Original Article

Pharmacologic Management of Non-Cancer Pain Among Nursing Home Residents

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Abstract

Context. Pain is common in nursing home settings.

Objectives. To describe scheduled analgesic use among nursing home (NH) residents experiencing non-cancer pain and evaluate factors associated with scheduled analgesic use.

Methods. We identified 2508 residents living in one of 185 NHs predominantly from one for-profit chain, with pain recorded on two consecutive Minimum Data Set assessments. Pharmacy transaction files provided detailed medication information. Logistic regression models adjusted for clustering of residents in NHs identified factors related to scheduled prescription analgesics.

Results. Twenty-three percent had no scheduled analgesics prescribed. Those with scheduled analgesics were more likely to have excruciating pain (5.5% vs. 1.2%) and moderate pain documented (64.7% vs. 47.5%) than residents without scheduled analgesics. Hydrocodone (41.7%), short-acting oxycodone (16.6%), and long-acting fentanyl (9.4%) were common, and 13.8% reported any nonsteroidal anti-inflammatory agent use. Factors associated with decreased odds of scheduled analgesics included severe cognitive impairment (adjusted odds ratio [AOR] 0.56; 95% confidence interval [CI] 0.36 to 0.88), age more than 85 years (AOR 0.57; 95% CI 0.41 to 0.80), and Parkinson's disease (AOR 0.55; 95% CI 0.30 to 0.99). Factors associated with increased odds of scheduled analgesic use included history of fracture (AOR 1.79; 95% CI 1.16 to 2.76), diabetes (AOR 1.30; 95% CI 1.02 to 1.66), and higher Minimum Data Set mood scores (AOR 1.11; 95% CI 1.04 to 1.19).

Conclusion. Some improvements in pharmacologic management of pain in NHs have been realized. Yet, presence of pain without scheduled analgesics prescribed was still common. Evidence-based procedures to assure adherence to clinical practice guidelines for pain management in this setting are warranted. J Pain Symptom Manage 2013;45:33–42.

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Key Words
Pain, analgesics, nursing home

Introduction

Persistent pain is common in nursing home (NH) settings[1,2] and is mostly associated with musculoskeletal disorders.[3] Functional impairment, mood changes, such as depression and anxiety, sleep disturbances, and falls, may be untoward effects associated with persistent pain and inadequate pain management,[4,5] but there also may be adverse effects associated with opioid use.[6] The goals of pain management in older adults are different from those in younger persons; quality of life is paramount.[4] Guidelines updated by the American Geriatrics Society note the challenges and considerations that must be made when treating persistent pain in elderly patients.[4] Pharmacokinetic changes associated with aging, including decreased clearance of medication owing to impaired renal function, slower gastrointestinal transit time prolonging effects of continuous release medications, and increased anticholinergic side effects must be considered when prescribing analgesics.[7,8] Because of these issues, guidelines recommend initiating pain medications at low doses followed by careful upward titration on reassessment of pain.[4]

We believed that more recent data on analgesic prescribing patterns would be useful to understand where improvements to appropriate analgesic prescribing and administration might be necessary given the American Geriatrics Society's updated clinical practice guidelines. The first-line therapy for pain is acetaminophen[9] and nonsteroidal anti-inflammatory agents (NSAIDs), with a proton pump inhibitor. COX-2 inhibitors should be used rarely, and if used, with extreme caution.[10] Opioids may be a relatively safe option in the management of pain. Therefore, the objectives of this study were to describe scheduled analgesic prescription patterns before the guidelines were released, describe the use of potential adjuvant therapy for pain, and identify correlates of scheduled analgesics among NH residents while non-cancer pain documented on at least two consecutive Minimum Data Set (MDS) assessments.

Methods

The New England Institutional Review Board approved this study.

MDS Data

This study used an extract from the AnalytiCare™ LLC, a proprietary database deriving data from predominantly one for-profit NH chain.[11] The extract extended the Resident Assessment Information from the MDS[12] to include pharmacy transaction data, which captures all scheduled prescriptions. The MDS version 2.0 includes sociodemographic elements, information on cognitive patterns, communication, mood and behavior, physical functioning, and psychosocial well-being, as well as an extensive array of signs, symptoms, syndromes, active clinical diagnoses, and treatments. Studies of the interrater and test-retest reliability of the MDS version 2.0 have documented that the tool reliably identifies common geriatric problems.[13–16] Summary scales based on various MDS items permit the valid and reliable[13] evaluation of activities of daily living (ADLs)[17] and cognitive performance.[18]

Study Sample

We requested a data extract from AnalytiCare™ LLC such that we received a random sample of 10,000 residents who resided in participating NHs with an initial qualifying MDS assessment (admission, quarterly or annual assessment) between January 1, 2007 and November 30, 2009 and a second qualifying assessment within 120 days of the initial assessment and before November 30, 2009. To be eligible for this study, NH residents also had to have at least one medication in the pharmacy extract files in the 90 days before their index assessment and the 90 days after their follow-up assessment. We did not restrict the sample at this stage with respect to age, hospice enrollment, or long stay. However, by virtue of the requirement of two consecutive MDS assessments, most short-stay residents were not included. The focus of this study was on non-cancer pain so we did not include

residents with a cancer diagnosis on the index assessment. We also excluded residents with inability to communicate (e.g., comatose state) or who exhibited severe communication difficulties (i.e., rarely/never understood as noted in the MDS Section C Item 4). The original extract included 48 residents without a consecutive MDS assessment within 120 days.

This analysis focused on the pharmacologic management with analgesics and/or adjuvants of residents experiencing pain on two consecutive MDS assessments. We evaluated pain using MDS items collected by a multidisciplinary team of various professionals within the NH who evaluated signs and symptoms of pain in each resident. The MDS pain items may result in underestimates of pain.[19–21] The NH team is trained to rely on resident self-report if possible by asking simple, direct questions about whether the resident had experienced pain over a period of observation allowing repeated interaction with the resident. The NH team also has the ability to get the input of family and staff regularly providing care. The frequency of any type of physical pain or discomfort in any part of the body over the seven days preceding the assessment was captured (no pain, pain less than daily, and pain daily),[11] as well as its intensity (mild pain, moderate pain, or times when pain is horrible or excruciating). Using these items over the two consecutive MDS assessments (either the quarterly or the annual assessment spaced within 120 days), there were 4836 residents with no documented pain on either assessment, 2608 residents with pain documented on only one assessment, and 2508 residents with pain that was documented on at least two consecutive MDS assessments. The latter group comprised our study sample ($n = 2508$).

Medication Use

Contained within the AnalytiCare™ database are pharmacy transaction billing data for medications filled for residents residing in one of the NHs contributing data to the database. We used data contained in the pharmacy dispensing data files to identify scheduled analgesics and other medications that are potentially used in the management of pain. In the AnalytiCare™ database, pharmacy transaction data include all prescription medications filled for residents while in the NH at one of the participating pharmacies. However, recording over-the-counter (OTC) medications is optional. Using the pharmacy dispensing data, we identified four classes of analgesics used in the management of pain, specifically: 1) opioids, 2) NSAIDs, 3) salicylates, and 4) acetaminophen.

The medications in the AnalytiCare™ files were coded to the American Hospital Formulary Service classification system.[22] Using this classification scheme, we identified broad medication classes of interest (e.g., opioids and NSAIDs). Using this information and considering a window of 120 days between the two included MDS assessments, we created a series of binary variables to classify residents into analgesic categories including the following: long-acting opioids, short-acting opioids (including combination formulations, e.g., oxycodone and oxycodone with acetaminophen), NSAIDs, salicylates (including aspirin >81 mg daily), acetaminophen, and no analgesic. As our study sample noted pain on two sequential MDS assessments, our focus was on scheduled orders for analgesics of interest.

For the analyses identifying factors related to scheduled analgesics, we classified residents as those with any scheduled analgesic (opioid [single-agent products and fixed-dose combination products], NSAIDs, salicylate, or acetaminophen) and those with none. To provide detailed descriptions of specific medications prescribed, we used the same approach for individual agents. In separate analyses, we also considered adjuvant medications that may be used for pain management alone or in combination with analgesics. As the indication for use of a particular medication by a resident was absent from the database, we identified medications broadly applicable to the management of pain. Potential adjuvant medications included corticosteroids, muscle relaxants, anticonvulsants (including gabapentin and pregabalin), tricyclic antidepressants (TCAs), selective norepinephrine reuptake inhibitors, alpha-2 adrenergic agonists, transdermal lidocaine, and mexiletine.[4]

Determinants of Scheduled Analgesic Prescriptions

We considered demographic and clinical characteristics of residents associated with pain, including the residents' age, gender, comorbid conditions (e.g., arthritis, diabetes,

and depression), and level of functional limitations and cognitive impairment. Seven measures of cognition (e.g., short- and long-term memory, recall or orientation items [season, location or room, staff names/faces, and orientation to NH], and decision-making ability) form the basis of the valid[23] and reliable[17] MDS Cognitive Performance Scale. The Cognitive Performance Scale score ranges from 0 (intact) to 6 (very severe impairment), and we grouped residents as no or mild impairments (0–1), moderate impairments (2–3), and severe impairments (4–6). The MDS ADL scale uses a five-point scale (independent, needing supervision, needing limited assistance, needing extensive assistance, or totally dependent) to rate each resident's ability to perform each ADL (dressing, eating, toilet use, bathing, locomotion, transfer, and continence). Residents were classified as having mild or moderate limitations (0–3) or as dependent (4–6). We used the Centers for Medicare and Medicaid Services MDS Quality Measure focusing on the percent of residents "who have become more depressed or anxious."[24] This quality measure uses eight MDS items assessing characteristics and the persistence of an NH resident's mood. The summary scale ranges from 0 to 8 (0 being the least depressed/anxious and 8 being the most).

Analytical Approach

Descriptive analyses provided estimates of pharmacologic treatment of non-cancer pain documented on two consecutive MDS assessments, including frequency and severity of pain. To evaluate factors associated with receipt of any scheduled analgesic (yes/no), we developed a logistic regression model. Before constructing a model, we evaluated the potential for (and ruled out) multicollinearity among the potential factors of interest. Logistic regression models provided estimates of the independent association of the determinants of interest and the prevalence of scheduled use of analgesics while simultaneously adjusting for the clustering effects owing to the correlation of residents living within the same home.[25] We assumed that resident characteristics were similarly related to the outcomes across all facilities. This method adjusted for confounding effects by NH and state. We derived the adjusted odds ratios (AORs) and corresponding 95% confidence intervals (CIs) from the final model.

Results

Twenty-three percent of residents with pain were documented on at least two MDS assessments with no scheduled analgesic prescription. Sixty-one percent received a scheduled analgesic, and 15.9% received at least two scheduled analgesics. Residents with scheduled analgesics were more likely to have daily pain in the seven days preceding the assessment documented relative to those without a scheduled analgesic prescription (41.2% vs. 24.3%). Those with scheduled analgesics were more likely to have excruciating pain (5.5% vs. 1.2%) and moderate pain documented (64.7% vs. 47.5%) than residents without scheduled analgesics.

Table 1 shows the factors related to scheduled analgesics. Advanced age was inversely associated with receipt of scheduled analgesics (85+ years vs. less than 65 years: AOR 0.57; 95% CI 0.41 to 0.80). With increased cognitive impairment, residents were less likely to receive a scheduled analgesic prescription. Residents with moderate and severe cognitive impairments were less likely to receive analgesics relative to cognitively intact residents (moderate cognitive impairment, AOR 0.60; 95% CI 0.46 to 0.77; severe cognitive impairment, AOR 0.56; 95% CI: 0.36 to 0.88). Residents with diabetes mellitus were 1.3 times as likely to receive scheduled analgesics relative to those without diabetes (AOR 1.30; 95% CI 1.02 to 1.66). Residents with Parkinson's disease were less likely to receive scheduled analgesics relative to residents without Parkinson's disease (AOR 0.55; 95% CI 0.30 to 0.99). Hip fractures or other fractures (in the previous six months) increased the likelihood of receipt of scheduled analgesics (hip fracture: AOR 1.95; 95% CI 1.17 to 3.26; other fractures: AOR 1.79; 95% CI 1.16 to 2.76).

Fig. 1 shows that 50.7% of residents with pain documented on at least two MDS assessments had opioid medications and acetaminophen as scheduled prescriptions. The second most frequent analgesic combination was the opioids and NSAIDs, with 10.3% of residents receiving this combination. Opioid monotherapy was documented in 10.1% of patients whereas

Table 1

Characteristics of Residents With Pain Documented in the Seven Days Preceding Assessment on Two Consecutive Minimum Data Set Assessments by Any Scheduled Analgesic Prescribed ($n = 2508$)

Characteristic	Any Scheduled Analgesic Prescribed ($n = 1940$) (%)	No Scheduled Analgesics Prescribed ($n = 568$) (%)	Adjusted Odds Ratio	95% CI
Age (years)				
<64[a]	22.7	17.2	1.0	
65–74	19.6	14.0	1.14	0.78, 1.66
75–84	31.9	30.3	0.99	0.65, 1.27
85+	25.8	38.5	0.57	0.41, 0.80
Women	69.9	73.9	0.80	0.62, 1.02
Cognitive deficits				
None/mild impairment	48.4	33.6	1.0	
Moderate impairment	44.9	57.4	0.60	0.46, 0.77
Severe impairment	6.7	9.0	0.56	0.36, 0.88
Functional limitations				
Mild/moderate	46.0	50.9	1.0	
Dependent	54.0	49.1	0.98	0.78, 1.23
Mood Scale (mean ± SD)	1.28 ± 1.73	1.16 ± 1.73	1.11	1.04, 1.19
Diseases/conditions				
Hip fracture	6.5	3.9	1.95	1.17, 3.26
Other fractures	9.9	5.5	1.79	1.16, 2.76
Osteoarthritis	22.3	22.9	1.12	0.85, 1.47
Depression	48.1	43.7	1.00	0.80, 1.26
Diabetes mellitus	37.6	28.0	1.30	1.02, 1.66
Alzheimer's/dementia	18.5	25.2	0.76	0.57, 1.01
Parkinson's disease	2.1	4.2	0.55	0.30, 0.99

[a]Missing age for 10 people without any scheduled analgesic use and 38 people with scheduled analgesic use.

monotherapy with NSAIDs, aspirin, and acetaminophen was infrequent (less than 3%). For those with less than daily pain ($n = 1570$; 62.6%) in the seven days preceding the MDS assessment, more were likely to have no scheduled prescriptions (27.4%) and were less likely to receive opioids in combination with acetaminophen (47.6%). Among those with daily pain ($n = 938$; 37.4%) in the seven days preceding the assessment documented on the MDS, only 14.7% had no scheduled analgesic prescriptions, 56.1% had scheduled prescriptions for

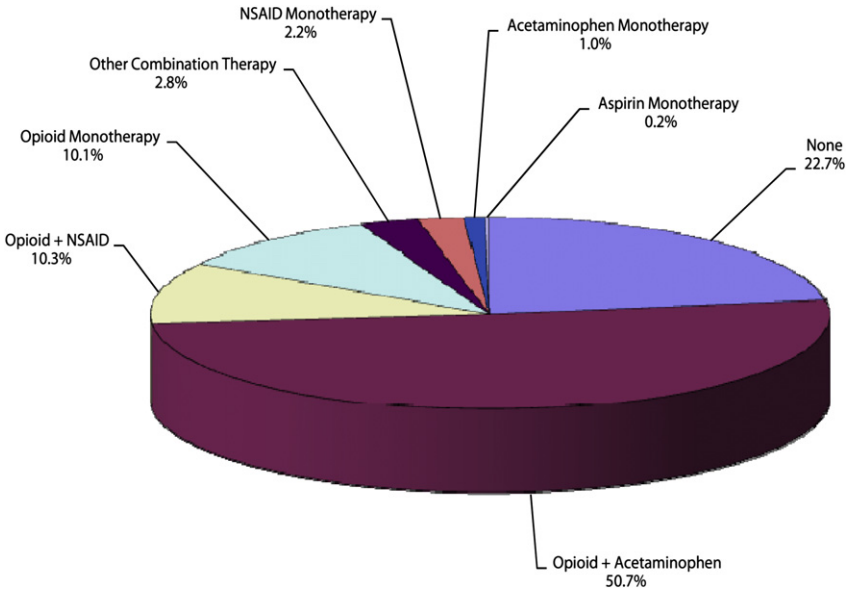

Fig. 1. Overlap of analgesics among residents with pain documented on two consecutive MDS assessments ($n = 2508$). We assessed four types of analgesia: opioids, nonsteroidal anti-inflammatory drugs, acetaminophen, and aspirin and created eight mutually exclusive categories of analgesia. The categorization used captures exposure to each of the four types of analgesics, both single-agent products and fixed-dose combination products.

opioids with acetaminophen, 13.0% had opioid and NSAIDs, and 12.1% had opioid monotherapy. Among residents with scheduled analgesic prescriptions but with documented excruciating pain ($n = 114$; 4.5%), 60.5% had opioids with acetaminophen, 14.9% an opioid and an NSAID, 11.4% had opioid monotherapy, and 7% were on other combinations of analgesics.

Table 2 shows that the analgesics most commonly prescribed were opioids, with 73.2% of residents with pain documented on at least two MDS assessments having scheduled prescriptions for these medications. The most frequently prescribed analgesic among residents with pain documented on at least two MDS assessments was hydrocodone (41.7%). Short-acting oxycodone (16.6%) and tramadol (13.8%) were the next most commonly prescribed agents. Of the long-acting agents, fentanyl was present in 9.4% of residents and oxycodone in 5.3%. The median days of use of hydrocodone use was 20 days (range 1−94 days), oxycodone short acting (23 days) and long acting (73 days), fentanyl long acting (73 days), and morphine short acting (55 days). Scheduled NSAID prescriptions were present in 13.8% of residents. Celecoxib (3.6%), ibuprofen (3.4%), meloxicam (3.0%), and naproxen (2.0%) were the most frequently prescribed NSAIDs. The median days of NSAID use ranged from ibuprofen (14 days) to celecoxib (48 days) and meloxicam (56 days). Salicylates and acetaminophen were less frequently prescribed (2.0 and 5.9%, respectively).

Table 3 shows the use of medications potentially used as adjuvants to pain medications. These medications also were frequently prescribed, with 57% of the residents with at least one adjuvant medication. The data also are shown stratified by the presence of scheduled analgesic prescription. Among residents with any scheduled analgesic prescription, 64.0% also had at least one potential adjuvant. The presence of scheduled prescriptions for adjuvants was lower in the group of residents without a scheduled analgesic prescription, such that only 30.6% had at least one adjuvant. All adjuvant pain medications were more frequently prescribed for those with scheduled analgesic prescriptions relative to residents without scheduled analgesic prescriptions. Anticonvulsants and TCAs were frequently present in both groups but more likely to be present in those with scheduled analgesic prescriptions (anticonvulsants: 33.3% vs. 13.7%, analgesic prescribed and nonusers, respectively; TCAs: 17.3% vs. 9.7%, analgesic prescribed and nonusers, respectively).

Table 2
Specific Fixed-Dose Mono- or Combination Therapy Analgesic Medications Prescribed Among Residents With Pain Documented on Two Consecutive Minimum Data Set Assessments ($n = 2508$)

Medication	*n*	%
Any opioid	1836	73.2
Hydrocodone	1045	41.7
With ibuprofen	2	0.1
With acetaminophen	1043	41.6
Short-acting oxycodone	416	16.6
Alone	145	5.8
With acetaminophen[a]	312	12.4
Tramadol	345	13.8
Alone	310	12.4
With acetaminophen	40	1.6
Long-acting fentanyl	235	9.4
Propoxyphene	209	8.3
Alone	5	0.20
With acetaminophen	204	8.1
Short-acting morphine	139	5.5
Long-acting oxycodone	132	5.3
Codeine	80	3.2
Alone	0	0
With acetaminophen	80	3.2
Miscellaneous opioid	45	1.9
Long-acting morphine	5	0.2
Short-acting fentanyl	1	0.04
Meperidine	1	0.04
Any NSAID	345	13.8
Celecoxib	89	3.6
Ibuprofen	85	3.4
Meloxicam	75	3.0
Naproxen	50	2.0
Diclofenac	29	1.2
Indomethacin	16	0.6
Nabumetone	11	0.4
Etodolac	9	0.4
Piroxicam	7	0.3
Ketoprofen, ketorolac, oxaprozin, sulindac, and flurbiprofen	10	0.4
Salicylates		
Aspirin (>81 mg daily), choline magnesium, and trisalicylate salsalate	49	1.9
Acetaminophen		
Alone/combination	149	5.9

NSAIDs = nonsteroidal anti-inflammatory drugs.
[a]Includes 41 people who were taking both oxycodone alone and oxycodone with acetaminophen.

Discussion

In NHs associated predominantly with one for-profit NH chain, we found that of the

Table 3
Potential Adjuvant Medications Among Residents With Pain Documented on Two Consecutive Minimum Data Set Assessments by Scheduled Analgesic Prescriptions

Potential Adjuvant Medication	Overall ($n = 2508$)	Any Scheduled Analgesic Prescription ($n = 1940$)	No Scheduled Analgesic Prescription ($n = 568$)
Any potential adjuvant	56.5	64.0	30.6
Anticonvulsants	28.8	33.3	13.7
Tricyclic antidepressants	15.6	17.3	9.7
Corticosteroids	11.1	12.3	7.0
Muscle relaxants	10.3	12.5	2.6
Selective norepinephrine reuptake inhibitors	12.1	13.9	6.0
Lidocaine transdermal	7.6	9.1	2.3
Alpha-2 adrenergic agonists	1.4	1.7	0.5
Mexiletine	0.04	0.1	0

residents with pain documented on at least two consecutive MDS assessments, 23% of residents received no scheduled analgesics. Undertreatment of pain in NHs remains common. The current research also indicates that 69% of those untreated with scheduled analgesics, or 15.7% of all residents with documented pain on two consecutive MDS assessments, received neither a scheduled analgesic nor a medication that could be used as an adjuvant to pain therapy. Although concerns of adverse side effects, such as constipation, nausea, sedation, vomiting, and dizziness/falls[26] are warranted, improvements in pain management in this setting appear justified.

The approaches to improvement of pain management in NHs have been varied. Yet, the number of high-quality studies demonstrating effectiveness of various strategies remains limited.[27] Promising strategies have included multifactorial pain management programs that include pain policies, staff education, including opioid management, and pain quality indicators.[28] Whereas some propose training certified nursing assistants in the pain management process,[29] the high turnover among these staff members may limit the effectiveness of this approach. The adoption of systematic implementation models and clinical decision-making algorithms coupled with continuous evaluation of outcomes and use of on-site resource consultants may prove effective.[30] Clearly, pain management policies and practices in NHs are lacking.[31] Recently, the Centers for Medicare and Medicaid Services implemented new guidelines that direct surveyors to investigate whether facilities are following proper pain management practices.[32] Such initiatives have been successful in reducing the use of potentially inappropriate medications,[33] and recent research suggests that this may be a viable approach to stimulating improvements in pain documentation and management as well.[34]

The patterns of analgesic use have changed in promising ways. First, propoxyphene use was previously reported at ~18% among a less cognitively impaired NH population with persistent non-cancer pain.[2] In our study, only 8.3% of residents received propoxyphene. We evaluated standing orders and included residents with greater cognitive impairments. In the fall of 2010, propoxyphene was withdrawn from the market owing to cardiac toxicity.[35] Second, there has been a shift from "as needed" medication use to scheduled analgesic use. Third, most analgesics were opioids. Use of hydrocodone was prevalent (41.7%). Seventeen percent received short-acting opioids, with only one resident receiving short-acting fentanyl. This represents a shift in prescribing patterns observed in the past 10 years, as previous reports favored non-opioid use in this setting. Lastly, an increase in acetaminophen use with a corresponding decrease in NSAID use was apparent. Only 2.2% received analgesic monotherapy with NSAIDs. Interventions to specifically reduce the use of NSAIDs in NHs have proven to be successful,[36] although widespread diffusion of physician educational interventions in this context may prove challenging. Among those who were prescribed opioids, most received monotherapy analgesic use; however, use of adjuvant therapy for pain was common.

Factors previously associated with lack of scheduled analgesic use among persons with pain were confirmed in this study. Advanced age and increased level of cognitive impairment

were inversely correlated with receipt of scheduled analgesics. We observed that residents with Parkinson's disease were less likely to receive analgesics compared with persons without the disease. This disturbing finding remained despite adjustments for sociodemographic, cognitive, and physical functioning measures. Estimates of the prevalence of pain in patients with Parkinson's disease range from 40 to 75%.[37] Recent research suggests that pain threshold and tolerance tend to decrease as Parkinson's disease progresses.[38] Efforts to improve pain management among this vulnerable group of NH residents are needed. Indeed, efforts to frame palliative care for Parkinson's disease have recently emerged.[39]

We do emphasize that opioid safety and efficacy have not been well studied in NH populations. Thus, it is important to consider the potential harms associated with opioids owing to the potential pharmacokinetic and pharmacodynamic drug-drug interactions likely with analgesics in this population.[40] Further, research supporting the efficacy of opioids in patients with moderate-to-severe pain also is lacking.[41] Additional research clarifying the extent to which the benefits of opioid therapy outweigh the harms is needed. In the interim, clinicians must assess opioid use in the context of the clinical situation, as well as the resident and family treatment goals, and use caution. The recommended approach to opioid treatment for pain management for NH residents involves slow titration, lower total doses, and anticipation of a longer duration of action.[40]

This study has important limitations. The NHs represented in the proprietary data source were predominantly from one for-profit NH chain and one large long-term care pharmacy chain. As such, the specific data related to medication use are likely not generalizable to all NHs in the U.S. Also, requiring that residents had at least one pharmacy transaction likely underestimated the proportion of residents receiving no analgesics (23%). Limitations of pain measurement based on the MDS items,[19–21] as well as ascertainment bias related to pain assessment, have been noted. It is possible that we have underestimated the prevalence of OTC medications, including aspirin and acetaminophen. However, subsample analysis of data from Maryland (a state which systematically reported OTC medication use) provided comparable results. The data available did not permit us to analyze the dosage of medications used. Previous research using data from ~10 years ago documented that practitioners did not hesitate to prescribe NSAIDs at high doses.[4] More recent data that permit the evaluation of NSAID doses are needed. The data source did not specifically capture the indication for specific medications. Thus, analyses of adjuvant pain medications cannot disentangle which of these medications were specifically used as adjuvant pain therapy. Lastly, we were unable to explore the impact of other factors that may have limited the use of scheduled analgesic drugs in the management of pain for NH residents. In this study, there were 19 different states, which may have had varied regulations influencing prescribing practices. During the time period of this study, the Drug Enforcement Agency interpreted the Controlled Substance Act in a way that placed nursing facilities at risk for penalties.[42] Although we controlled for the variation in the analyses, we were unable to study these important factors.

In conclusion, there appears to have been a desirable shift from "as needed" to scheduled analgesic use for persistent pain, as well as increased use of acetaminophen and decreased use of NSAIDs and COX-2 inhibitors. Nevertheless, the proportion of residents receiving neither scheduled analgesics nor potential adjuvants for pain management supports the need for additional strategies to improve pain management in this setting. Additional evidence-based interventions to improve pain management in NHs are justified.

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