Prevalence of Long-term Opioid Use in Long-Stay Nursing Home Residents

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Abstract

Background/Objectives—Overall and long-term opioid use among older adults have increased since 1999. Less is known about opioid use in older adults in nursing homes (NH).

Design—Cross-sectional.

Setting—13,522 U.S. NHs

Participants—315,949 long-stay NH resident Medicare beneficiaries with a Minimum Data Set 3.0 (MDS) assessment between 4/1/2012 – 6/30/2012 and 120 days of follow-up.

Measurements—We used Medicare Part D claims to measure length of opioid use in the 120 days from the index assessment (short-term: 30 days, medium-term: >30–89 days, long-term: 90 days), adjuvants (e.g., anticonvulsants), and other pain medications (e.g., corticosteroids). MDS assessments in the follow-up period were used to measure nonpharmacologic pain management use. Modified Poisson models were used to estimate adjusted prevalence ratios (aPR) and 95% confidence intervals (CI) for age, gender, race/ethnicity, cognitive and physical impairment and long-term opioid use.

Results—Among all long-stay residents, 32.4% were prescribed any opioid and 15.5% were prescribed long-term. Pain adjuvants (32.9% vs. 14.9% in non-users), other pain medications (25.5% vs. 11.0%) and nonpharmacologic approaches (24.5% vs. 9.3%) were more common among opioid users versus non-users. Long-term opioid use was higher in women (vs. men, aPR: 1.21, 95% CI: 1.18–1.23) and lower in racial/ethnic minorities (non-Hispanic blacks vs. whites, aPR: 0.93, 95% CI: 0.90–0.94) and those with severe cognitive impairment (vs. no/mild impairment, aPR: 0.82, 95% CI: 0.79–0.83).

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Conclusion—One in 7 NH residents were prescribed opioids long-term. National concerns of opioid safety highlight reducing long-term opioid use, but this is challenging in NHs because residents may not benefit from nonpharmacologic and nonopioid interventions. Studies to address concerns of opioid safety and effectiveness (e.g., on pain and functional status) in NHs are needed.

Keywords

opioids; pain management; nursing homes; pain adjuvants

INTRODUCTION

In the United States, prescription opioid use quadrupled to >240 million prescriptions annually from 1999–2010.[1] At the same time, rates of opioid misuse, abuse, addiction, and fatal and non-fatal overdoses increased for both younger and older adults.[2–5] In response to this epidemic, the Centers for Disease Control and Prevention (CDC) released guidelines for managing chronic pain that caution against opioid use and warn that the benefits for improving pain and function must outweigh the risks when prescribing opioids.[6] The short-term effectiveness of opioids for pain management has been documented.[7,8] No study has demonstrated that long-term opioid use (3 months) is effective while many studies document risks (e.g. falls, fractures, overdoses).[9] Despite this, use of opioids long-term has increased in community-dwelling older adults.[10,11] To our knowledge, no studies have described long-term opioid use in older adults living in nursing homes.

Managing pain in nursing homes is challenging, and this care setting has a documented history of undertreating pain.[12–15] Prescribers must balance the risks associated with untreated/undertreated pain (e.g., dependence in activities of daily living, anxiety, depression)[16–18] with potential risks of opioids. Opioids are prescribed to 60% of nursing home residents in persistent pain.[14,19] Elderly nursing home residents may be uniquely vulnerable to the sedating side effects of opioids (even at therapeutic doses) and adverse drug events due to their older age, frailty, and high burden of comorbidities and polypharmacy in comparison to community-dwelling elders.[20–23] Yet, little is known about how opioids and concurrent pharmacologic/nonpharmacologic therapies for pain are currently being used in nursing homes despite the potential harms associated with long-term opioid use.[6,9]

To date, opioid prescribing guidelines and national campaigns have largely focused on younger adults and community-dwelling elders and may not be applicable to nursing home residents despite the burden of pain and extensive analgesic use in this population.[6,24–26] We conducted a study to: 1) estimate the prevalence of overall and long-term opioid use; 2) describe patterns of opioid and other pharmacologic/nonpharmacologic pain management by length of opioid use; and 3) describe variation in long-term opioid use by key resident factors.

METHODS

Study Design and Data Sources

This cross-sectional study (approved by the University of Massachusetts School Internal Review Board) used routinely-collected, federally-required administrative data from 2012 of all nursing home residents in Medicare- and/or Medicaid-certified nursing homes (the Minimum Data Set [MDS] 3.0; covering ~96% of US nursing homes) merged to facility characteristics data (Certification and Survey Provider Enhanced Reporting) and pharmacy claims (Medicare Part D). The MDS 3.0 is a standardized assessment conducted by trained, registered nurses with 400+ items including medical conditions, cognitive/physical functioning, and pain/pain management.[27–29] Based on medical record review and interviews with staff and direct caregivers, assessments are conducted at admission and quarterly thereafter. Measures have demonstrated validity and reliability (K ≥ 0.78 for pain management measures).[27]

Study Sample

Our cohort included Medicare beneficiaries who were long-stay residents (>100 consecutive days in nursing home) and had a MDS assessment between 4/1/2012–6/30/2012 (n=602,122). The first eligible assessment was selected. Long-stay residents were included because they generally require extensive, long-term assistance from nursing homes to manage their chronic disabilities.[30] After restricting to those ≥ 65 years of age without a cancer diagnosis or receiving hospice care, 315,949 residents met inclusion/exclusion criteria applied for practical purposes (e.g., missing data; see Supplementary Figure S1).

Opioid Use

We were conceptually interested in opioid use during 120 days of follow-up (starting at index date), which we operationalized using Medicare Part D claims. Part D claims provided information on the generic drug name (used to identify opioids), prescription fill date, days' supply, dosage form, and dosage strength. Opioids were classified by their duration of action (short- vs. long-acting). The number of prescribed opioids during the 120 days of follow-up was calculated. Dosage form was categorized as oral, injection, transdermal, or other.

We estimated cumulative days of opioid use during the 120 day study period based on opioid prescription fill dates plus days' supply, assuming that the opioid was used on the fill date and daily for as long as the medication was prescribed.[31] We assumed that residents with overlapping opioid prescriptions (e.g., filling a second opioid prescription with ≥ 1 day of opioid use still remaining from the previous prescription) used both medications simultaneously as prescribed. We categorized opioid use as long-term (≥ 90 days cumulative use during the 120 days)[32,33], medium-term (31–89 cumulative days), and short-term (1–30 days). We categorized the average daily dose in oral morphine equivalents (OME) using recent CDC guidelines as <50 mg, 50–89 mg, and ≥ 90 mg OME/day.[6,34]

Part D claims provide no information on the administration of pain medications. Although not specific to opioids, MDS assessments during follow-up (items J0100A and J0100B)

were used to broadly describe pain management regimens in the preceding five days as scheduled and/or *pro re nata* (PRN).

Pain Management and Other Medications

Part D claims provided information on the total number of nonopioid medications and alternative analgesics / pain adjuvants prescribed during the 120 day follow-up. Nonopioid pharmacotherapies included prescribed nonsteroidal anti-inflammatory agents (NSAIDS; excluding aspirin). The American Geriatrics Society (AGS) 2009 guidelines[26] were used to identify pain adjuvants and other medications used for pain.

MDS assessments during the follow-up provided information on potentially contraindicated psychopharmacologic medication use in the 7 days preceding the MDS (anxiolytics, hypnotics).[6] We used the MDS because benzodiazepines were not covered by Part D in 2012. We also measured the percentage of residents receiving 2 antipsychotics, anxiolytics, and/or hypnotics because concurrent use of 2 central nervous system-active medications with opioids can increase the risk of falls/fractures beyond opioid use alone.[9,35]

Guidelines recommend that persons receiving opioids receive nonpharmacological interventions.[6] MDS 3.0 item J0100C documented receipt of nonpharmacologic pain management in the 5 days before the assessment.[27]

Resident Characteristics

Age, gender, race/ethnicity, and cognitive/physical impairment have been documented to influence opioid use.[12–16,36] Age (65–74 years, 76–84 years, 85 years), gender, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic/Latino, Asian, other), physical impairment, and cognitive impairment came from the MDS. Physical impairment was measured using the MDS-ADL scale.[37] Cognitive impairment was classified using CMS definitions.[38] We also evaluated persistent pain (defined as pain with a duration 3 months),[26] and intermittent pain.[15] We considered resident characteristics that may be potential confounders including length of nursing home stay (<1 year, 1–2 years, 2–3 years, 3 years), marital status (married vs. other), comorbidities known to cause pain (e.g., arthritis, fractures), and total comorbidity burden (based on MDS 3.0 Section I; categorized into quartiles).

Analysis

Descriptive statistics summarized 1) variation in resident characteristics by age group; 2) medication use / characteristics of use by length of opioid use during follow-up; and 3) length of opioid use by resident characteristics. Modified Poisson models with robust variance estimation (using generalized estimating equations and exchangeable correlation structure) were used to estimate crude and adjusted prevalence ratios (aPR) with 95% confidence intervals (CI) for key resident characteristics and long-term opioid use.[39] Adjusted analyses included nursing home state and all resident characteristics. We conducted analyses restricted to those in persistent pain to provide further information on this vulnerable subgroup and to compare our results to prior studies.[12,14,15]

Supplemental analyses to examine potential selection bias due to loss to follow-up by estimating any opioid use in those who were censored (excluding those who died or received hospice care).

RESULTS

The mean age of long-stay residents was 84.4 years (standard deviation [SD]: 8.7); the majority were women (76.2%), non-Hispanic white (80.6%), with a median length of stay of 2.1 years (interquartile range [IQR]: 1.3–3.6; see Table 1). Most residents were moderately or severely physically and/or cognitively impaired, with higher prevalence of severe cognitive impairment and dementia in older age groups. More than 40% of residents had 7 comorbidities, and painful comorbidities including arthritis (32.8%; more prevalent in older groups), anxiety (25.8%), depression (54.5%), and diabetes (31.6%; more prevalent in younger groups) were common. Persistent pain and intermittent pain occurred in 15.5% and 16.1% of residents, respectively.

Thirty-two percent were prescribed any opioids during the 120 day follow-up period, with 10.4%, 6.5%, and 15.5% of all participants prescribed opioids for short-, medium-, and long-term (Table 2). The most common opioids were hydrocodone (52.6%; see Supplementary Table S1 for further detail), tramadol (31.8%), fentanyl (12.5%) and oxycodone (11.8%). The majority of short-term (99.0%), medium-term (94.5%) and long-term opioid users (65.7%) were prescribed short-acting opioids only. Long-term opioid users were prescribed more long-acting opioids (34.1% of long-term vs. 1.0% of short-term users) and had higher average daily doses (16.0% of long-term had average daily dose 90 mg OME/day vs. 3.3% of short-term). The majority of opioid prescriptions were oral formulations, though nearly one-quarter of long-term users received transdermal prescriptions (fentanyl). The majority of long-term users received scheduled analgesics (97.0%) with 29.5% receiving PRN analgesics. Scheduled analgesic use was lower for short-term (scheduled: 43.5%, PRN: 42.0%) and medium-term users (scheduled: 77.6%, PRN: 47.6%).

The median number of unique nonopioid medications prescribed during 120 days was 12 in opioid users (IQR: 8–16) and 9 in non-users (IQR: 6–12). When examining other medications used during follow-up (Table 2), 16.1% of residents prescribed opioids had stand-alone prescription NSAIDS claims versus 8.4% of non-users. Pain adjuvants (32.9% of opioid users) and other medications used for pain (25.5% of opioid users) appeared more than twice as common in opioid users versus non-users. Anxiolytics/hypnotics were more common in opioid users than non-users (31.6% vs. 17.5%), as were 2 psychopharmacologics (13.1% vs. 8.0%). See Supplementary Table S2 for specific medications.

Nine percent, 19.8%, 26.0%, and 25.4% of non-, short-term, medium-term, and long-term opioid users received nonpharmacological pain management, respectively.

Women (vs. men; overall: 34.1% vs. 26.8%; long-term: 16.7% vs. 11.6%, non-Hispanic whites (vs. non-Hispanic blacks; overall: 33.9% vs. 27.3%; long-term: 16.6% vs. 11.7%),

those with no/mild cognitive impairment (vs. severe impairment; overall: 44.5 vs. 25.4%; long-term: 21.9% vs. 12.1%), and those in persistent pain (vs. no pain; overall: 69.8% vs. 20.5%; long-term: 35.6% vs. 9.6%) appeared to have greater overall opioid and long-term opioid use (Figure 1).

Table 3 shows that resident factors associated with increased prevalence of long-term opioid use included being severely physically impaired (vs. no/mild impairment; aPR: 1.25, 95% CI: 1.22–1.28) or a woman (vs. men; aPR: 1.21, 95% CI: 1.18–1.23). Prevalence of long-term use was lower in racial/ethnic minorities (vs. non-Hispanic whites): non-Hispanic blacks (aPR: 0.93 95% CI: 0.90–0.95), Hispanics (aPR: 0.84, 95% CI: 0.80–0.88), Asians (aPR: 0.69, 95% CI: 0.61–0.77), and other (aPR: 0.89, 95% CI: 0.80–0.99). Prevalence of long-term opioid use was lower in those with moderate to severe cognitive impairment (severe vs. no/mild; aPR: 0.82, 95% CI: 0.79–0.83). When restricting to residents in persistent pain, adjusted prevalence ratios were qualitatively similar albeit attenuated for gender physical impairment (Supplementary Table S3).

In supplemental analyses of opioid use in those excluded due to censoring other than death or hospice, overall opioid use was higher than in our analytic sample (41.8% vs. 32.4%; see Supplementary Text S1).

DISCUSSION

We found that nearly one-third of long-stay residents in 2012 were prescribed opioids during the 120 day follow-up, with 1 in 7 residents prescribed opioids long-term. We identified interesting patterns of nonopioid analgesics, adjuvants, and nonpharmacologic pain management use in opioid users and non-users that begin to fill knowledge gaps in nursing home resident pain management. Although we reported a lower prevalence of persistent pain than older studies,[12,40] the extent to which this is due to the opioids, other medications, or methodologic differences cannot be disentangled.[15] Given no studies demonstrate the long-term effectiveness of opioids and concerns that nursing home residents may be more vulnerable to adverse side effects of opioids,[9,20–23] our findings inform discussions about improving opioid use with other pain management strategies in nursing homes.

The high prevalence of long-term opioid use in nursing homes is more than twofold the prescribing seen in community-dwelling older adults.[10,11] This may be warranted due to residents' pain/painful comorbidity burden and the historical undertreatment of pain in this care setting,[12–16,36] which has distressing consequences including poor quality of life, decreased physical functioning, anxiety, and depression.[16–18] Similar to community-dwelling populations, most residents received only short-acting opioids.[41] This may be insufficient for managing chronic pain, which may require scheduled, long-acting opioids for adequate pain management.[26] However, the risks of opioid use are not adequately understood, as few studies of opioid effectiveness and safety have examined nursing home residents.[9,42] The high frequency of fentanyl initiation in opioid-naïve residents also raises concerns of suboptimal opioid prescribing.[43,44] In community-dwelling populations, opioids have been linked to falls, fractures, overdoses, and all-cause mortality; further work is needed to characterize risks in nursing home residents.[6,9]

Our findings suggest that increased use of nonopioid analgesics and nonpharmacologic pain management may be potential areas for improvement in nursing homes, though these recommendations are not without limitations.[6,26] Nonopioid medications used for pain are recommended as the first line treatment for chronic nonmalignant pain and can be concurrently used with opioids to provide potentially greater benefits to residents.[6] We found that pain adjuvants/other medications for pain were only prescribed to approximately half of opioid users during follow-up. Whether this is appropriate remains unclear because these agents also have potential risks. For example, NSAIDS are known to be associated with hepatic, gastrointestinal, renal, and cardiovascular events in older adults and may not be appropriate opioid substitutes.[26,35] AGS and CDC guidelines recommend nonpharmacologic pain management, which can be combined with opioid therapy to provide potentially greater pain relief to residents.[6,45] We found that nonpharmacologic therapies were used in only one-quarter of opioid users. Although we could not ascertain specific nonpharmacologic interventions used with the MDS 3.0, common approaches in nursing homes include bio-feedback, applying heat/cold, massage, physical therapy, nerve block, stretching/strengthening exercises), and electrical stimulation.[46] Their use – along with other nonopioid analgesics – are associated with short-term benefits and lower risks than opioids,[6] but may have limited applicability to cognitively impaired residents and may be difficult to implement given nursing home staffing and reimbursement constraints.

We noted several potentially modifiable risk factors for opioid prescribing, particularly in long-term users. Long-term users had higher daily doses than short- and medium-term users. Although long-term users may need higher doses due to increased opioid tolerance, many adverse events linked to opioids are dose-dependent,[9] and the CDC prescribing guidelines recommend reassessing individual risks and benefits at doses 50 OME/day and avoiding or carefully justifying doses 90 OME/day.[6] Opioid users had a high prevalence of anxiolytic/hypnotic use. Direct measurement of benzodiazepines was not possible because they were not covered by Part D. Yet, before Part D, benzodiazepine use was more common than other anxiolytics/hypnotics in nursing homes.[47] Benzodiazepines should never be co-prescribed with opioids,[6] though further work is needed to evaluate this issue. Finally, 13% of opioid users received 2 medications known to increase the risks of falls/fractures during follow-up (antipsychotics, anxiolytics, and/or hypnotics).[35] When possible, prescribers should optimize concurrent psychopharmacologic use to address concerns of drug-drug interactions and the co-occurrence of anxiety and depression with pain, which can interfere with pain management.[6,35] Although reductions in antipsychotic use have occurred since 2012, antipsychotics, anxiolytics and hypnotics remain commonly used.[48,49]

Findings that long-term opioid use was higher in women, non-Hispanic whites, those with severe physical impairment, and those with no/mild cognitive impairment are consistent with prior studies examining the correlates of untreated or undertreated persistent pain in long-stay residents.[14,15] Contrasting with prior studies,[14,15] we did not observe a strong relationship between age and opioid use, perhaps due to the higher burden of certain painful comorbidities (e.g., arthritis) in those 85 years old, though caution is warranted when using opioids long-term in this population due to residents' increased frailty. Identifying whether some residents are more susceptible to opioid-related adverse events is warranted.

This study has several strengths and limitations. The national MDS 3.0 data linked to Part D claims provided national, comprehensive information on long-stay residents who were Medicare beneficiaries. We provided detailed information on opioid use not previously examined including specific opioids used, dosage strength, and length of opioid use over 120 days of follow-up. We characterized nonopioid pharmacologic alternatives for pain, nonpharmacologic pain management, and concurrent psychopharmacologic medication use. While the data are from 2012, they provide an important, more recent snapshot on opioid prescribing during the height of the opioid epidemic.[4,14,15] Although we had loss to follow-up by requiring residents to be in the nursing home for 120 days, the sensitivity analysis suggests our estimates may be conservative because those lost to follow-up had higher opioid use. We recognize that classifying opioid use by cumulative number of days discarded important information on patterns of opioid use. We believe this affected our results focusing on long-term opioid use minimally. Operationalizing medication use through Part D claims may overestimate opioid use if medications were not used by residents; multiple opioid claims among those prescribed opioids suggest that this issue may be minimal. We cannot know from Part D claims how medications were administered, though data from MDS assessments show that most long-term opioid users received scheduled analgesics. We have limited information on indications for medication use, resulting in potential misclassification (e.g., medications classified as pain adjuvants when they are prescribed for other indications). We could not evaluate over-the-counter medications from Part D (e.g., over-the-counter NSAIDS). No information on resident or staff pain management preferences was available.

In conclusion, long-term opioid use in older nursing home residents is twice as prevalent than in community settings.[11] Cautious and consistent monitoring of opioid doses, optimizing concurrent psychopharmacologic, and increasing use of nonopioid analgesics and adjuvants and nonpharmacologic interventions hen appropriate may be warranted to improve the quality opioid use in nursing homes. Interventions to improve opioid prescribing should incorporate complex systems approaches that engage all providers including physicians, nurses, pharmacists, and other staff to improve opioid prescribing (e.g., through education, increased use of alternatives, and adverse event monitoring).[50] Comparative effectiveness studies that focus on physical functioning, pain control, and quality of life endpoints, and comparative safety studies of opioids in nursing homes could help healthcare providers, residents and their families make informed decisions on opioid use.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Conflict of interest:

Elements of Financial/Personal Conflicts	JNH		SAC		CMU		AH		JT		KLL	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Employment or Affiliation		X		X		X		x		X		X
Grants/Funds	X			X	X			x	X		X	
Honoraria		X		X		X		x		X		X
Speaker Forum		X		X		X		x		X		X
Consultant		X		X		X		x	X			X
Stocks		X		X		X		x		X		X
Royalties		X		X		X		x		X		X
Expert Testimony		X		X		X		x		X		X
Board Member		X		X		X		x		X		X
Patents		X		X		X		x		X		X
Personal Relationship		X		X		X		x		X		X

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	No use, %	Short-term, %	Medium-term,%	Long-term,%
Age, years				
65-74	65.1	10.9	7.5	16.5
75-84	66.7	10.6	7.0	15.7
85+	68.9	10.1	6.0	15.0
Gender				
Women	65.9	10.6	6.9	16.7
Men	73.2	9.8	5.4	11.6
Race/Ethnicity				
Non-Hispanic White	66.1	10.5	6.8	16.6
Non-Hispanic Black	72.7	10.1	5.6	11.7
Hispanic/Latino	75.2	10.3	5.0	9.4
Asian	83.4	7.3	2.9	6.4
Other	72.2	9.5	5.7	12.6
Cognitive Impairment				
None/mild	55.5	13.0	9.6	21.9
Moderate	67.6	11.0	6.5	15.0
Severe	74.6	8.5	4.8	12.1
Physical Impairment				
None/mild	66.0	11.1	7.1	15.8
Moderate	67.5	10.8	6.6	15.1
Severe	69.5	8.9	5.8	15.9
Pain Duration				
None	79.5	7.5	3.4	9.6
Intermittent	53.3	16.2	9.6	21.0
Persistent	30.2	17.2	17.1	35.5

(60%) (20%) 20% 60%

No opioid use   **Opioid use**

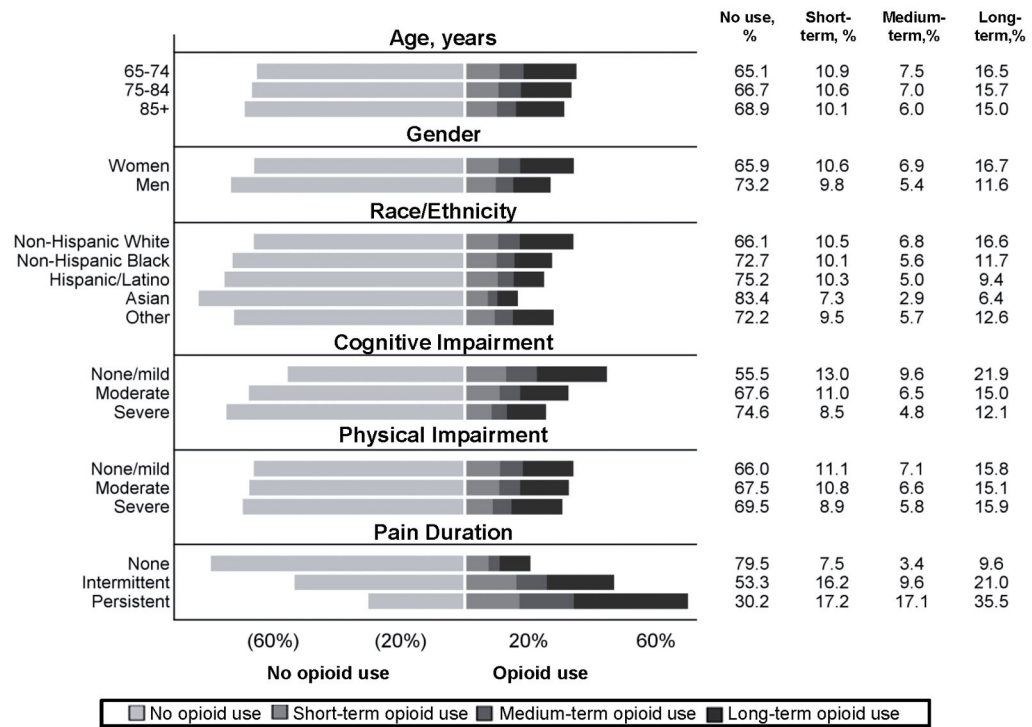☐ No opioid use ☐ Short-term opioid use ■ Medium-term opioid use ■ Long-term opioid use

Figure 1.
Crude prevalence of short-, medium-, and long-term opioid use by age, gender, race/ ethnicity, cognitive impairment, physical impairment, and pain duration for long stay nursing home resident in 2012 (N=315,949).

Table 1

Characteristics of long-stay nursing home residents who were Medicare beneficiaries in 2012, overall and stratified by age (N=315,949).

Characteristic, %[a]	Overall (N=315,949)	Stratified by age		
		65–74 years (n= 50,005)	75–84 years (n=95,297)	85 years (n=170,647)
Women	76.2	55.5	70.8	85.3
Race/ethnicity				
Non-Hispanic white	80.6	73.2	77.3	84.6
Non-Hispanic black	12.6	19.4	14.5	9.5
Hispanic / Latino	4.7	5.5	5.8	3.9
Asian	1.5	1.2	1.6	1.5
Other	0.6	0.8	0.8	0.5
Married	15.7	18.6	21.1	11.8
Length of nursing home stay				
<1 year	17.2	17.9	18.6	16.2
1–2 years	31.1	31.7	32.5	30.1
2–3 years	19.4	18.2	19.4	19.9
>3 years	32.3	32.3	29.6	33.8
Physical impairment[b]				
Moderate	50.9	46.6	49.2	53.2
Severe	25.5	24.3	26.4	25.4
Cognitive impairment[c]				
Moderate	29.4	29.2	29.8	29.3
Severe	44.7	29.8	42.1	50.6
Comorbidities				
Arthritis	30.5	20.6	27.6	35.0
Osteoporosis	19.5	11.6	16.6	23.4
Hip fracture	1.1	0.5	1.0	1.3
Other fracture	1.6	1.1	1.4	1.7
Diabetes	31.6	42.6	37.7	24.9
Dementia	64.5	45.7	64.5	70.0
Parkinson's	7.2	7.7	9.4	5.9
Pressure ulcers	3.0	3.2	3.0	2.9
Anxiety	25.8	26.9	27.0	24.7
Depression	54.5	57.2	56.9	52.5
Asthma, COPD, chronic lung failure	18.3	22.6	19.8	16.2
Respiratory failure	0.6	1.3	0.6	0.3
Renal failure	7.8	8.0	7.8	7.8
>8 total comorbidities[d]	19.1	21.0	20.7	17.8
Pain duration[e]				

Characteristic, %[a]	Overall (N=315,949)	Stratified by age		
		65–74 years (n=50,005)	75–84 years (n=95,297)	85 years (n=170,647)
Intermittent pain	16.1	15.7	16.0	16.2
Persistent pain	15.5	18.4	16.4	14.1

Abbreviations: BIMS: Brief Interview for Mental Status; COPD: chronic obstructive pulmonary disease; CPS: Cognitive Performance Scale; MDS: Minimum Data Set.

[a]Columns may not add up to 100% due to rounding

[b]Defined using the MDS ADL Self-Performance Hierarchy Scale (range 0–7): None/mild (0–2), moderate (3–4), severe (5–6)

[c]Defined using the BIMS (range 0–15) or CPS (range 0–7): no/mild impairment (BIMS 13–15 or CPS 0–2), moderate (BIMS 8–12 or CPS 3–4), severe (BIMS 0–7 or CPS 5–6)

[d]Total comorbidity burden was defined by summing all comorbidities in MDS 3.0 section I on index assessment and categorizing into quartiles. Only top quartile is displayed.

[e]Defined as any self-reported or staff-assessed pain on both the index MDS assessment and a preceding MDS assessment (90 +/− 20 days before the index assessment)

Table 2

Characteristics of opioids, nonopioid pharmacologic alternatives, and potentially contraindicated psychopharmacologic medications prescribed during 120 days of follow-up in long-stay nursing home residents in 2012 (N=315,949).

Medication use during follow-up[a]	No opioid use (n=213,652)	Length of opioid use[b]		
		Short-term (n=32,841)	Medium-term (n=20,615)	Long-term (n=48,841)
Opioid use[c]				
Median number opioid claims, (IQR)	-	1 (1–2)	5 (3–7)	6 (5–10)
Duration of action				
Short-acting only	-	99.0	94.5	65.7
Long-acting only	-	0.6	1.8	12.5
Short- and long-acting	-	0.4	3.6	21.8
Average daily dose (in oral morphine equivalents)[d]				
<50 mg/day	-	78.4	77.2	68.1
50–89 mg/day	-	18.4	19.0	15.9
90 mg/day	-	3.3	3.8	16.0
Dosage form[e]				
Oral	-	99.5	98.8	91.5
Injection	-	0.2	0.1	0.1
Transdermal	-	0.7	3.6	24.3
Other	-	0.01	0.0	0.0
Nonopioid pharmacologic alternatives				
Standalone prescription NSAIDS	8.4	15.3	17.5	16.0
Any pain adjuvants and/or other medications used for pain[f]	23.4	41.4	50.3	50.3
Pain adjuvants	14.9	27.6	34.7	35.7
Anticonvulsants	9.7	19.7	25.5	25.4
Antidepressants	6.4	11.6	15.6	17.1
Other medications used for pain	11.0	21.8	27.4	27.2
Corticosteroids	6.5	11.2	13.1	12.2
Muscle relaxants	2.7	6.6	9.1	9.6
Transdermal Lidocaine	2.4	6.2	9.2	9.5
Potentially contraindicated medication use[g]				
Any anxiolytic or hypnotic use	17.5	27.6	35.5	32.7
2 antipsychotic, anxiolytic and/or hypnotic[g]	8.0	11.5	14.8	13.5

Abbreviations: ER: extended release; IQR: interquartile range; PRN: pro re nata; NSAIDS: nonsteroidal anti-inflammatory agents

[a]Numbers are percentages unless otherwise noted. Percentages may not add up to 100% due to rounding

[b]Based on MDS assessments during follow-up, prevalence of scheduled and PRN analgesics use varied by short- (scheduled: 43.5%, PRN: 42.0%), medium- (scheduled: 77.6%, PRN: 47.6%) and long-term users (scheduled:97.0%, PRN: 29.5%).

[c]Short-acting opioids included codeine, dihydrocodeine, hydrocodone, hydromorphone, meperidine, morphine, nalbuphine, oxycodone, oxymorphone, pentazocine, tapentadol, and tramadol. Long-acting opioids included buprenorphine, butorphanol, transdermal fentanyl, hydromorphone extended release (ER), methadone, morphine ER, oxycodone ER, oxymorphone ER, tapentadol ER, and tramadol ER

[d]Calculated by estimating average daily dose of each unique opioid prescription, converting each prescription to oral morphine equivalents, summing the oral morphine equivalents for all prescriptions, and dividing by the estimated cumulative days of opioid use.

[e]Percentages add up to >100% because some participants used multiple opioids with different dosage forms

[f]Antidepressents commonly used as adjuvants included desipramine, nortriptyline, amitriptyline, duloxetine, venlafaxine and milnacipran.[26] Anticonvulsants included carbamazepine, gabapentin, lamotrigine, pregabalin. Corticosteroids included dexamethasone, prednisone, prednisolone, and methylprednisolone. Muscle relaxants included baclofen, carisoprodol, chlorzoxazone, cyclobenzaprine, dantrolene, metaxolone, methocarbamol, orphenadrine, and tizanidine.

[g]Defined using the Minimum Data Set during 120-day follow-up (excludes the index MDS assessment).

Table 3

Association between resident characteristics and long-term opioid use (N=315,949).

Characteristic	Long-term opioid use, %	Crude PR (95% CI)	Adjusted PR[a] (95% CI)
Age, years			
65–74	16.5	Referent	Referent
75–84	15.7	0.93 (0.91–0.95)	0.97 (0.95–1.00)
85	15.0	0.88 (0.86–0.90)	0.94 (0.92–0.97)
Gender			
Men	11.6	Referent	Referent
Women	16.7	1.40 (1.37–1.43)	1.21 (1.18–1.23)
Race/ethnicity			
Non-Hispanic White	16.6	Referent	Referent
Non-Hispanic Black	11.7	0.77 (0.75–0.80)	0.93 (0.90–0.95)
Hispanic/Latino	9.4	0.69 (0.66–0.73)	0.84 (0.80–0.88)
Asian	6.4	0.51 (0.46–0.57)	0.69 (0.61–0.77)
Other	12.6	0.81 (0.72–0.90)	0.89 (0.80–0.99)
Cognitive Impairment			
No/mild	21.9	Referent	Referent
Moderate	15.0	0.69 (0.68–0.71)	0.89 (0.87–0.91)
Severe	12.1	0.56 (0.54–0.57)	0.82 (0.79–0.83)
Physical impairment			
No/mild	15.8	Referent	Referent
Moderate	15.1	0.95 (0.93–0.97)	1.04 (1.02–1.06)
Severe	15.9	1.04 (1.02–1.07)	1.25 (1.22–1.28)

Abbreviations: CI: confidence interval; PR: prevalence ratio

[a] Prevalence ratios were estimated using modified Poisson models (using generalized estimating equations to account for clustering within nursing homes).[39] Models are adjusted for all resident characteristics in Table 1 and state of residence.