagnosis; those with cancer were more likely to receive opioids, benzodiazepines, and antipsychotics but less likely to receive antidepressants and antiepileptics.

Conclusions: Psychotropic and opioid medications are frequently prescribed in hospice.

Observed variations in prescribing across race and ethnicity may reflect disparities in prescribing as well as patient preferences for care. Further work is important to understand factors driving prescribing given limited studies surrounding medication prescribing in hospice.

KEY WORDS: Hospice, psychotropic medication, symptom management

INTRODUCTION

Hospice utilization among Medicare beneficiaries has grown considerably and patients over age 65 comprise 84% of those receiving hospice services,¹ which focuses on comfort and symptom control for patients who are terminally ill. Behavioral symptoms such as anxiety, agitation, depression, and delirium are common at end of life and can be highly distressing for patients and caregivers.^{2,3} Psychotropic medications such as antipsychotics and benzodiazepines are routinely prescribed for both behavioral and physical (e.g., nausea) symptom management in hospice care.⁴ Despite being common components of the hospice toolkit, these same medications are generally considered potentially inappropriate for older adults not enrolled in hospice given side effects such as falls, sedation, and confusion.^{5,6} Balancing the risks and benefits of treatment can be challenging for hospice providers given limited studies to guide clinical decision making regarding psychotropic medication use at end of life.^{7,8}

While psychotropic and opioid medications are a routine part of symptom management at end of life, the actual extent of use is unclear. Previous national studies are based on older data limited to nursing home populations or staff-reported use in interviews recalling medication administration confined to the last week of life.^{9,10} A study of an individual hospice organization found that opioids, benzodiazepines, and antipsychotics were among the most common medication classes prescribed at end of life.¹¹ However, national estimates of medication use across various hospice care settings and throughout the entire hospice enrollment period are lacking. While Medicare includes a hospice benefit, prescribing to enrolled beneficiaries have not been captured in Medicare claims.¹² However, starting in 2014, hospices were required to list medications in the hospice bill to Medicare, providing the first opportunity to examine prescribing provided through the hospice benefit.¹³

By utilizing a 20% traditional and managed Medicare sample linking Part D and hospice data, this study provides the first national claims-based estimate of psychotropic and opioid

medication prescribing among older hospice beneficiaries in the U.S. from 2014-2016. This analysis presents the prevalence of psychotropic and opioid medication prescriptions by class and identifies the most commonly prescribed medications. Lastly, we evaluated the patient demographic and clinical factors associated with psychotropic and opioid medication prescribing in hospice.

METHODS

Study Cohort

We began with the 20% sample of Medicare beneficiaries from 7/1/2014-12/31/2016, including those in both traditional and managed Medicare. We used the linked Hospice file and limited the sample to Medicare beneficiaries ≥ 65 newly enrolled in hospice during the study time period. We also linked Part D claims for those in the cohort who had prescription coverage. Hospice payment reform recommended reporting of medications billed to hospice starting in January 2014, with reporting mandated by April 2014;^{12,13} we used a study start date of 7/1/2014 to provide a 6-month lag period as hospice providers began to comply with the new medication reporting requirement. We limited the sample to Medicare beneficiaries ≥ 65 newly enrolled in hospice during the study time period. For beneficiaries with more than one hospice enrollment episode during the study period (6.5%), we included their first hospice enrollment. A beneficiary remained in the cohort until disenrollment from hospice, death, or the end of the study period, whichever came first.

Outcomes

The outcomes of interest were overall and class-specific psychotropic and opioid medication prescription fills for the following classes: antidepressants, antiepileptics, antipsychotics, benzodiazepines, other sedative hypnotics, opioids, and stimulants (**Supplementary Table S1**). To capture use overall, we identified medications in both the

hospice revenue center file and Part D prescription drug event file: medications identified in the Hospice claims are specifically billed for end-of-life care; claims in Part D are for chronic conditions receiving ongoing treatment.¹⁴ We identified prescription fills from revenue codes in Hospice claims including non-injectable and injectable drugs.¹³ We identified medications based on using National Drug Codes (NDC) and Healthcare Common Procedure Coding System (HCPCS) codes. Prescription fills rather than days of use were evaluated within both Part D and Hospice claims because unlike Part D, days of medication supplied is not available within the hospice revenue center file.

Demographic and Clinical Characteristics

We determined beneficiary age, sex, race/ethnicity, rurality, medical comorbidity, and predominate location of care from the Medicare Hospice claims files. Rurality was derived using beneficiary zip code and Rural-Urban Commuting Area Codes.¹⁵ Medical comorbidity was determined based on the number of clinical diagnoses at the time of hospice enrollment and categorized into 1-3, 4-6, and 7+ diagnoses based on the distribution of number of comorbidities. Predominant location of care was determined as the location beneficiaries spent the majority of days during hospice enrollment. For the 0.2% of beneficiaries who had equal days across locations, their most recent location was recorded. Hospice primary qualifying diagnoses including cancer, circulatory/heart disease, dementia, respiratory disease, stroke, and other were categorized based on Clinical Classifications Software (CCS) diagnosis categories for ICD-9 and ICD-10 diagnosis codes and identified in the Hospice claims files. Diagnoses and CCS groupings were based on the Centers for Medicare and Medicaid Services principal hospice diagnosis classifications designated in the Medicare Hospice Public Use File (see **Supplementary Table S2** for CCS codes used).^{16,17} Length of hospice enrollment was categorized as < 1 month, 1-3 months, > 3 months based on the distribution of hospice enrollment length.

Statistical Analysis

We first estimated the prevalence of psychotropic and opioid medication prescription fills overall and by individual medication class. Within each medication class, we calculated the prevalence of prescription fills by demographic characteristic and principal hospice diagnosis code. We used multivariable logistic regression to model the odds of psychotropic and opioid medication prescribing overall and for each class, adjusting for demographic characteristics, rurality, principal hospice diagnosis, medical comorbidity, length of hospice enrollment, and type of Medicare coverage (e.g., traditional fee-for-service or Medicare Advantage) at time of hospice enrollment. Lastly, we identified the top psychotropic and opioid medications prescribed overall and by medication classes and summarized the rate of medication fills per person calculated as the number of prescription fills per beneficiary divided by the number of days in hospice. We conducted a sensitivity analysis to examine if findings were consistent when restricting the cohort to patients with a hospice length of stay >7 days to further examine potential differences in prescribing among beneficiaries with longer hospice stays.

All analyses were conducted using SAS 9.4. Two-sided statistical tests were conducted using alpha set at 0.05. This study was approved the Michigan Medicine IRB; informed consent was waived.

RESULTS

The cohort for the primary analysis included 554,022 older Medicare beneficiaries with an index hospice enrollment period between 7/1/2014-12/31/2016. The majority of hospice enrollees were female (58.3%), non-Hispanic white (87.5%), and the average age was 83.2 (**Table 1**). Beneficiaries received the majority of their hospice care at home (50.9%) or in nursing facilities (31.4%). The most common principal hospice diagnosis code was cancer (28.9%) followed by circulatory/heart disease (18.6%) and dementia (17.0%). The median hospice length of stay was 17 days (interquartile range [IQR] 5, 72); 32.2% of enrollees had a

length of stay < 7 days. 3.6% (N=19,683) of beneficiaries had a hospice length of stay greater than one year; among those beneficiaries, the most common principal hospice diagnosis was dementia (33.3%) followed by circulatory/heart disease (21.8%).

Psychotropic and Opioid Medication Prescribing Among Hospice Beneficiaries

Among older hospice beneficiaries in our cohort, 75.9% were prescribed a psychotropic or opioid medication during their index hospice stay: 60.2% received psychotropic and opioid medications only through the hospice benefit, 11.8% received medications through both hospice and Part D, and 3.8% received medications only through Part D. The prevalence of prescribing by medication class was: opioids (63.3%), benzodiazepines (60.6%), antipsychotics (38.3%), antidepressants (18.4%), antiepileptics (10.2%), sedative hypnotics (1.9%), and stimulants (0.2%; **Table 2**). A total of 70.3% of beneficiaries had at least one prescription fill for a psychotropic medication. The prevalence of any psychotropic or opioid medication prescription fill was highest among beneficiaries who were female (76.7%), younger (76.5%), lived in rural areas (76.6%), non-Hispanic white (76.6%), and those with cancer (78.9%). Additionally, psychotropic and opioid prescription fills were more common among beneficiaries with a greater number of medical comorbidities (78.7%), longer length of hospice enrollment (90.3%), and among those with Medicare Advantage (76.7%). Male beneficiaries were slightly less likely to receive psychotropic and opioid medication prescriptions (74.7% vs. 76.7% female; adjusted odds ratio [AOR] 0.95, 95% confidence interval [CI] 0.95-0.97, $p < 0.001$). Males were less likely to receive most medication class with the exception of benzodiazepines and antipsychotics.

Non-Hispanic whites were more likely to receive prescriptions for most medication classes. Compared to non-Hispanic white beneficiaries, non-Hispanic black beneficiaries were less likely to receive nearly every class of medication, with significantly lower odds of receiving opioids (64.1% vs. 57.9%; AOR 0.75, 95% CI 0.72-0.77) and benzodiazepines (61.6% vs. 52.2%; AOR 0.66, 95% CI 0.64-0.68). Non-Hispanic black beneficiaries had lower odds of

receiving prescriptions for all medication classes with the exception of antiepileptics (11.5% vs. 10.2% non-Hispanic white; AOR 1.06, 95% CI 1.01-1.10, $p < 0.01$). Patients in rural locations were slightly more likely to receive an opioid (66.0% vs. 63.2% urban; AOR 1.10, 95% CI 1.07-1.12, $p < 0.001$), but less likely to receive antipsychotics, antidepressants, or antiepileptics.

Beneficiaries with a greater number of medical comorbidities were more likely to be prescribed medications overall (78.7% 7+ comorbidities vs. 73.8% 1-3 comorbidities; AOR 1.41, 95% CI 1.38-1.44, $p < 0.001$). Similarly, patients with a longer length of hospice enrollment were significantly more likely to be prescribed any psychotropic or opioid medication (90.3% length of stay > 3 months vs. 67.7% length of stay < 1 month; AOR 4.80, 95% CI 4.66-4.93, $p < 0.001$).

When evaluating the top 20 psychotropic and opioid medications prescribed overall, lorazepam (56.4%), morphine (52.8%), and haloperidol (28.6%) were the most common medications received by hospice enrollees (**Supplementary Table S3**). The median per-person rate of prescribing was 7.1 prescription fills per 100 person-days for lorazepam and for morphine, and 5.3 prescription fills for haloperidol. The top 3 specific medications prescribed within each medication class and their median per-person rate of prescribing are presented in **Table 3**. The most commonly received antidepressant, antiepileptic, sedative hypnotic, and stimulant medication were as follows: mirtazapine (5.1%), gabapentin (5.4%), zolpidem (1.8%), and methylphenidate (0.2%).

Psychotropic and opioid medication use also varied with principal hospice diagnosis (**Table 2; Figure 1**). Compared to other hospice principal diagnoses, patients with cancer were significantly more likely to receive opioids, benzodiazepines, antipsychotics, other sedative hypnotics, and stimulants, but less likely to receive antidepressants and antiepileptics (**Supplementary Table S4**). Patients with dementia had the highest odds of being prescribed antidepressants (25.6% dementia vs. 14.2% cancer; AOR 1.55, 95% CI 1.52-1.59, $p < 0.001$) while patients enrolled in hospice for stroke had the highest odds of being prescribed antiepileptics (11.9% stroke vs. 9.4% cancer; AOR 1.44, 95% CI 1.38-1.51, $p < 0.001$). Following

patients with dementia, patients with a principal hospice diagnosis of heart disease had the next highest odds of receiving antidepressants, while patients with dementia had the next highest odds of receiving antiepileptics.

Sensitivity Analyses

Among beneficiaries in our cohort, 14.9% had no prescription fills for any medication class while enrolled in hospice including medication classes prescribed in addition to psychotropics and opioids (e.g., diuretics, antihypertensives). These beneficiaries had a shorter hospice length of stay (median length of stay 4 days, IQR 2-9 days). We conducted a sensitivity analysis restricting the study cohort to patients with a hospice length of stay of >7 days (N=375,550), and this reduced the number of beneficiaries without any prescription fills in hospice to 6.8%. The prevalence of psychotropic and opioid prescribing overall increased to 84.0% and the prevalence increased across all medication classes (**Supplementary Table S5**). Primary analysis results remained largely unchanged with one exception: patients with respiratory disorders were more likely to be prescribed antiepileptics relative to patients with cancer.

DISCUSSION

In this analysis of older Medicare beneficiaries enrolled in hospice, 75.9% of patients received a psychotropic or opioid medication prescription; prevalence increased to 84.0% when restricting to patients enrolled in hospice for >7 days. The most common medication classes prescribed were opioids, benzodiazepines, and antipsychotics as were a host of other psychotropic medications. Lorazepam, morphine, and haloperidol were received by the most beneficiaries—medications that are common components of the hospice “comfort” or emergency kit. However, refills of these medications suggest that prescribing extended beyond the “comfort” kit and not all beneficiaries uniformly received these medications. Female

beneficiaries had a slightly higher prevalence of prescribing than male beneficiaries, while the odds of psychotropic and opioid prescribing were lowest among non-Hispanic black patients as compared to other racial groups. Patterns of psychotropic and opioid prescribing also varied by the principal hospice diagnosis.

Despite the routine use of psychotropic and opioid medications in end-of-life care, the true extent of use has been unknown because the Medicare hospice benefit did not require hospice providers to report medication administration.¹² In 2002 Buchanan et al., using the Minimum Data Set from nursing home residents in hospice from 1998-2000, found 89% of residents were prescribed sedative hypnotics, 88% antipsychotics, and 77% antidepressants.⁹ Evaluation of hospice staff interviews from the 2007 National Home and Hospice Care Survey (NHHCS) found that opioids, sedative hypnotics, and antipsychotics were commonly prescribed to 92%, 76%, and 38% of all hospice patients within the last week of life, respectively.¹⁰ More recently, in an analysis of data from patients from a single hospice organization, opioids, anxiolytics, and antipsychotics were among the most commonly prescribed medications, each prescribed to over 60% of patients with cancer and dementia in hospice in 2010.¹¹ Since Medicare began to require documentation of medications provided in hospice, there has been only one preliminary evaluation of medications provided by the hospice benefit in 2014, finding that lorazepam, morphine, and haloperidol were among the most frequently prescribed medications, consistent with our findings.¹³

Previous studies outside of hospice care demonstrate that non-clinical factors such as sex, race, and geography are associated with psychotropic medication prescribing^{18,19}—it appears that these patterns also extend to end-of-life care. The prevalence of psychotropic or opioid prescription fills was slightly higher for female than male beneficiaries overall, with higher rates of prescribing of opioids, antidepressants, and antiepileptics. This is consistent with previous findings that among older adults overall, psychotropic and opioid prescribing is more common among females than males, with especially high rates of medication prescribing to

older non-Hispanic white females.¹⁹⁻²¹ The higher prevalence of opioid prescribing in rural locations is also consistent with non-hospice settings,²² suggesting that this may reflect higher baseline prescribing of these medications that extends into the end of life period or differences in the practice patterns of the physicians beneficiaries see. Older beneficiaries were slightly less likely to receive all medication classes which may reflect concerns regarding the side effect profile of such medications among the oldest hospice beneficiaries.

The largest prescribing differences observed among patient characteristics were across racial and ethnic groups. Compared to white beneficiaries, non-Hispanic black patients were less likely to receive nearly every class of medication, with significantly lower odds of receiving opioids and benzodiazepines, even after controlling for medical comorbidity and hospice length of stay. Studies have consistently documented that minority patients are less likely to enroll in hospice care and report less satisfaction with the quality of end-of-life care received.^{23,24} The same physician biases that limit prescribing of controlled substances to black patients may extend to end-of-life care, preventing access to medications that can provide comfort and symptom relief.^{25,26} Alternatively, the lower prevalence of opioid and benzodiazepine medication prescribing may represent patient and family preferences to not use such medications given concerns for side effects such as sedation or fears that use of such medications may hasten death.²⁷

Among clinical characteristics, beneficiaries with a greater number of medical comorbidities were more likely to receive medications overall, possibility related to increased symptom burden. Similarly, beneficiaries with a longer length of hospice stay were significantly more likely to receive psychotropic or opioid medications during their hospice enrollment. Significant differences were also seen across principal hospice diagnoses. Compared to beneficiaries with other hospice principal diagnoses, those with cancer were more likely to receive opioids, benzodiazepines, and antipsychotics but less likely to receive antidepressants and antiepileptics. High rates of antipsychotic medication prescribing (44.0%) observed here

may represent off-label use (e.g., haloperidol, olanzapine) for treatment of nausea.²⁸ Patients with cancer had the lowest rates of antidepressant prescribing which may reflect concerns regarding time to benefit with starting antidepressant medication in patients with limited life expectancy or potential lower detection and treatment of depression among patients with cancer.²⁹ Patients with dementia had high rates of being prescribed antidepressant and antiepileptic medications as compared to other hospice diagnoses. Off-label use of psychotropic medications to treat behavioral symptoms in dementia is common and recent studies of Medicare beneficiaries with dementia not in hospice care demonstrate high rates of antidepressant and antiepileptic prescribing.^{30,31}

Psychotropic medications are frequently used in hospice for symptom management, however, there are few studies that evaluate the efficacy of psychotropic use for symptom management in end-of-life care to help guide clinical decision making with these medications.^{7,28,32} A recent randomized, placebo-controlled trial and Cochrane review of haloperidol in terminally ill patients found that antipsychotics caused earlier mortality and worsened delirium relative to placebo.^{7,8} It is unclear whether more or less use of psychotropic medications is appropriate in end-of-life care. However, it is important to understand differences in who receives and does not receive these medications within hospice as this may reflect other quality and access to care issues.

Our analysis has several limitations. First, prescription claims may not reflect actual medication use, and we do not know the prescribing indications. Second, while our sample includes patients with traditional and managed Medicare, the prevalence of medication use may be underestimated as we are not able to capture other non-hospice or non-Part D prescriptions. Third, the claims do not include prescriptions from inpatient or skilled nursing admissions, which may further underestimate the extent of medication prescribing and does not allow us to evaluate prescribing across these hospice locations. Fourth, overall prescribing may be underestimated as medications prescribed prior to hospice enrollment may be continued and

not require a refill. Additionally, medications provided through infusion pumps are not included here which may also underestimate prescribing, however, this represents only 1.6% of hospice beneficiaries. Finally, this analysis does not control for provider or hospice facility-level factors that may be associated with medication prescribing.

CONCLUSIONS

Psychotropic and opioid medications are routinely prescribed for both behavioral and physical symptom management in hospice care. This analysis provides the first national estimate of the extent of medication prescribing among Medicare beneficiaries enrolled in hospice in the U.S. While opioid, benzodiazepine, and antipsychotic medications—common components of the hospice “comfort” kit—were frequently prescribed, so were a host of other psychotropic medications. Non-clinical factors such as race and ethnicity were associated with medication prescribing, which may reflect disparities in prescribing, patient and family preferences for care, or both. It is critical to better understand the factors that drive psychotropic prescribing at end of life, as well as whether this extensive prescribing does in fact improve quality of life for these older adults.

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Study concept and design: Gerlach, Kales, Kim, Covinsky, Bynum, Teno, Maust

Acquisition, analysis, or interpretation of data: all authors

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Supplementary Materials

Supplementary Table S1. List of opioid and psychotropic medication classes

Supplementary Table S2. Clinical Classifications Software (CCS) diagnosis categories used to define principal hospice qualifying diagnosis

Supplementary Table S3. Top 20 psychotropic and opioid medications prescribed among older hospice beneficiaries in the U.S., from 2014-2016 (N=554,022)

Supplementary Table S4. Adjusted prevalence of psychotropic and opioid medication prescribing among older hospice beneficiaries based on principal hospice diagnosis, 2014-2016 (N=554,022)

Supplementary Table S5. Prevalence of psychotropic and opioid medication prescribing among older hospice beneficiaries, overall and by demographics, principal hospice diagnosis, and location of care, restricting to patients with a hospice length of stay >7 days (N=375,550)

Figure Legends:

Figure 1. Adjusted prevalence of opioid and psychotropic medication classes prescribed to older hospice beneficiaries by principal hospice diagnosis (N=554,022)^{a,b}

^a Adjusted prevalence of opioids and psychotropic medication classes are presented. Logistic regression models with sex, age, race/ethnicity, rurality, principal hospice diagnosis, medical comorbidity, hospice length of stay, and Medicare coverage were fit. Adjusted prevalence of a given medication class (e.g., opioids) for a given principal hospice diagnosis group were computed by setting all variables except principal hospice diagnosis group to their mean.

^b For example, among older hospice beneficiaries with a principal hospice diagnosis of cancer, the adjusted prevalence of opioids was 72.3%, the adjusted prevalence of benzodiazepines was 66.6%, and so on. Results for stimulant medications are excluded here given low prevalence of use.

Table 1. Demographic and clinical characteristics of study cohort, 2014-2016

Characteristic	Study Cohort (N=544,022)
	Patient, No. (%)
Sex	
Female	323,106 (58.3)
Male	230,916 (41.7)
Age, mean (SD), years	83.2 (8.8)
Died during index hospice enrollment	434,732 (78.4)
Rurality	
Urban	471,809 (85.2)
Rural	66,825 (12.1)
Race/Ethnicity	
Non-Hispanic White	484,557 (87.5)
Non-Hispanic Black	42,656 (7.7)
Hispanic	10,694 (1.9)
Other	16,115 (2.9)
Principal Hospice Diagnosis	
Cancer	160,015 (28.9)
Circulatory/Heart Disease	103,203 (18.6)
Dementia	94,199 (17.0)
Respiratory	59,599 (10.8)
Stroke	52,790 (9.5)
Other	84,216 (15.2)
Predominant Location of Care	
Home	282,125 (50.9)
Nursing facility ^a	174,053 (31.4)
Hospice inpatient facility	53,424 (9.7)
Acute care hospital	36,599 (6.6)
Other	7,671 (1.4)
Medicare Coverage	
Traditional Fee for Service	369,650 (66.7)
Medicare Advantage	184,372 (33.3)
Sources of Medications Dispensed in Hospice	
Hospice claims file only	333,794 (60.2)
Both Hospice claims file and Part D	65,530 (11.8)
Part D only	20,951 (3.8)
Hospice length of stay, median (Q1, Q3), days	17 (5, 72)

SD, standard deviation; Q1: 25th percentile; Q3: 75th percentile

^a Includes skilled nursing facilities, nursing facilities, assisted living facilities, and long-term care facilities

Table 2. Prevalence of psychotropic and opioid medication prescribing among older hospice beneficiaries, overall and by demographics and principal hospice diagnosis (N=544,022)^a

Demographics	Opioids		Benzodiazepines		Antipsychotics		Antidepressants		Antiepileptics	
	%	AOR (95% CI)	%	AOR (95% CI)	%	AOR (95% CI)	%	AOR (95% CI)	%	AOR (95% CI)
All	63.3		60.6		38.3		18.4		10.2	
Sex										
Female	63.4	1 (ref)	60.7	1 (ref)	37.9	1 (ref)	20.2	1 (ref)	10.9	1 (ref)
Male	63.2	0.98 (0.97,1.00) ^c	60.5	1.00 (0.98,1.01)	38.9	1.07 (1.06,1.10) ^d	15.8	0.86 (0.84,0.87) ^d	9.3	0.90 (0.88,0.92) ^d
Age										
65-74	66.2	1.10 (1.08,1.13) ^d	62.5	1.10 (1.08,1.12) ^d	40.1	1.11 (1.09,1.14) ^d	17.7	1.41 (1.38,1.44) ^d	13.3	2.31 (2.24,2.39) ^d
75-84	64.2	1.06 (1.04,1.08) ^d	61.2	1.06 (1.04,1.08) ^d	39.0	1.07 (1.05,1.09) ^d	18.8	1.25 (1.23,1.27) ^d	11.2	1.62 (1.58,1.67) ^d
85 +	61.6	1 (ref)	59.5	1 (ref)	37.1	1 (ref)	18.3	1 (ref)	8.3	1 (ref)
Rurality										
Urban	63.2	1 (ref)	60.8	1 (ref)	39.2	1 (ref)	18.6	1 (ref)	10.2	1 (ref)
Rural	66.0	1.10 (1.07,1.12) ^d	60.9	0.98 (0.96,1.00) ^b	33.6	0.77 (0.76,0.79) ^d	17.4	0.91 (0.89,0.93) ^d	9.9	0.95 (0.92,0.99) ^c
Race/Ethnicity										
Non-Hispanic white	64.1	1 (ref)	61.6	1 (ref)	38.8	1 (ref)	19.0	1 (ref)	10.2	1 (ref)
Non-Hispanic black	57.9	0.75 (0.72,0.77) ^d	52.2	0.66 (0.64,0.68) ^d	33.6	0.75 (0.73,0.78) ^d	13.5	0.61 (0.59,0.63) ^d	11.5	1.06 (1.01,1.10) ^c
Hispanic	54.3	0.74 (0.70,0.78) ^d	54.0	0.78 (0.74,0.82) ^d	35.8	0.91 (0.86,0.97) ^d	17.1	0.85 (0.80,0.90) ^d	10.7	1.02 (0.93,1.12)
Other	60.6	0.84 (0.80,0.87) ^d	56.7	0.80 (0.76,0.83) ^d	38.6	0.95 (0.90,0.99) ^c	13.2	0.61 (0.58,0.64) ^d	8.5	0.77 (0.71,0.83) ^d
Principal Hospice Diagnosis										
Cancer	70.7	1 (ref)	65.1	1 (ref)	44.0	1 (ref)	14.2	1 (ref)	9.4	1 (ref)
Circulatory/heart disease	63.3	0.66 (0.65,0.68) ^d	60.9	0.78 (0.76,0.80) ^d	36.8	0.69 (0.67,0.70) ^d	19.6	1.31 (1.28,1.34) ^d	10.2	1.16 (1.12,1.21) ^d
Dementia	58.9	0.52 (0.50,0.53) ^d	58.7	0.67 (0.65,0.69) ^d	41.1	0.78 (0.76,0.80) ^d	25.6	1.55 (1.52,1.59) ^d	12.4	1.22 (1.17,1.26) ^d
Respiratory	61.5	0.63 (0.61,0.65) ^d	60.1	0.77 (0.75,0.79) ^d	32.0	0.57 (0.55,0.58) ^d	18.8	1.30 (1.26,1.34) ^d	9.6	0.99 (0.94,1.03)
Stroke	57.7	0.56 (0.54,0.57) ^d	56.1	0.67 (0.65,0.69) ^d	33.5	0.63 (0.61,0.65) ^d	18.0	1.30 (1.26,1.34) ^d	11.9	1.44 (1.38,1.51) ^d
Other	59.2	0.60 (0.58,0.61) ^d	56.9	0.70 (0.69,0.72) ^d	33.9	0.65 (0.64,0.67) ^d	16.6	1.26 (1.23,1.29) ^d	8.8	1.04 (1.00,1.08) ^c
Medical Comorbidity (Number of Diagnoses)										
1-3	60.7	1 (ref)	58.4	1 (ref)	36.6	1 (ref)	18.2	1 (ref)	10.1	1 (ref)
4-6	64.5	1.19 (1.16,1.21) ^d	61.7	1.16 (1.13,1.18) ^d	39.7	1.16 (1.14,1.19) ^d	17.8	1.02 (1.00,1.04)	9.9	1.01 (0.98,1.04)
7+	66.8	1.36 (1.34,1.39) ^d	63.4	1.28 (1.25,1.30) ^d	40.1	1.22 (1.20,1.25) ^d	18.9	1.16 (1.14,1.19) ^d	10.6	1.15 (1.12,1.18) ^d
Length of Hospice Enrollment										
< 1 month	57.0	1 (ref)	54.8	1 (ref)	31.0	1 (ref)	7.3	1 (ref)	4.7	1 (ref)
1-3 months	71.9	1.97 (1.93,2.01) ^d	67.5	1.73 (1.70,1.76) ^d	47.9	2.05 (2.01,2.09) ^d	28.2	5.00 (4.91,5.10) ^d	15.4	3.76 (3.65,3.88) ^d
> 3 months	73.8	2.45 (2.40,2.50) ^d	71.3	2.23 (2.19,2.28) ^d	50.8	2.49 (2.44,2.53) ^d	41.3	8.79 (8.63,8.95) ^d	21.5	5.84 (5.67,6.02) ^d
Medicare Coverage										
Medicare Advantage	63.7	1 (ref)	61.6	1 (ref)	40.4	1 (ref)	18.5	1 (ref)	10.5	1 (ref)
Fee-for-Service	63.1	0.96 (0.95,0.98) ^d	60.1	0.93 (0.92,0.94) ^d	37.3	0.88 (0.87,0.90) ^d	18.2	0.98 (0.97,1.00) ^b	10.1	1.01 (0.99,1.04)

AOR, adjusted odds ratio; CI, confidence interval

^a Results for other sedative hypnotics and stimulants are excluded here given low prevalence of use (1.9% and 0.2%, respectively).

^b p<0.05; ^c p<0.01; ^d p<0.001. P-value corresponds to test examining if use differs from the reference group, adjusting for sex, age, race/ethnicity, rurality, principal hospice diagnosis, medical comorbidity, hospice length of stay, and Medicare coverage.

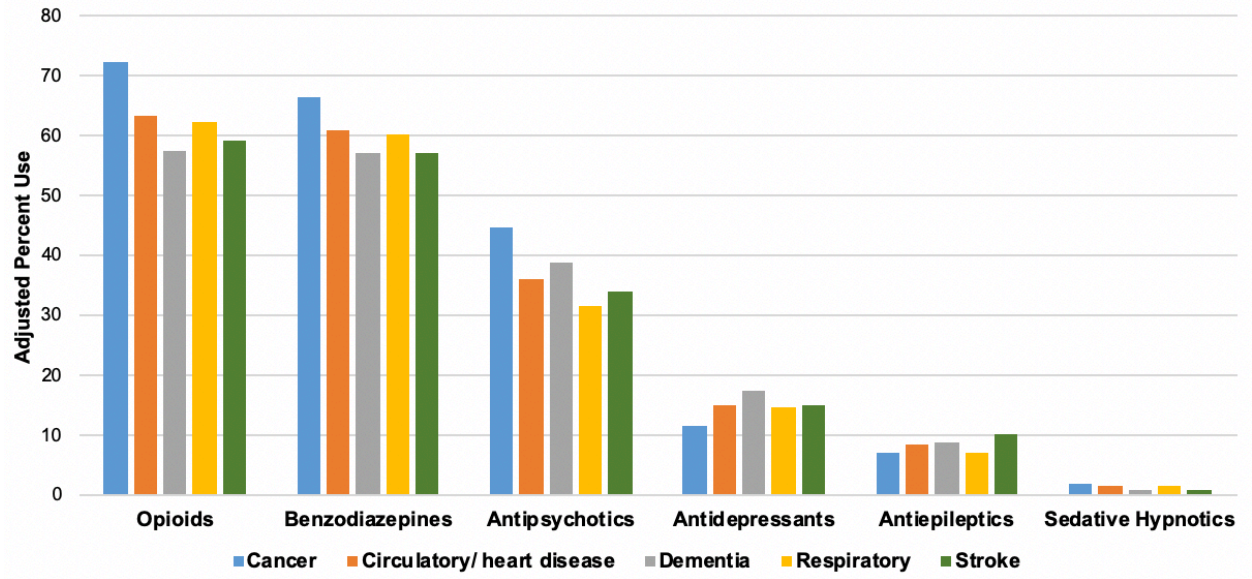
Table 3. Top opioid and psychotropic medication classes and medications within class among older hospice beneficiaries in the U.S., 2014-2016 (N=554,022)

Drug class	Beneficiaries Prescribed, %	Generic Drug Name	Beneficiaries Prescribed, %	Median Rate of Prescribing per 100 person-days (Q1, Q3) ^a
Opioids ^b	63.3	Morphine	52.8	7.1 (2.1, 20.0)
		Hydrocodone	10.3	3.7 (1.7, 7.0)
		Oxycodone	7.0	5.3 (2.4, 10.6)
Benzodiazepines	60.6	Lorazepam	56.4	7.1 (2.4, 20.0)
		Alprazolam	4.8	4.4 (2.1, 8.3)
		Temazepam	3.5	3.8 (1.9, 6.9)
Antipsychotics	38.3	Haloperidol	28.6	5.3 (1.7, 14.3)
		Prochlorperazine	17.0	4.0 (1.3, 11.1)
		Quetiapine	5.1	4.1 (2.2, 7.1)
Antidepressants	18.4	Mirtazapine	5.1	3.6 (2.2, 6.1)
		Trazodone	5.0	3.6 (1.9, 6.1)
		Sertraline	4.1	3.7 (2.3, 6.1)
Antiepileptics	10.2	Gabapentin	5.4	3.9 (2.2, 6.7)
		Levetiracetam	1.9	4.3 (2.8, 7.9)
		Divalproex ^c	1.9	3.6 (2.1, 5.9)
Sedative Hypnotics	1.9	Zolpidem	1.8	3.5 (1.7, 6.5)
		Eszopiclone	0.1	2.9 (1.6, 4.5)
		Zaleplon	0.0	2.9 (0.9, 5.3)
Stimulants	0.2	Methylphenidate	0.2	2.9 (1.3, 5.4)
		Dextroamphetamine	0.0	3.2 (2.0, 6.7)
		Atomoxetine	0.0	0.6 (0.3, 7.0)

^a Rate of prescribing is calculated as number of prescription fills / number of days in hospice per 100 person-days. Q1 is 25th percentile, and Q3 is 75th percentile.

^b Includes combination medications (e.g., oxycodone/acetaminophen).

^c Includes valproate and derivatives



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