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Pain Management Among Nursing Home Residents with Cancer

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Abstract

BACKGROUND—In the mid-1990s, 29.4% of nursing home (NH) residents with cancer suffered from daily pain, and among them 26% failed to receive any analgesics.

OBJECTIVES—To assess improvements in pain management of NH residents with cancer since the implementation of pain management quality indicators.

DESIGN—Cross-sectional study.

SETTING—1,382 US NHs.

PARTICIPANTS—8,094 newly-admitted, Medicare-eligible NH residents with cancer.

MEASUREMENTS—Nationwide data on NH resident health from the Minimum Data Set 2.0 linked to all-payer pharmacy dispensing records (February 2006–June 2007) were used to determine prevalence of pain, including frequency and intensity, and receipt of non-opioid and opioid analgesics. Multinomial logistic regression evaluated resident-level correlates of pain and binomial logistic regression identified correlates of untreated pain.

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Author Contributions: Ms. Pimentel had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Ms. Pimentel, Drs. Briesacher, Gurwitz, Rosen, and Lapane. Acquisition of data: Dr. Briesacher. Analysis and interpretation of data: Ms. Pimentel, Drs. Briesacher, Gurwitz, Rosen, and Lapane. Preparation of manuscript: Ms. Pimentel, Drs. Briesacher, and Lapane. Critical revision of manuscript for important intellectual content: Ms. Pimentel, Drs. Briesacher, Gurwitz, Rosen, Pimentel and Lapane. Statistical analysis: Ms. Pimentel. Obtained funding: Not applicable. Study supervision: Drs. Briesacher and Lapane.

RESULTS—More than 65% of NH residents with cancer had any pain (28.3% daily, 37.3% less than daily), among whom 13.5% had severe and 61.3% had moderate pain. Women, residents admitted from acute care or who were bedfast, and those with compromised activities of daily living, depressed mood, indwelling catheter, or terminal prognosis were more likely to have pain. More than 17% of residents in daily pain (95% confidence interval [CI]: 16.0–19.1%) received no analgesics, including 11.7% with daily severe pain (95% CI: 8.9–14.5%) and 16.9% with daily moderate pain (95% CI: 15.1–18.8%). Treatment was negatively associated with age >85 years (adjusted odds ratio [aOR]=0.67, 95% CI: 0.55–0.81 versus aged 65–74), cognitive impairment (aOR=0.71, 95% CI: 0.61–0.82), presence of feeding tube (aOR=0.77, 95% CI: 0.60–0.99), and restraints (aOR=0.50, 95% CI: 0.31–0.82).

CONCLUSION—Untreated pain is still common among NH residents with cancer and persists despite pain management quality indicators.

Keywords

nursing home; cancer; pain; analgesics

INTRODUCTION

Nursing homes (NHs) are becoming an essential provider of cancer care for those whose complex health needs require continuous care. Among an estimated 1.4 million NH residents,¹ 9% have a cancer diagnosis at admission.² Approximately 31.3% of Medicare beneficiaries with cancer receive NH care in the three months before death, and 17.1% ultimately die in this setting.³ Nursing homes are expected to carry more of the burden of cancer care delivery, given a 40% lifetime risk of NH placement after age 65 years,^{4–6} rising prevalence of cancer among a growing older adult population, and improvements in life expectancy after a cancer diagnosis.⁷

Pain is the most common symptom in older adults with cancer,^{8,9} and pain management is critical to providing optimal care to these patients. Widely regarded as the “fifth vital sign,”¹⁰ pain deserves prompt evaluation and treatment. Clinical practice guidelines published by the World Health Organization (WHO)^{11,12} serve as the foundation for guidelines by the American Society of Anesthesiologists,¹³ European Society for Medical Oncologists,¹⁴ and the National Comprehensive Cancer Network,¹⁵ and have been shown to be 80–90% effective at managing cancer-related pain overall.^{16–18} However, pain among patients with cancer is known to be undertreated in NHs. The most comprehensive evaluation thus far of pain management among NH residents with cancer, published in 1998, found that 29.4% of residents with cancer suffered from pain on a daily basis.¹⁹ More than a quarter of those with daily pain failed to receive analgesics, and lack of treatment was significantly associated with advanced age, minority race, and cognitive impairment.¹⁹ Similarly, studies of NH residents with comorbid dementia and advanced cancer showed inverse relationships between cognitive ability and pain-related behaviors, and between cognitive ability and dose of opioid medication.^{20,21}

National efforts have since been made to improve upon the quality of NH care, including the public reporting of the Centers for Medicare and Medicaid (CMS) pain management quality

indicators beginning in 2002.²² An update to our current understanding of pain management among NH residents with cancer is needed. Therefore, we examined the use of analgesics among more than 8,000 cancer patients residing in US NHs in 2006 and 2007. Specifically, we estimated the prevalence and resident-level correlates of pain and receipt of analgesics among newly-admitted older and disabled NH residents with cancer.

METHODS

We used the most recent data available from a nationwide long-term care pharmacy, including NH resident health assessments from the Minimum Data Set (MDS) version 2.0 linked with an all-payer administrative data source of all dispensed prescription and over-the-counter medication. The study was approved by the institutional review board of the University of Massachusetts Medical School.

The MDS is a federally-mandated comprehensive clinical assessment of all residents in Medicare- or Medicaid-certified nursing facilities (approximately 96% of US facilities). It consists of more than 400 items, including sociodemographic information, clinical items (e.g., communication, mood and behavior, signs, symptoms), clinical diagnoses, and treatments provided.^{23,24} It includes multi-item summary scales for measures of physical functioning (Activities of Daily Living [ADL] Hierarchy Scale),^{25,26} cognitive status (Cognitive Performance Scale),²⁷ and depressed mood (Depression Rating Scale).²⁸ Nursing staff are required to perform full assessments at admission and annually, as well as reduced assessments on a quarterly basis or after a significant change in resident health.²³ A registered nurse performs the assessment of a resident's status over the previous week based on medical record review, direct observation of and communication with the resident, family interviews, and discussions with the resident's medical and direct care teams.

Study Sample

The sampling frame for this study was 166,139 NH residents with MDS assessments performed between February 1, 2006 and June 30, 2007. We excluded 142,654 NH residents without a diagnosis of cancer indicated on MDS assessment, those admitted to the NH before February 2006 (n = 13,452), residents whose prescriptions could not be identified using National Drug Codes (NDC; n = 1,633); those who were Medicare-ineligible, defined as aged <65 years without >1 Medicare-paid prescription drug (n = 25); comatose residents (n = 7); and those missing information on important confounders (n = 274). The final sample size was 8,094 residents admitted to 1,382 NHs.

Measurement of Pain

Section J of the MDS 2.0 allowed for evaluation of pain, defined as any type of physical pain or discomfort in any part of the body, occurring in the seven days preceding the assessment. The valid²⁹ and reliable³⁰ pain-related items address two general characteristics of pain: frequency (no pain, pain less than daily, pain daily) and intensity (mild pain, moderate pain, times when pain is horrible or excruciating [severe]). Nursing staff used a checklist to specify site of pain (e.g., bone, soft tissue). A "skip pattern" allowed the assessor to skip the items on intensity and site of pain if there was no pain present.

Instructions for these measures recommended reliance on resident report whenever possible, although staff and family observations, physician records, or medical charts could also have been used.²³ For residents who were unable to communicate, nursing staff were instructed to look for non-verbal cues of pain, such as grimacing or moaning.

Measurement of Analgesic Use

To evaluate the quality of medication use at the beginning of NH admission, we identified all drugs dispensed within seven days of a resident's first prescription date. Drug dispensing records were available from February 1, 2006 to June 30, 2007. Data elements included all drugs prescribed and administered to NH residents, prescription date, product code (NDC), days' supply, quantity dispensed, and payment source. A database provided by the long-term care pharmacy was used to translate NDCs into therapeutic classes and subclasses.

Opioids are central to existing clinical practice guidelines for management of cancer-related pain. To allow for comparisons with previous work,¹⁹ analgesics were classified into three groups according to the WHO's three-level "ladder" for cancer pain relief.^{11,12} Non-opioids (level 1) included non-steroidal anti-inflammatory drugs and acetaminophen. Aspirin was not considered an analgesic medication because it is typically used among older adults as anti-platelet therapy.³¹ Opioids commonly used for mild to moderate pain (level 2) included codeine, oxycodone, hydrocodone, propoxyphene, meperidine, pentazocine, buprenorphine, nalbuphine, butorphanol, and any combination of these drugs with level 1 drugs. Opioids commonly used for severe pain (level 3) included morphine, hydromorphone, oxymorphone, methadone, levorphanol, and fentanyl. Per more recent clinical practice guidelines that consider pain management by level of opioid-tolerance and alternative modes of administration,¹³⁻¹⁵ we categorized opioid analgesics by duration of effect (short-acting, long-acting) and by formulation (oral, intravenous/intramuscular, transdermal, suppository). We considered adjuvant medications used for pain management alone or in combination with analgesics. Since indication was absent from drug dispensing records, we identified medication broadly applicable to pain management, including corticosteroids, muscle relaxants, anticonvulsants (i.e., gabapentin, pregabalin), tricyclic antidepressants, selective norepinephrine reuptake inhibitors, alpha-2-adrenergic agonists, transdermal lidocaine, and mexiletine.³¹

Analytic Approach

We evaluated age trends of resident-level characteristics using likelihood chi-square tests for categorical variables and non-parametric tests (e.g., Kruskal-Wallis test) for continuous variables with skewed distributions. We used multinomial logistic regression models to estimate association among resident characteristics and pain, measured on three levels: daily, less than daily, and none. Binary logistic regression was used to evaluate association among resident characteristics and receipt of analgesics among residents with any pain. To facilitate comparison with published estimates of daily pain and receipt of analgesic medication among NH residents with cancer,¹⁹ we performed sensitivity analyses on a reduced study sample of NH residents >65 years who were admitted to the NH from an acute care hospital (n = 6,610). We also separately evaluated receipt of opioid analgesics among NH residents with moderate-to-severe pain (n=3,973).

Regression models were fit using robust estimation of standard errors to account for correlation between residents within the same NH.³² Models were manually constructed in a step-wise fashion. We first evaluated crude associations between each variable and the outcome and, at each stage of model building, selected the strongest variable for inclusion and considered the remaining variables in the presence of those selected for the model. We evaluated correlations among covariates, and if variable pairs were highly collinear (>0.90), only one of the variables was included in the final models. Risk estimates are presented as unadjusted and adjusted odds ratios (OR) and 95% confidence intervals (CI). $P < .05$ (2-tailed) was considered statistically significant. All analyses were performed using Stata version 11.2 (StataCorp LP, College Station, TX).

RESULTS

Newly-admitted NH residents had a mean age of 80.0 ± 9.1 years (range: 29.0–105.6 years) and were predominately female (53.1%), non-Hispanic white (83.2%), and admitted from an acute care hospital (86.2%). Nearly 74% and 45% of residents had moderate-to-severe impairment in ADLs and cognition, respectively, with prevalence of both increasing with age ($P < .001$ for age trend; Table 1). Similarly, the mean number of medical conditions increased with age ($P < .001$). Conversely, the prevalence of depressed mood and mean number of medications decreased with age (both $P < .001$).

Pain

More than 65% of residents with cancer had documented pain, 28.3% had daily pain (95% CI, 27.3–29.2%) and 37.3% had less frequent pain (95% CI, 36.3–38.4%) documented. Daily pain decreased with age ($P < .001$ for age trend; Table 1), while less frequent pain increased with age ($P < .001$). Clinical conditions potentially associated with pain, including arthritis, osteoporosis, and hip fractures, were more prevalent with increasing age ($P < .001$).

Compared to residents aged 65–74 years, older residents were less likely to have pain documented on a daily basis or less. Independent of age, those with cognitive impairment, feeding tubes, or who were restrained were less likely to have daily pain recorded (Table 2). Conversely, women, residents admitted from a hospital, those with compromised ADLs, depressed mood, an indwelling catheter or an explicit terminal prognosis, or who were bedfast had increased odds of pain. Results were consistent in sensitivity analysis of NH residents >65 years admitted from a hospital (data not shown); however, non-Hispanic blacks were less likely than non-Hispanic whites to have documented pain.

Receipt of Analgesics

Analgesics comprised 9.5% of medications dispensed within the first week of NH admission. More than half of NH residents (58.8%) received an analgesic (mean 1.8 ± 0.9 , range: 1–8). Nearly 12% received at least one non-opioid, 46.6% at least one level 2 drug, and 15.3% at least one level 3 drug. Specifically, 51.5% received a level 2 drug only, 7.7% received a non-opioid only, and 9.6% received a level 3 drug only. One-fifth received multiple analgesics of varying strength according to the WHO three-level ladder (7.1% received a non-opioid plus a level 2 drug; 1.4%, a non-opioid plus a level 3 drug; 10.9%, a

level 2 drug plus a level 3 drug; and 1.4%, all three). Hydrocodone was the most commonly prescribed analgesic (comprising 26.7% of analgesic prescriptions), followed by oxycodone (19.1%), fentanyl (9.1%), and propoxyphene (8.9%, withdrawn from the US market in 2010³³). Approximately 36% of residents with daily severe pain and 21% of residents with daily moderate pain used long-acting opioids.

Overall, 27.6% of NH residents with documented pain received no analgesics (95% CI: 26.4–28.9%). Among those in daily pain, 17.5% received no analgesics (95% CI: 16.0–19.1%), including 11.7% whose daily pain was severe (95% CI: 8.9–14.5%; Table 3) and 16.9% whose daily pain was moderate (95% CI: 15.1–18.8%). More than 35% of residents with less frequent pain did not receive treatment (95% CI: 33.6–37.0%), including 21.5% with severe pain (95% CI: 15.8–27.1%) and 28.3% with moderate pain (95% CI: 26.2–30.4%). There were no differences by pain severity with respect to problems swallowing ($P=.185$), but those with moderate pain were more likely than those with mild or with severe pain to have medication restrictions documented in their medical record ($P<.001$). Those with untreated pain were less likely than those with treated pain to receive an adjuvant medication (17.2% vs. 25.0%, $P<.001$).

Relative to residents aged 65–74 years, older residents were less likely to receive analgesics for their pain, although the 95% CI included unity for those aged 75–84 years (Table 4). Similarly, those with cognitive impairment, feeding tubes, and restraints were less likely to receive analgesics. Conversely, women were more likely than men to receive treatment. Receipt of analgesics was also positively associated with NH admission from a hospital, increasing number of non-analgesic medications, and terminal prognosis. Results were generally consistent in sensitivity analyses of NH residents >65 years admitted from a hospital and of NH residents in moderate-to-severe pain (data not shown). However, the latter sensitivity analysis did not find a statistically significant association of opioid treatment among women and residents who used restraints.

DISCUSSION

This study reveals that the majority (65.6%) of NH residents with a cancer diagnosis experience pain. A substantial proportion of that pain is daily, and moderate to severe in intensity. Between 2006 and 2007, 17.6% of NH residents with daily pain lacked treatment with analgesics in the first week of NH admission. These results are only modestly decreased from those documented before national efforts to improve the quality of pain management in NHs.

Between 1992 and 1995, approximately 26% of NH residents in daily pain did not receive any analgesic agent.¹⁹ Earlier estimates of medication receipt may be underreported due to a reliance on pharmacist- and nurse-reported medication lists (Section U of the MDS). Our use of long-term care pharmacy dispensing records offers improved identification of analgesic treatment. Because Section U was removed from the MDS, we were unable to disentangle the extent to which the observed improvement in pain management may be an artifact of differences in measurement methodology rather than a true shift in practice patterns.

We anticipated improvements in pain management since the mid-1990s for several reasons. The CMS NH quality indicators focused on pain were tested beginning in 1998,³⁴ and public reporting of the prevalence of uncontrolled pain began in 2002.²² Thirteen states have passed or updated legislation since 1998 to improve access to scheduled drugs for treatment of intractable pain.³⁵ In addition, the Federation of State Medical Boards published their *Policy on the Use of Opioid Analgesics in the Treatment of Chronic Pain* encouraging the adequate treatment of patients in pain and appropriate use of opioids,³⁶ and nearly 30 states have adopted the *Policy* for their own policies. Despite these efforts, untreated pain remains a significant problem among NH residents with cancer.

Further, among this medically-needy patient population, a number of particularly vulnerable sub-groups continue to be at higher risk of having their pain go untreated. Consistent with previous findings,^{19–21} we found that the oldest old and those with cognitive impairment were more likely to not receive treatment for their documented pain. Despite the widespread dissemination of clinical guidelines for pain management in older adults, adequate pain management among older adults may be complicated by the presence of comorbid conditions, increased risk of adverse effects, and physician factors such as inadequate training or reluctance to prescribe opioids.³⁷ Cognitive impairment may preclude NH residents from effectively communicating their need for pain relief. Although nursing staff have detailed instructions on pain assessment in non-verbal residents,²³ providers may continue to rely on patients' verbal reports when deciding to treat pain.³⁸ Indeed, even in our sensitivity analysis of NH residents with documented moderate-to-severe pain, those with cognitive impairment were less likely to receive analgesic medication.

Facility-level characteristics have been shown to impact quality of pain management among NH residents. For example, residents whose cancer was diagnosed after NH admission were less likely to receive pain medication in facilities with a high Medicaid patient load or with a higher Medicare-paid percentage of days.³⁹ While it was beyond the scope of this study to evaluate organizational factors related to receipt of analgesics, we found that NH residents with feeding tubes or restraints—devices known to be associated with poor NH quality^{40,41}—had decreased odds of receiving analgesics for their documented pain. This study provides additional evidence that NH quality is associated with quality of care provided to residents.

The present study has several strengths worth highlighting. First, it is a much-needed update to what is already known about pain management among NH residents with cancer. While our evaluation of daily pain permits comparisons with previous research, we also provide new evidence around more nuanced facets of pain, including pain intensity and the prevalence and treatment of infrequent pain. Second, we provide new evidence on pain management that is relevant to a broader population of NH residents with cancer. Indeed, study participants were drawn from a national sample of NHs across 46 states and were admitted to the NH from both acute and non-acute settings. Third, data were from newly-admitted NH residents and thus permitted evaluation of medication quality at the beginning of a NH stay. Fourth, we used a unique prescription dispensing data source that spanned all payers (i.e., Medicare, Medicaid, third party private insurance, cash, and facility/hospice) and thus represented all types of NH residents. Previous studies of analgesic medication use

in NHs have examined only beneficiaries of single-payer sources.^{42,43} Finally, our data source included over-the-counter as well as prescription medications dispensed to NH residents during the study period, allowing for prevalence estimates of non-opioid analgesics.

There were also some limitations. We reference the WHO analgesic ladder, which has been subject to numerous debate and criticism^{44–47} owing to its omission of alternative routes of drug administration, nonpharmaceutical treatments, and interventional procedures. Despite these limitations, the WHO analgesic ladder has demonstrated effectiveness and widespread utility, and remains the reference point for cancer-related pain management.^{13,14} This was a cross-sectional study of pain management in the first week of NH admission, a period of great transition during which care processes may suffer. While we cannot comment on the quality of pain management among residents with longer NH stays, previous research has shown that more than half of cancer patients with pain have severe pain on subsequent MDS assessment.⁴⁸ Although MDS 2.0 pain assessments could be augmented by nursing staff and family observations, concerns remain about potential misclassification of pain, especially among residents with difficulty communicating. Although we considered a resident's pain to be treated if they had at least one dispensing record for an analgesic, we were unable to determine whether the treatment provided adequate pain relief. Therefore, our results may underestimate the true prevalence of pain and its treatment. We also acknowledge that it is possible that pain medications started before admission to the NH were never re-evaluated. We were unable to definitively attribute cancer as the underlying pathology of pain, nor were we able to specify cancer type. However, guidelines on the use of analgesic medication for persistent pain among older adults are not cancer-specific. Although we provide prevalence estimates of adjuvant medication use, we were unable to evaluate non-pharmacological approaches to pain management owing to the absence of this information in the MDS 2.0. Future studies using the MDS 3.0 may be better able to evaluate these alternative approaches to pain management. Finally, dispensing records lacked the indication for medication use and information on medications used prior to NH admission, so we could not determine appropriateness of treatment.

CONCLUSION

This study contributes a much-needed update on the quality of pain management among NH residents with cancer, a critical public health issue of increasing prominence. Pain remains common and undertreated among some of the most vulnerable cancer patients in the US, and special attention should be paid to the oldest old, those with cognitive impairment, and residents of potentially poor quality NHs. Among NH residents overall, recent national goals for prevalence of moderate-to-severe pain were 15% for short-stay, post-acute residents and 4% for long-stay residents.⁴⁹ Although cancer-specific targets for pain management do not currently exist, these data suggest that the current state of pain management among NH residents with cancer falls short of these goals. New information provided here may provide initial directions for targeted efforts to improve the quality of pain treatment in NHs, including redoubled efforts to disseminate older adult-specific clinical practice guidelines in this setting.

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Table 1

Characteristics of newly-admitted NH residents with cancer (N = 8,094)

	Resident age group			
	<65 years (n = 421)	65–74 years (n = 1,682)	75–84 years (n = 3,459)	85 years (n = 2,532)
Women	56.3	52.7	51.1	55.6
Race/ethnicity				
White, non-Hispanic	73.4	76.5	83.7	88.7
Black, non-Hispanic	18.8	15.6	10.2	6.8
Hispanic	4.0	5.6	4.0	3.0
Asian/Pacific Islander	3.1	2.1	2.0	1.3
American Indian/Alaskan Native	0.7	0.2	0.1	0.2
Source of admission				
Acute care hospital	86.9	89.8	87.2	82.4
Private home	4.8	4.4	6.2	8.2
Other nursing home	4.5	3.0	3.8	5.2
Other ^a	3.8	2.8	2.9	4.3
Marital status, widowed	12.1	28.5	42.1	62.4
Degree ADL compromised ^b				
Moderate	39.9	44.5	49.3	49.0
Severe	27.1	27.2	26.0	26.7
Degree of cognitive impairment ^c				
Moderate	24.0	29.3	40.5	50.8
Severe	4.3	3.2	4.3	4.9
Depressed mood ^d	13.8	9.0	7.8	7.6
Bedfast	5.5	5.8	4.6	3.7
Explicit terminal prognosis ^e	8.3	8.9	8.4	7.3
# diagnoses	5.5 ± 2.6 (1–15)	5.7 ± 2.5 (1–19)	6.1 ± 2.5 (1–16)	6.2 ± 2.4 (1–16)
Clinical conditions				
Arthritis	12.6	18.4	22.8	27.6
Osteoporosis	4.8	8.2	11.7	15.3
Hip fracture	3.3	5.3	6.6	9.3
# medications in first week	11.1 ± 5.7 (1–35)	9.9 ± 5.4 (1–35)	9.2 ± 4.9 (1–33)	7.9 ± 4.5 (1–31)
# non-analgesics in first week	9.9 ± 5.4 (0–34)	8.9 ± 5.1 (0–34)	8.3 ± 4.7 (0–32)	7.2 ± 4.2 (0–28)
Pain frequency ^f				
Daily	43.2	35.1	28.0	21.7
Less than daily	33.5	37.0	37.6	37.8

Percentage or mean ± standard deviation (range) shown

ADL: activities of daily living; **CI:** confidence interval; **NH:** nursing home^a“Other” includes board and care/assisted living/group home, psychiatric hospital, rehabilitation hospital.^bBased on 7-level scale. ADL Hierarchy Scale score is 3 or 4 for moderate impairment, 5 or 6 for severe impairment.

^cBased on 7-level scale. Cognitive Performance Scale score is 2 to 4 for moderate impairment, 5 or 6 for severe impairment.

^dBased on a scale from 0–14. Depression Rating Scale scores of 3 or more indicate major or minor depressive disorders.

^eIndicated by prognosis < 6 months or receipt of hospice.

^fAs assessed by NH staff over a 7-day period.

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Table 2

Correlates of pain among newly-admitted NH residents with cancer (N = 8,094)

	Pain frequency			Daily pain vs. no pain (referent)			Less than daily pain vs. no pain (referent)		
	Daily (n = 2,291)	Less than daily (n = 3,022)	None (n = 2,781)	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)	Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)
Age, years									
<65	7.9	4.7	3.5	1.48 (1.11–1.96)	1.45 (1.08–1.95)	Referent	Referent	1.08 (0.82–1.42)	1.11 (0.85–1.46)
65–74	25.8	20.6	16.9	Referent	Referent	Referent	Referent	Referent	Referent
75–84	42.3	43.1	42.7	0.65 (0.56–0.75)	0.70 (0.60–0.82)	0.83 (0.72–0.94)	0.86 (0.74–0.99)	0.83 (0.72–0.94)	0.86 (0.74–0.99)
85	24.0	31.6	36.9	0.42 (0.36–0.50)	0.48 (0.41–0.58)	0.70 (0.60–0.81)	0.75 (0.63–0.88)	0.70 (0.60–0.81)	0.75 (0.63–0.88)
Women	59.8	54.5	46.1	1.74 (1.54–1.95)	1.67 (1.46–1.91)	1.40 (1.26–1.55)	1.35 (1.20–1.51)	1.40 (1.26–1.55)	1.35 (1.20–1.51)
Race/ethnicity									
White, non-Hispanic	83.9	83.9	82.0	Referent	Referent	Referent	Referent	Referent	Referent
Black, non-Hispanic	10.6	9.8	11.8	0.87 (0.73–1.05)	0.87 (0.73–1.05)	0.81 (0.66–0.98)	0.82 (0.67–1.01)	0.81 (0.66–0.98)	0.82 (0.67–1.01)
Hispanic	3.9	4.3	3.9	0.98 (0.73–1.32)	1.01 (0.75–1.37)	1.08 (0.82–1.40)	1.06 (0.81–1.39)	1.08 (0.82–1.40)	1.06 (0.81–1.39)
Asian/Pacific Islander	1.4	1.9	2.1	0.66 (0.46–0.95)	0.70 (0.49–1.01)	0.87 (0.56–1.35)	0.85 (0.57–1.26)	0.87 (0.56–1.35)	0.85 (0.57–1.26)
American Indian / Alaskan Native	0.2	0.2	0.1	1.48 (0.40–5.55)	1.60 (0.49–5.21)	1.58 (0.46–5.41)	1.49 (0.41–5.41)	1.58 (0.46–5.41)	1.49 (0.41–5.41)
Source of admission, acute care hospital	88.2	87.9	82.7	1.56 (1.32–1.84)	1.52 (1.27–1.82)	1.52 (1.30–1.77)	1.44 (1.23–1.69)	1.52 (1.30–1.77)	1.44 (1.23–1.69)
Marital status, widowed	42.7	45.7	43.6	0.96 (0.86–1.08)	1.02 (0.89–1.17)	1.09 (0.98–1.21)	1.08 (0.96–1.22)	1.09 (0.98–1.21)	1.08 (0.96–1.22)
Compromised ADLs ^b	76.0	74.6	72.6	1.19 (1.04–1.37)	1.33 (1.15–1.54)	1.11 (0.98–1.26)	1.16 (1.01–1.32)	1.11 (0.98–1.26)	1.16 (1.01–1.32)
Cognitive impairment ^c	35.9	44.0	53.0	0.50 (0.44–0.56)	0.62 (0.54–0.72)	0.70 (0.62–0.78)	0.78 (0.69–0.89)	0.70 (0.62–0.78)	0.78 (0.69–0.89)
Depressed mood ^d	12.1	7.7	5.7	2.28 (1.82–2.84)	2.27 (1.79–2.88)	1.37 (1.11–1.70)	1.46 (1.16–1.83)	1.37 (1.11–1.70)	1.46 (1.16–1.83)
Feeding tubes	5.0	7.9	7.5	0.65 (0.52–0.82)	0.64 (0.50–0.82)	1.06 (0.87–1.29)	1.10 (0.90–1.37)	1.06 (0.87–1.29)	1.10 (0.90–1.37)
Indwelling catheter	27.1	24.1	19.1	1.58 (1.39–1.80)	1.52 (1.32–1.75)	1.35 (1.19–1.53)	1.28 (1.12–1.46)	1.35 (1.19–1.53)	1.28 (1.12–1.46)
Use of restraints ^e	0.9	1.8	2.7	0.34 (0.20–0.56)	0.50 (0.30–0.86)	0.67 (0.47–0.94)	0.81 (0.57–1.16)	0.67 (0.47–0.94)	0.81 (0.57–1.16)
Bedfast	6.7	4.4	3.1	2.23 (1.70–2.93)	2.06 (1.54–2.74)	1.41 (1.07–1.86)	1.37 (1.02–1.83)	1.41 (1.07–1.86)	1.37 (1.02–1.83)
Explicit terminal prognosis ^f	11.3	7.9	5.8	2.06 (1.65–2.57)	2.21 (1.73–2.83)	1.39 (1.12–1.72)	1.58 (1.26–1.98)	1.39 (1.12–1.72)	1.58 (1.26–1.98)

ADL: activities of daily living; **CI:** confidence interval; **NH:** nursing home; **OR:** odds ratio

^a Adjusted for all variables listed in Table 1 and variables describing participation in MDS assessment (resident, family, significant other) and communication skills.

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^b ADL Hierarchy Scale scores equal 3 or more.

^c Cognitive Performance Scale score equal 2 or more.

^d Depression Rating Scale scores equal 3 or more.

^e Includes trunk and limb restraints as well as chairs to prevent rising.

^f Indicated by prognosis 6 months or receipt of hospice.

Table 3

Use of any analgesic medication within first week of NH admission among newly-admitted residents with cancer and any pain, by pain frequency and intensity^a (N = 5,311)

Pain intensity	Pain frequency	
	Daily	< Daily
Severe pain	(n = 512)	(n = 205)
No analgesic	11.7	21.5
Any analgesic	88.3	78.5
Non-opioid only ^b	1.0	4.9
Level 2 drug only ^c	37.3	40.5
Level 3 drug only ^d	16.8	12.7
Non-opioid + level 2 drug	4.5	5.9
Non-opioid + level 3 drug	2.7	1.0
Level 2 drug + level 3 drug	23.4	11.2
Non-opioid + level 2 drug + level 3 drug	2.5	2.4
Adjuvant ^e	25.6	25.4
Duration of effect (opioids only)		
Short-acting	80.9	71.2
Long-acting	35.7	17.1
Formulation (opioids only)		
Oral	83.8	71.7
Non-oral ^f	25.8	13.7
Transdermal	23.2	12.2
Intravenous/intramuscular	4.9	2.0
Moderate pain	(n = 1,536)	(n = 1,720)
No analgesic	16.9	28.3
Any analgesic	83.1	71.7
Non-opioid only ^b	2.9	3.4
Level 2 drug only ^c	48.7	45.7
Level 3 drug only ^d	9.2	6.5
Non-opioid + level 2 drug	6.6	6.2
Non-opioid + level 3 drug	1.1	1.2
Level 2 drug + level 3 drug	13.2	7.6
Non-opioid + level 2 drug + level 3 drug	1.4	1.1
Adjuvant ^e	25.7	21.4
Duration of effect (opioids only)		
Short-acting	75.1	64.8
Long-acting	21.1	12.4
Formulation (opioids only)		
Oral	78.3	66.0

Pain intensity	Pain frequency	
	Daily	< Daily
Non-oral ^f	14.8	9.7
Transdermal	13.5	8.3
Intravenous/intramuscular	1.7	1.4
Mild pain	(n = 243)	(n = 1095)
No analgesic	33.7	48.9
Any analgesic	66.3	51.1
Non-opioid only ^b	4.9	9.3
Level 2 drug only ^c	39.1	28.5
Level 3 drug only ^d	3.7	4.2
Non-opioid + level 2 drug	8.2	4.7
Non-opioid + level 3 drug	1.6	0.5
Level 2 drug + level 3 drug	6.6	3.4
Non-opioid + level 2 drug + level 3 drug	2.1	0.5
Adjuvant ^e	23.5	19.3
Duration of effect (opioids only)		
Short-acting opioid	59.3	39.5
Long-acting opioid	9.9	5.4
Formulation (opioids only)		
Oral	60.9	39.5
Non-oral ^f	7.0	4.8
Transdermal	5.8	4.0
Intravenous/intramuscular	1.2	1.0

Percentages presented may not add to 100% due to rounding.

NH: nursing home

^a Of 5,313 NH residents with any pain, 2 have missing pain intensity data

^b Classified by the World Health Organization (WHO) as a level 1 drug, including non-steroidal anti-inflammatory drugs and acetaminophen.

^c Includes codeine, oxycodone, hydrocodone, propoxyphene, meperidine, pentazocine, buprenorphine, nalbuphine, butorphanol and any combination of these drugs with level 1 drugs.

^d Includes morphine, hydromorphone, oxymorphone, methadone, levorphanol and fentanyl.

^e Includes corticosteroids, muscle relaxants, anticonvulsants, tricyclic antidepressants, selective norepinephrine reuptake inhibitors, alpha-2-adrenergic agonists, transdermal lidocaine and mexiletine.²⁶

^f Suppository opioid formulations were used by <0.1% of the study population.

Table 4

Correlates of receiving any analgesic among newly-admitted NH residents with cancer and any pain (N = 5,313)

	Any analgesic (n = 3,844)	No analgesic (n = 1,469)	Odds of receiving any analgesic for any pain	
			Unadjusted OR (95% CI)	Adjusted ^a OR (95% CI)
Age, years				
<65 (Medicare-disabled)	7.0	3.8	1.41 (1.02–1.95)	1.33 (0.96–1.85)
65–74	24.4	18.9	Referent	Referent
75–84	43.2	41.6	0.80 (0.68–0.95)	0.88 (0.74–1.04)
85	25.5	35.7	0.55 (0.47–0.66)	0.67 (0.55–0.81)
Women	57.6	54.6	1.13 (1.00–1.28)	1.16 (1.02–1.33)
Race/ethnicity				
White, non-Hispanic	84.4	82.5	Referent	Referent
Black, non-Hispanic	9.8	11.0	0.87 (0.72–1.06)	0.85 (0.69–1.05)
Other	5.8	6.5	0.87 (0.68–1.11)	0.81 (0.62–1.05)
Source of admission, acute care hospital	88.8	86.1	1.29 (1.08–1.54)	1.25 (1.03–1.51)
Num. of other medication in first week				
5	25.0	45.2	Referent	Referent
6–10	40.2	32.7	2.22 (1.91–2.59)	2.46 (2.12–2.86)
11	34.8	22.1	2.86 (2.41–3.39)	3.13 (2.64–3.72)
Compromised ADLs ^c	75.1	75.5	0.98 (0.85–1.13)	1.13 (0.97–1.32)
Cognitive impairment ^d	37.1	49.4	0.60 (0.53–0.68)	0.71 (0.61–0.82)
Depressed mood ^e	10.1	8.4	1.23 (0.99–1.52)	1.26 (1.00–1.58)
Feeding tubes	6.4	7.4	0.85 (0.68–1.06)	0.77 (0.60–0.99)
Use of restraints ^f	1.0	2.4	0.43 (0.28–0.67)	0.50 (0.31–0.82)
Bedfast	5.6	4.8	1.19 (0.89–1.59)	1.19 (0.88–1.61)
Explicit terminal prognosis ^g	9.8	8.4	1.18 (0.95–1.48)	1.45 (1.14–1.8)

Percentages presented.

ADL: activities of daily living; **CI:** confidence interval; **NH:** nursing home; **OR:** odds ratio

^a Adjusted for all variables listed in Table 1 and variables describing participation in MDS assessment (family, significant other) and communication skills.

^b “Other” includes Hispanic, Asian/Pacific Islander, American Indian/Alaskan Native.

^c ADL Hierarchy Scale scores equal 3 or more.

^d Cognitive Performance Scale score equal 2 or more.

^e Depression Rating Scale scores equal 3 or more.

^f Includes trunk and limb restraints as well as chairs to prevent rising.

^g Indicated by prognosis 6 months or receipt of hospice.