

# Analgesic Use Among Community-Dwelling People Aged 75 Years and Older: A Population-Based Interview Study

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## ABSTRACT

**Background:** Pain is often underrecognized and undertreated among older people. However, older people may be particularly susceptible to adverse drug reactions linked to prescription and nonprescription analgesics.

**Objectives:** The aims of this study were to assess the prevalence of analgesic use among a random sample of community-dwelling people aged  $\geq 75$  years, and to investigate factors associated with daily and as-needed analgesic use.

**Methods:** A random sample of people aged  $\geq 75$  years was drawn from the population register in Kuopio, Finland, in November 2003. Data on prescription and nonprescription analgesic use were elicited during nurse interviews conducted once for each participant in 2004. Self-reported drug utilization data were verified against medical records. The interview included items pertaining to sociodemographic factors, living conditions, social contacts, health behavior, and state of health. Physical function was assessed using the Instrumental Activities of Daily Living Scale, and the 10-item Barthel Index. Self-rated mobility was assessed by asking whether respondents could walk 400 meters (yes, yes with difficulty but without help, not without help, or no). Cognitive function was assessed using the Mini-Mental State Examination. The presence of depressive symptoms was assessed using the 15-item Geriatric Depression Scale. Respondents' self-rated health was determined using a 5-point scale (very poor, poor, moderate, good, or very good).

**Results:** Of the initial random sample of participants ( $N = 1000$ ), 700 provided consent to participate and were community dwelling. Among the participants, 318 (45.4%) were users of  $\geq 1$  analgesic on a daily or as-needed basis. Only 23.3% of analgesic users took an analgesic on a daily basis. Factors associated with any analgesic use included female sex (odds ratio [OR], 1.78 [95% CI, 1.17–2.71]), living alone (OR, 1.46 [95% CI, 1.02–2.11]), poor self-rated health (OR, 2.6 [95% CI, 1.22–3.84]), and use of  $\geq 10$  nonanalgesic drugs (OR, 2.21 [95% CI, 1.26–3.87]). Among users of  $\geq 1$  oral analgesic, factors associated with opioid use included moderate (OR, 2.46 [95% CI, 1.17–5.14]) and poor (OR, 2.57 [95% CI, 1.03–6.42]) self-rated health. Opioid use (OR, 0.19 [95% CI, 0.04–0.86]) and daily analgesic use (OR, 0.16 [95% CI, 0.04–0.74]) were inversely associated with depressive symptoms. Pain in the previous month was reported by 71.4% of analgesic users and 26.4% of nonusers of analgesics.

**Conclusions:** Analgesics were used by  $\sim 50\%$  of community-dwelling people aged  $\geq 75$  years. However, age was not significantly associated with increased use of analgesics in multivariate analysis. The majority of analgesic drugs were used on an as-needed rather than a daily basis (76.7% vs 23.3%, respectively). Factors most significantly associated with analgesic use were female sex, living alone, poor self-rated health, and use of  $\geq 10$  nonanalgesic drugs. (*Am J Geriatr Pharmacother.* 2010;8:233–244) © 2010 Excerpta Medica Inc.

**Key words:** aged, elderly, cross-sectional studies, drug utilization, pain, analgesics.

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## INTRODUCTION

Pain is often underrecognized and undertreated among older people, especially among those people aged  $\geq 75$  years.<sup>1-3</sup> The prevalence of persistent pain ranges from 30% to 60% among community-dwelling older people,<sup>1-4</sup> and from 45% to 83% among residents of nursing homes and long-term care facilities.<sup>5-8</sup> Pain has been associated with depression, anxiety, sleeping disorders, loss of appetite, increased use of health services, impaired physical capacity, frailty, and reduced participation in social activities.<sup>7,9-15</sup> The assessment and management of pain in older people may be confounded by multimorbidity, cognitive impairment, and a belief that pain is a natural part of the aging process. Suboptimal pain management may cause unnecessary suffering to individuals and extra costs to society.<sup>16</sup>

The American Geriatrics Society Panel on Persistent Pain in Older Persons has recognized that analgesic drugs are the most common pain management strategy in older people.<sup>16</sup> However, providing optimal drug therapy to older people may be complicated by polypharmacy and age-related changes in pharmacokinetics and pharmacodynamics.<sup>17-19</sup> Older people are particularly susceptible to adverse drug reactions (ADRs) associated with prescription and nonprescription (over-the-counter [OTC]) analgesics.<sup>18</sup> NSAIDs have been associated with increased hospitalization for gastrointestinal and renal adverse effects, including peptic ulcers, perforations, and hemorrhages.<sup>19-21</sup> Randomized controlled studies have suggested that NSAIDs are superior to acetaminophen for improving knee and hip pain in osteoarthritis, although the treatment effects have been modest, and 2 surveys have reported  $>40\%$  of people with osteoarthritis prefer acetaminophen or report no difference between acetaminophen and NSAIDs.<sup>22,23</sup> The use of opioids has increased rapidly in Europe and North America over the past decade, with opioid use doubling and expenditure tripling in the United States between 1998 and 2003.<sup>24-26</sup> Opioid analgesics provide effective analgesia for moderate to severe pain, but their use may be limited by fear of addiction, constipation, and respiratory depression.<sup>27,28</sup> There is a lack of clinical trial data to guide analgesic prescribing for older people; therefore, analgesic prescribing for older people is primarily informed by clinical experience, expert consensus statements, and clinical practice guidelines.<sup>18,29</sup> Notwithstanding the potential for ADRs, when prescribed appropriately, prescription and OTC analgesic drugs represent an important component of effective pain management strategies.<sup>16</sup>

A MEDLINE search of the English-language peer-reviewed literature using MeSH and search terms in-

cluding *analgesic, drug utilization, aged, aged 80 and over, and pain* revealed relatively few studies have focused on analgesic use among community-dwelling older people.<sup>2,3,30-33</sup> A population-based study conducted in Kuopio, Finland, in 1998 reported that analgesics were used by 70% of community-dwelling people aged  $\geq 75$  years.<sup>2</sup> Of concern, NSAIDs were used by 51% of all people aged  $\geq 75$  years. A cross-sectional postal survey conducted in Finland in 1999 reported that only one third of community-dwelling people with pain that interfered with daily function were prescribed an analgesic for regular use.<sup>3</sup> Few previous studies have specifically investigated the prevalence and factors associated with continuous daily analgesic use.<sup>34-36</sup> The objectives of the present cross-sectional study were to assess the prevalence of analgesic use among a random sample of community-dwelling people aged  $\geq 75$  years, and to investigate factors associated with daily and as-needed analgesic use.

## PATIENTS AND METHODS

### Study Population

This study utilized baseline data from the Geriatric Multidisciplinary Strategy for the Good Care of the Elderly (GeMS) study.<sup>37</sup> The GeMS study was a randomized comparative study which evaluated a model for geriatric assessment, care, and rehabilitation. The study sample was randomly selected from all persons aged  $\geq 75$  years (born before November 1, 1928) living in the city of Kuopio, Finland, in November 2003.

### Data Collection

All participants were interviewed by a trained nurse in 2004. If the participant was unable to visit the outpatient clinic, the interview took place in the participant's home. Each participant was interviewed once with each interview lasting  $\sim 2$  hours. The interview included items pertaining to sociodemographic factors, living conditions, social contacts, health behavior, and state of health. Sociodemographic data collected during the interviews included respondents' age, sex, education level, and whether the respondents were living alone (yes or no). Physical function was assessed using the Instrumental Activities of Daily Living (IADL) Scale<sup>38</sup> and the 10-item Barthel Index (BI).<sup>39</sup> Self-rated mobility was assessed by asking whether respondents could walk 400 meters (yes, yes with difficulty but without help, not without help, or no). For the sake of analysis, the categories "not without help" and "no" were combined under the single category "not independently." Cognitive function was assessed

using the Mini-Mental State Examination (MMSE), with a score <25 considered indicative of cognitive impairment.<sup>40</sup> The presence of depressive symptoms was assessed using the 15-item Geriatric Depression Screening scale, with a score  $\geq 5$  considered indicative of depressive symptoms.<sup>41</sup> Respondents' self-rated health was determined using a 5-point scale (very poor, poor, moderate, good, or very good). For the sake of analysis, the categories "very poor" and "poor" were combined under the single category "poor," and the categories "good" and "very good" were combined under the single category "good." Use of prescription and OTC drugs was self-reported by participants during the interviews. This was important because acetaminophen and certain NSAIDs are available without a prescription in Finland. To reduce the possibility of recall error, participants were asked to bring their prescription forms and drug packages to the interviews. Self-reported drug use was verified against medical records from the municipal health center, home nursing service, local hospitals, and Kuopio University Hospital, Kuopio, Finland. If a participant was unable to self-report their drug use (eg, in cases of severe dementia), this information was sought from that person's caregiver.

### Definition and Classification of Drug Use

Drugs were categorized according to the Anatomical Therapeutic Chemical Classification System recommended by the World Health Organization.<sup>42</sup> For the purpose of this study, analgesics were considered to include NSAIDs (M01AB, M01AC, M01AE, M01AG, M01AX1, N02BA), topical NSAIDs (M02AA, M02AC), coxibs (M01AH), acetaminophen (N02BE), and opioids (N02A). Low-dose aspirin ( $\leq 250$  mg daily) was classified as an antithrombotic rather than an analgesic. Aspirin/caffeine/vitamin C powder (marketed for sore throats) and orphenadrine in combination with acetaminophen (marketed as a muscle relaxant) were excluded from the analyses. Opioids were subcategorized as *strong* (morphine, hydromorphone, oxycodone, and fentanyl) or *weak* (codeine combination products, dextropropoxyphene, buprenorphine, and tramadol). Analgesic use was classified as either *daily* or *as needed* (less frequent than daily).

### Pain Assessment

Participants were interviewed by a nurse regarding the presence of pain. The pain assessment was conducted using a structured paper-based interview guide. For the purpose of this study, participants were consid-

ered to be experiencing pain if they reported any pain during the previous month. This included pain in the shoulders, neck, back, hips, knees, or other sites in the upper or lower body. Headache and persistent pain with symptoms resembling "electric shocks, pressure-evoked pain, numbness, stabbing, or tingling" (suggestive of neuropathic pain) were also included in the definition of pain. In addition, participants who reported pain as a reason for mobility difficulties were considered to be experiencing pain.

### Data Analyses and Ethical Considerations

Respondents' age was classified into 3 groups: 75–79, 80–84, or  $\geq 85$  years. Respondents' total length of education was classified as  $\leq 6$  years or  $>6$  years. All analyses were conducted using SPSS version 15.0 (SPSS Inc., Chicago, Illinois). Logistic regression models were used to determine odds ratios (ORs) and 95% CIs for the association between use of  $\geq 1$  analgesic drug and demographic parameters, and cognitive and physical function. Logistic regression models were also used to investigate sociodemographic differences and health characteristics of nonopioid and opioid analgesic users, and to compare daily and as-needed analgesic users. Written informed consent was obtained from all participants or their guardian. The percentage of daily and as-needed analgesic users who experienced pain in the previous month was compared using the  $\chi^2$  test. The study protocol was approved by the Research Ethics Committee of the Northern Savo Hospital District, Kuopio, Finland.

### RESULTS

Of the 1000 persons selected, 781 persons provided written informed consent to participate (162 persons refused participation, 2 persons moved residence, and 55 persons died before the scheduled baseline interview). For the purpose of this study we excluded those participants who resided in institutional care ( $n = 81$ ). This meant there were 700 people included in the analyses.

The mean (SD) age of the participants was 81.3 (4.6) years and 486 (69.4%) were women. Of all participants, 318 (45.4%) were users of  $\geq 1$  analgesic drug on a daily or an as-needed basis (Table I). Among all analgesic users, 25.2% (80/318) used  $>1$  analgesic concurrently. Acetaminophen was the most commonly used analgesic (48.4%, 154/318), followed by NSAIDs (41.2%, 131/318), weak opioids (21.1%, 67/318), coxibs (9.4%, 30/318), local analgesics (6.9%, 22/318), and strong opioids (0.3%, 1/318). Ibuprofen was the most frequently used NSAID (61.1%, 80/131). Cele-

**Table I. Sociodemographic and clinical characteristics associated with use or nonuse of analgesic drugs on a daily or an as-needed basis.\***

Variable	Analgesic Users, No. (%) (n = 318)	Analgesic Nonusers, No. (%) (n = 382)	Unadjusted OR (95% CI)	Adjusted OR (95% CI) <sup>†</sup>
Age group, y				
75–79	143 (45.0)	203 (53.1)	1.00	1.00
80–84	100 (31.4)	115 (30.1)	1.23 (0.88–1.74)	1.01 (0.76–1.60)
≥85	75 (23.6)	64 (16.8)	1.66 (1.12–2.47) <sup>‡</sup>	1.35 (0.85–2.15)
Sex, female	250 (78.6)	236 (61.8)	2.27 (1.62–3.19) <sup>§</sup>	2.52 (1.71–3.72) <sup>§</sup>
Education, y				
≤6	168 (54.4)	174 (46.6)	1.36 (1.01–1.84) <sup>‡</sup>	1.16 (0.83–1.62)
>6	141 (45.6)	199 (53.4)	1.00	1.00
Living alone, yes	211 (66.4)	191 (50.0)	1.97 (1.45–2.68) <sup>§</sup>	1.46 (1.02–2.09) <sup>‡</sup>
Self-rated health				
Good	107 (33.6)	194 (50.8)	1.00	1.00
Moderate	141 (44.3)	153 (40.1)	1.67 (1.20–2.32) <sup>‡</sup>	1.47 (1.03–2.10) <sup>‡</sup>
Poor	70 (22.0)	33 (8.6)	3.85 (2.39–6.19) <sup>§</sup>	2.83 (1.66–4.82) <sup>§</sup>
GDS15 <sup>41</sup>				
0–4	281 (89.8)	354 (94.1)	1.00	1.00
5–15	32 (10.2)	22 (5.9)	1.83 (1.04–3.22) <sup>‡</sup>	1.02 (0.54–1.92)
MMSE <sup>40</sup>				
25–30	233 (74.2)	291 (76.6)	1.00	1.00
0–24	81 (25.8)	89 (23.4)	1.14 (0.80–1.61)	0.71 (0.46–1.09)
IADL <sup>38</sup>				
7–8	189 (61.0)	256 (67.9)	1.00	1.00
0–6	121 (39.0)	121 (32.1)	1.35 (0.99–1.86)	1.89 (1.18–3.01) <sup>‡</sup>
Barthel Index <sup>39</sup>				
81–100	281 (88.6)	363 (96.0)	1.00	1.00
0–80	36 (11.4)	15 (4.0)	3.10 (1.66–5.78) <sup>§</sup>	1.48 (0.67–3.29)
Self-rated mobility (able to walk ≥400 m)				
Yes	161 (50.6)	272 (71.2)	1.00	1.00
With difficulty, but without help	106 (33.3)	82 (21.5)	2.18 (1.54–3.09) <sup>§</sup>	1.69 (1.12–2.55) <sup>‡</sup>
Not independently	51 (16.0)	28 (7.3)	3.08 (1.87–5.08) <sup>§</sup>	1.46 (0.74–2.90)
Total number of drugs without analgesics				
0–5	130 (40.9)	238 (62.3)	1.00	1.00
6–9	115 (36.1)	105 (27.5)	2.01 (1.43–2.82) <sup>§</sup>	1.60 (1.07–2.37) <sup>‡</sup>
≥10	73 (23.0)	39 (10.2)	3.43 (2.20–5.34) <sup>§</sup>	2.00 (1.15–3.45) <sup>‡</sup>
Concomitant disease, yes				
Cardiovascular	225 (70.8)	230 (60.2)	1.60 (1.17–2.20) <sup>‡</sup>	1.38 (0.97–1.95)
Chronic pulmonary	30 (9.4)	36 (9.4)	1.00 (0.60–1.67)	0.94 (0.54–1.65)
Diabetes	28 (8.8)	20 (5.2)	1.75 (0.97–3.17)	1.27 (0.65–2.49)

OR = odds ratio; GDS = Geriatric Depression Scale; MMSE = Mini-Mental State Examination; IADL = Instrumental Activities of Daily Living scale.

\*The number of analgesic users and nonusers does not always total 318 and 382, respectively, due to missing data for some items.

<sup>†</sup>Adjusted for age, sex, education, self-rated health, GDS15, MMSE, IADL, cardiovascular disease, chronic pulmonary disease, and diabetes.

<sup>‡</sup>P < 0.001.

<sup>§</sup>P < 0.05.

coxib was the most frequently used coxib (63.3%, 19/30). Codeine in combination with either acetaminophen or ibuprofen (79.1%, 53/67) was the most frequently used opioid, followed by tramadol (13.4%, 9/67).

The use of  $\geq 1$  analgesic drug on a daily or an as-needed basis increased numerically with age: 143/346 people (41.3%) aged 75–79 years; 100/215 people (46.5%) aged 80–84 years; and 75/139 people (54.0%) aged  $\geq 85$  years. In the adjusted multivariate logistic regression model, use of  $\geq 1$  analgesic drug on a daily or as-needed basis was associated with female sex (OR, 1.78 [95% CI, 1.17–2.71]), living alone (OR, 1.46 [95% CI, 1.02–2.11]), poor self-rated health (OR, 2.60 [95% CI, 1.22–3.84]), use of  $\geq 10$  nonanalgesic drugs (OR, 2.21 [95% CI, 1.26–3.87]), and being able to walk 400 meters with difficulty but without assistance (OR, 1.68 [95% CI, 1.11–2.54]).

Among users of  $\geq 1$  oral analgesic drug on a daily or an as-needed basis ( $n = 307$ ), 77.9% ( $n = 239$ ) took only nonopioid analgesics and 22.1% ( $n = 68$ ) took opioid analgesics (Table II). Among those people who used opioid analgesics, 48.5% (33/68) took only opioid analgesics and 51.5% (35/68) used a combination of both opioid and nonopioid analgesics. People aged 80–84 years, but not people aged  $\geq 85$  years, were more likely to take opioid analgesics (alone or in combination with nonopioid analgesics) compared with the youngest age group (75–79 years) (unadjusted OR, 1.88 [95% CI, 1.02–3.48]).

When considering users of  $\geq 1$  analgesic drug on a daily or an as-needed basis, 23.3% (74/318) used analgesics on a daily basis and 76.7% (244/318) used analgesics on an as-needed basis (Figure 1). Acetaminophen, NSAIDs, weak opioids, and local analgesics were typically used on an as-needed basis. Analgesics administered on a daily basis were as follows: acetaminophen, 18.2% (28/154); NSAIDs, 19.1% (25/131); weak opioids, 23.9% (16/67); and local analgesics, 13.6% (3/22) on a daily basis. Coxibs were taken equally on a daily and an as-needed basis (50.0%, 15/30). Only one person took a strong opioid and it was administered on an as-needed basis. Daily use of analgesics was associated with female sex (OR, 3.60 [95% CI, 1.44–8.99]), an IADL score of  $\leq 6$  (OR, 4.25 [95% CI, 1.90–9.52]), and being able to walk 400 meters with difficulty but without assistance (OR, 2.29 [95% CI, 1.09–4.78]) (Table III). Daily use of analgesics was inversely associated with cardiovascular disease (OR, 0.46 [95% CI, 0.24–0.89]) and depressive symptoms (OR, 0.16 [95% CI, 0.34–0.74]).

Among daily and as-needed analgesic users, 71.4% (222/311) of people experienced pain in the previous month compared with 26.4% (98/371) of nonusers of analgesics (Figure 2); pain data for 18 people were missing. The percentage of people who experienced pain in the previous month was higher among daily analgesic users (80.8% [59/73]) than among as-needed analgesic users (68.5% [163/238]) ( $P = 0.041$ ).

## DISCUSSION

The overall prevalence of analgesic use (45.4%) in our study was numerically lower than previously reported in 1998 when 70% of community-dwelling Finns aged  $\geq 75$  years took one or more analgesic drugs.<sup>2</sup> In addition, the majority of analgesic drugs were taken on an as-needed rather than a daily basis. Less than one quarter of analgesic users in our study took an analgesic on a daily basis. Approximately 75% of analgesic users and ~25% of nonusers of analgesics reported pain during the previous month. The findings of the present study suggest that persistent pain may be insufficiently or poorly managed among these community-dwelling older people.

Our study revealed a change in the pattern of analgesic use in Finland. Acetaminophen was the most frequently (48.4%) used analgesic among these study participants. This was in contrast to previous studies (1999–2008) conducted in Finland, Canada, and the United States in which NSAIDs were more frequently used than acetaminophen.<sup>2,3,31,32</sup> In a study of community-dwelling Finns aged  $\geq 75$  years conducted in 1998 in the same municipality with a similar sampling strategy, 51% of all participants took NSAIDs and 23% took acetaminophen.<sup>2</sup> Our finding that NSAIDs were used by 18.7% (131/700) of people and acetaminophen by 22.0% (154/700) of people reflects an apparent shift away from use of NSAIDs among older people in Finland. This shift may be due in part to education programs and the publication of current care guidelines related to the appropriate and well-tolerated use of NSAIDs.<sup>29</sup> NSAIDs are frequently implicated in ADRs and medication errors.<sup>43</sup> A systematic review of 13 studies on preventable drug-related hospitalizations reported that 11.0% (155/1406) of preventable admissions were associated with NSAIDs, predominately due to ADRs and overdose.<sup>44</sup> Only 20% of Finnish and 22% of Swedish users of NSAIDs or cyclooxygenase-2 inhibitors receive concurrent treatment with gastroprotective drugs.<sup>3,45</sup> However, the prevalence of acetaminophen use was comparable in both 1998 and 2004 (23% and 22%, respectively). This may mean clinicians and

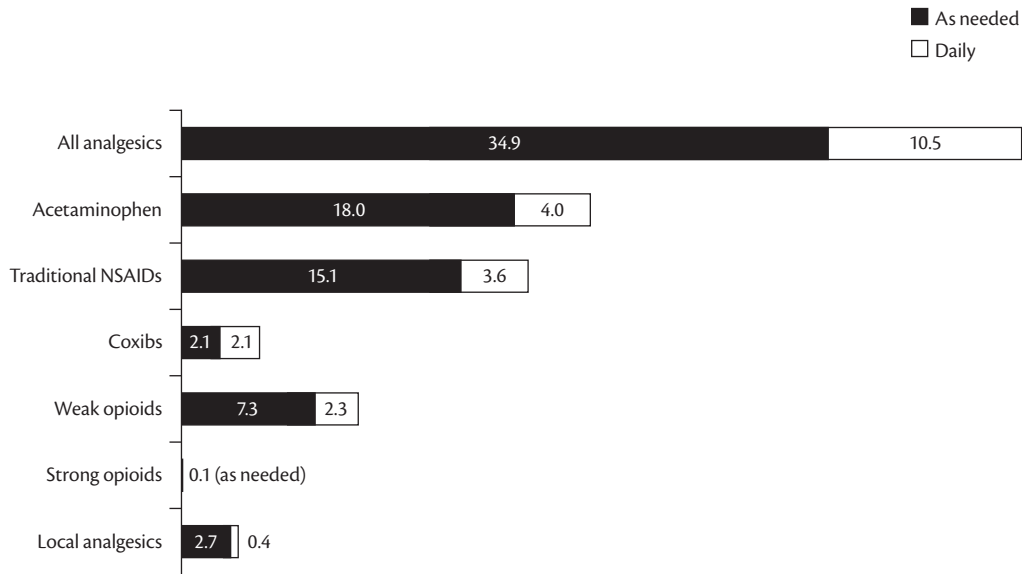
**Table II. Sociodemographic and health characteristics associated with use or nonuse of opioids among users of  $\geq 1$  analgesic drug on a daily or as-needed basis (n = 307).\***

Variable	Opioid Users, No. (%) (n = 68)	Nonopioid Users, No. (%) (n = 239)	Unadjusted OR (95% CI)	Adjusted OR (95% CI) <sup>†</sup>
Age group, y				
75–79	25 (36.8)	112 (46.9)	1.00	1.00
80–84	29 (42.6)	69 (28.9)	1.88 (1.02–3.48) <sup>‡</sup>	1.91 (0.96–3.82) <sup>‡</sup>
$\geq 85$	14 (20.6)	52 (24.3)	1.08 (0.52–2.24)	1.48 (0.64–3.42)
Sex, female	55 (80.9)	186 (77.8)	1.21 (0.61–2.37)	1.18 (0.53–2.63)
Education, y				
$\leq 6$	41 (61.2)	123 (53.2)	1.39 (0.80–2.41)	1.45 (0.77–2.72)
$> 6$	26 (38.8)	108 (46.8)	1.00	1.00
Living alone, yes	42 (61.8)	159 (66.5)	0.81 (0.47–1.42)	0.63 (0.32–1.22)
Self-rated health				
Good	14 (20.6)	89 (37.2)	1.00	1.00
Moderate	35 (51.5)	99 (41.4)	2.25 (1.14–4.45) <sup>‡</sup>	2.46 (1.17–5.14) <sup>‡</sup>
Poor	19 (27.9)	51 (21.3)	2.37 (1.10–5.12) <sup>‡</sup>	2.57 (1.03–6.42) <sup>‡</sup>
GDS15 <sup>41</sup>				
0–4	61 (95.3)	209 (87.8)	1.00	1.00
5–15	3 (4.7)	29 (12.2)	0.35 (0.10–1.20)	0.19 (0.04–0.86) <sup>‡</sup>
MMSE <sup>40</sup>				
25–30	51 (76.1)	175 (74.2)	1.00	1.00
0–24	16 (23.9)	61 (25.8)	0.90 (0.48–1.70)	0.87 (0.38–2.00)
IADL <sup>38</sup>				
7–8	39 (59.1)	143 (61.1)	1.00	1.00
0–6	27 (40.9)	91 (38.9)	1.09 (0.62–1.90)	0.78 (0.33–1.85)
Barthel Index <sup>39</sup>				
81–100	59 (86.8)	212 (89.1)	1.00	1.00
0–80	9 (13.2)	26 (10.9)	1.24 (0.55–2.80)	1.62 (0.49–5.39)
Self-rated mobility (able to walk $\geq 400$ m)				
Yes	32 (47.1)	122 (51.0)	1.00	1.00
With difficulty, but without help	24 (35.3)	79 (33.1)	1.16 (0.64–2.11)	1.12 (0.54–2.31)
Not independently	12 (17.6)	38 (15.9)	1.20 (0.57–2.57)	1.73 (0.56–5.31)
Total number of drugs excluding analgesics				
0–5	16 (23.5)	106 (44.4)	1.00	1.00
6–9	31 (45.6)	84 (35.1)	2.45 (1.25–4.77) <sup>‡</sup>	3.28 (1.50–7.17) <sup>‡</sup>
$\geq 10$	21 (30.9)	49 (20.5)	2.84 (1.36–5.91) <sup>‡</sup>	2.87 (1.09–7.52) <sup>‡</sup>
Concomitant disease, yes				
Cardiovascular	49 (72.1)	169 (70.7)	1.60 (1.17–2.20) <sup>‡</sup>	0.91 (0.46–1.79)
Chronic pulmonary	13 (19.1)	17 (7.1)	1.00 (0.60–1.67)	2.75 (1.15–6.57) <sup>‡</sup>
Diabetes	6 (8.8)	21 (8.8)	1.75 (0.97–3.17)	1.08 (0.54–2.15)
Antithrombotic medication, yes	52 (76.5)	147 (61.5)	2.03 (1.10–3.77) <sup>‡</sup>	2.63 (1.25–5.52) <sup>‡</sup>

OR = odds ratio; GDS = Geriatric Depression Scale; MMSE = Mini-Mental State Examination; IADL = Instrumental Activities of Daily Living scale.

\*The number of opioid and nonopioid users does not always total 68 and 239, respectively, due to missing data for some items.

<sup>†</sup>Adjusted for age, sex, education, self-rated health, GDS15, MMSE, IADL, cardiovascular disease, chronic pulmonary disease, and diabetes.<sup>‡</sup>P < 0.05.



**Figure 1. Percentage of Finnish participants using prescription and nonprescription analgesics on an as-needed or a daily basis (n = 318). Distribution of analgesic groups is not equal to percentages of all analgesics because some individuals reported using >1 analgesic.**

patients recognized the risk of ADRs associated with NSAIDs but did not use acetaminophen in place of NSAIDs. Overall, only 10.5% of the total population administered an analgesic on a daily basis. Reasons why analgesics were predominately used on an as-needed basis may have been that people only experienced mild pain or that they experienced or feared adverse reactions with daily use. Of all analgesic users, ~23% took an analgesic on a daily basis in our study compared with ~16% of analgesic users in 1998. While daily use of analgesics may improve pain control, overdose with NSAIDs is a common cause of preventable hospitalization.<sup>44</sup> Nevertheless, lack of daily analgesic use may be one reason why >70% of analgesic users continued to experience pain.

A higher percentage of participants aged  $\geq 85$  years used analgesics (54.0%). However, the increased use of analgesics with increased age was not statistically significant in the multivariate model. The more frequent use of analgesics among older participants had been reported in 2 previous studies in Finland,<sup>2,3</sup> which contrast earlier studies conducted in the United States.<sup>1,46</sup> Reasons cited for the lower use of analgesics among older people in other studies have included having difficulty describing their pain, the misconception that pain is a natural part of the aging process, and the fear of addiction, drug–drug interactions (DDIs), and

ADRs.<sup>47</sup> In addition, people with cognitive impairment (MMSE <25) in our study were not statistically less likely to take analgesic drugs than people without cognitive impairment in either the unadjusted (OR, 1.14 [95% CI, 0.80–1.61]) or adjusted analyses (OR, 0.71 [95% CI, 0.46–1.09]). Previous studies have reported that people with cognitive impairment may receive inadequate analgesia.<sup>1</sup> A population-based study in Kuopio, Finland, found that people with dementia were less likely to report any pain, daily pain, daily pain interfering with routine activities, and daily pain at rest than people without dementia.<sup>48</sup> Clinicians may also be less likely to identify and treat pain among people with cognitive impairment.<sup>49</sup> However, these factors were not evident in our study population.

Living alone was significantly associated with analgesic use in our study (OR, 1.46 [95% CI, 1.02–2.09]). This finding was consistent with results of a US study that found not being married was associated with prescription analgesic use.<sup>30</sup> People who were widowed and living alone may be more likely to report pain.<sup>2,50</sup> However, the relationship between pain and being widowed and living alone has not been consistent across all studies.<sup>30</sup> The percentage of community-dwelling Finns aged  $\geq 75$  years who took opioid analgesics was comparable in 1998 and 2004.<sup>2</sup> No study participants used a strong opioid in 1998 and only one participant used a

**Table III. Sociodemographic and health characteristics associated with as-needed use or daily use of analgesics (n = 318).\***

Variable	As-Needed User, No. (%) (n = 244)	Daily User, No. (%) (n = 74)	Unadjusted OR (95% CI)	Adjusted OR (95% CI) <sup>†</sup>
Age group, y				
75–79	118 (48.4)	25 (33.8)	1.00	1.00
80–84	74 (30.3)	26 (35.1)	1.66 (0.89–3.09)	1.48 (0.72–3.05)
≥85	52 (21.3)	23 (31.1)	2.09 (1.09–4.01) <sup>‡</sup>	1.09 (0.46–2.58)
Sex, female	187 (76.6)	63 (85.1)	1.75 (0.86–3.54)	3.60 (1.44–8.99) <sup>‡</sup>
Education, y				
>6	120 (50.2)	21 (30.0)	1.00	1.00
≤6	119 (49.8)	49 (70.0)	2.35 (1.33–4.16) <sup>‡</sup>	1.58 (0.82–3.04)
Living alone, yes	154 (63.1)	57 (77.0)	1.96 (1.08–3.57) <sup>‡</sup>	2.13 (0.98–4.66)
Self-rated health				
Good	85 (34.8)	22 (29.7)	1.00	1.00
Moderate	111 (45.5)	30 (40.6)	1.04 (0.56–1.94)	1.07 (0.53–2.18)
Poor	48 (19.7)	22 (29.7)	1.77 (0.89–3.53)	1.52 (0.63–3.68)
GDS15 <sup>41</sup>				
0–4	213 (88.4)	68 (94.4)	1.00	1.00
5–15	28 (11.6)	4 (5.6)	0.45 (0.15–1.32)	0.16 (0.34–0.74) <sup>‡</sup>
MMSE <sup>40</sup>				
25–30	185 (76.4)	48 (66.7)	1.00	1.00
0–24	57 (23.6)	24 (33.3)	1.62 (0.92–2.88)	0.77 (0.35–1.69)
IADL <sup>38</sup>				
7–8	158 (66.1)	31 (43.7)	1.00	1.00
0–6	81 (33.9)	40 (56.3)	2.52 (1.47–4.32) <sup>‡</sup>	4.25 (1.90–9.52) <sup>§</sup>
Barthel Index <sup>39</sup>				
81–100	224 (91.8)	57 (78.1)	1.00	1.00
0–80	20 (8.2)	16 (21.9)	3.14 (1.53–6.45) <sup>‡</sup>	1.32 (0.45–3.85)
Self-rated mobility (able to walk ≥400 m)				
Yes	137 (56.2)	24 (32.4)	1.00	1.00
With difficulty, but without help	73 (29.9)	33 (44.6)	2.58 (1.42–4.69) <sup>‡</sup>	2.29 (1.09–4.78) <sup>‡</sup>
Not independently	34 (13.9)	17 (23.0)	2.85 (1.38–5.90) <sup>‡</sup>	1.50 (0.50–4.50)
Total number of drugs excluding analgesics				
0–5	107 (43.9)	23 (31.1)	1.00	1.00
6–9	83 (34.0)	32 (43.2)	1.79 (0.98–3.29)	1.82 (0.86–3.86)
≥10	54 (22.1)	19 (25.7)	1.64 (0.82–3.26)	1.11 (0.43–2.88)
Concomitant disease, yes				
Cardiovascular	179 (73.4)	46 (62.2)	0.60 (0.35–1.03)	0.46 (0.24–0.89) <sup>‡</sup>
Chronic pulmonary	24 (9.8)	6 (8.1)	0.81 (0.32–2.06)	1.08 (0.37–3.05)
Diabetes	21 (8.6)	7 (9.5)	1.11 (0.45–2.72)	0.50 (0.13–1.92)

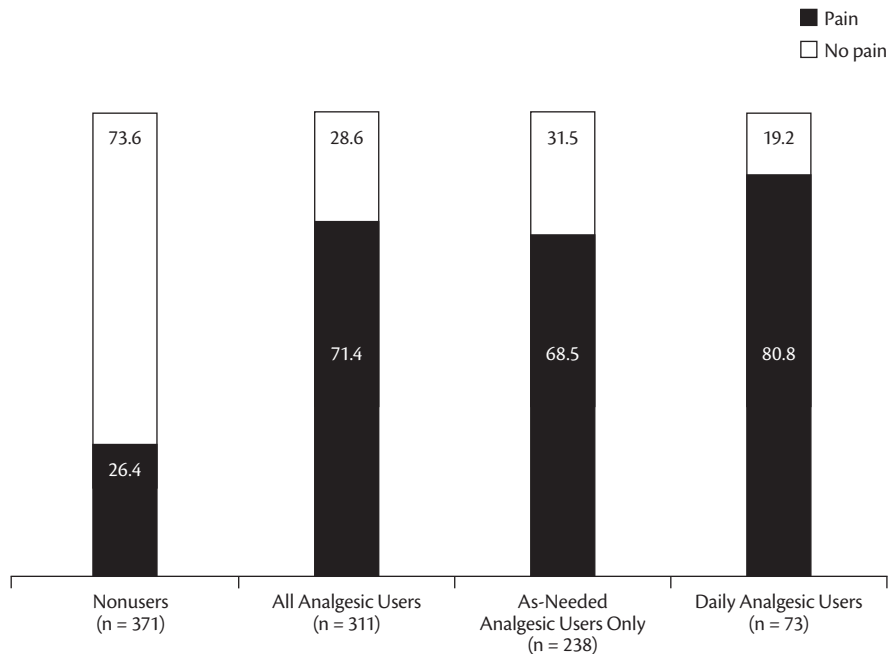
OR = odds ratio; GDS = Geriatric Depression Scale; MMSE = Mini-Mental State Examination; IADL = Instrumental Activities of Daily Living scale.

\*The number of as-needed analgesic users and daily users does not always total 244 and 74, respectively, due to missing data for some items.

<sup>†</sup>Adjusted for age, sex, education, self-rated health, GDS15, MMSE, IADL, cardiovascular disease, chronic pulmonary disease, and diabetes.

<sup>‡</sup>P < 0.05.

<sup>§</sup>P < 0.001.



**Figure 2.** Percentage of analgesic users (n = 311) and nonusers (n = 371) experiencing pain. The number of analgesic users and nonusers does not total 700 due to missing pain data (n = 18).

strong opioid in 2004. However, the use of strong opioids has increased in Finland since 2004, driven in part by the prescribing of transdermal fentanyl.<sup>51,52</sup> The use of opioid analgesic drugs in our study was associated with moderate and poor self-rated health, use of antithrombotic drugs, number of drugs excluding analgesics, and a diagnosis of chronic obstructive pulmonary disease (COPD). The association between opioid use and a participant's total number of non-analgesic drugs was expected because a participant's total number of drugs may be an indicator of comorbidity.<sup>45</sup> Previous research has documented a relationship between pain and medical comorbidity.<sup>53</sup> Physicians may have prescribed opioid analgesics to people receiving concurrent antithrombotic treatment due to the potential DDI between NSAIDs and warfarin that may increase the risk of bleeding.<sup>19</sup> The association between opioid analgesic use and a diagnosis of COPD may have been because our definition of COPD included asthma, and physicians avoided prescribing NSAIDs to people with asthma due to the fear NSAIDs may exacerbate asthmatic symptoms. The association between opioid analgesic use and COPD is of some concern because respiratory depression is a potential ADR of opioids.<sup>54,55</sup> However, almost all opioids used in our study were weak opioids and, therefore, this

potential ADR may have been of little clinical significance. Opioid use was highest among people aged 80–84 years. This may have been because physicians were aware that age-related changes in pharmacokinetics may lead to a longer  $t_{1/2}$ , reduced clearance, and higher plasma concentrations of opioid analgesics among people aged  $\geq 85$  years.<sup>55</sup> Some opioid analgesics have active metabolites that are renally cleared and may accumulate in older people with renal impairment.<sup>56</sup> Older people may be particularly sensitive to opioid-induced ADRs including constipation, nausea, and drowsiness.<sup>57</sup> In contrast to earlier studies,<sup>2,58</sup> opioid use was inversely associated with depressive symptoms in our study. This may reflect an increased awareness and greater recognition of depression among older people. It is also possible that better pain relief alleviated depressive symptoms. Tramadol has structural and pharmacologic similarities to antidepressant drugs, and has been reported to possess antidepressant properties.<sup>59</sup> Further studies are required to determine the prevalence of antidepressant use for neuropathic pain in community-dwelling older people.

### Methodologic Strengths and Limitations

An important strength of our study was that all participants were interviewed regarding their prescription

and OTC drug use. This data-collection method captured both prescribed and nonprescription drug use, and reflected actual analgesic use rather than the prescribing or dispensing of analgesics. To reduce the possibility of recall error, participants were asked to bring all prescriptions and drug packages/containers with them to the interview. Analgesic use was also verified against medical records from the municipal health center, home nursing service, local hospitals, and Kuopio University Hospital. This method represents an advantage over previous studies that have relied on prescription claims databases. While prescription claims databases are not subject to recall bias, they often exclude OTC analgesics, do not account for nonadherence, and prevalence estimates may vary according to the choice of exposure–time window.<sup>60</sup> The random sample of 1000 people aged  $\geq 75$  years invited to participate in our study represented  $\sim 20\%$  of people aged  $\geq 75$  years living in Kuopio, Finland. The study participants had similar demographic characteristics to people aged  $\geq 75$  years living in Kuopio, suggesting our findings can be reasonably generalized to this population. However, differences in prescribing culture, use of opioids, insurance coverage, and comorbidity mean that analgesic prescribing in Finland may differ from analgesic prescribing in other countries, including the United States. This means that the results of our study may not be generalizable to other countries. The cross-sectional study design meant that we were unable to determine the duration of analgesic use and whether participants stopped or switched analgesics. Although use of aspirin at a dose of  $\leq 250$  mg daily was excluded from the analyses, we cannot exclude the possibility that some analgesics may have been for indications other than pain. Conversely, we did not investigate whether any nonanalgesic drugs were being used for their analgesic properties (eg, tricyclic antidepressants or anticonvulsants for neuropathic pain, nitroglycerin for angina pectoris). Additional limitations of our study included that we did not investigate the doses or effectiveness of analgesic drugs used by the study participants, the prevalence of pain according to specific types or causes, or whether the participants used nonpharmacologic treatments to manage their pain.

Our data highlight the importance for clinicians to implement effective pain management strategies among community-dwelling people aged  $\geq 75$  years. This is because  $>80\%$  of daily analgesic users, and  $\sim 70\%$  of as-needed analgesic users, continued to experience pain. In addition, our study revealed that  $>25\%$  of nonusers of analgesics reported pain in the previous month. While NSAIDs were less likely to be used in 2004 than

in 1998, the prevalence of acetaminophen use was similar in both studies. The lower use of NSAIDs was an encouraging finding; however, clinicians should remain vigilant to ensure that older people receive appropriate analgesia. Further education programs may be required to optimize the use of analgesic drugs.

## CONCLUSIONS

Analgesics were used by  $\sim 50\%$  of community-dwelling people aged  $\geq 75$  years. However, age was not significantly associated with increased use of analgesics in multivariate analysis. The majority of analgesic drugs were used on an as-needed rather than a daily basis (76.7% vs 23.3%, respectively). Factors most significantly associated with analgesic use were female sex, living alone, poor self-rated health, and use of  $\geq 10$  non-analgesic drugs.

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