



Contents lists available at ScienceDirect

Pain Management Nursing

journal homepage: www.painmanagementnursing.org

Original Article

Self-Reported Pain Interference and Analgesic Characteristics in Rural Older Adults

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ARTICLE INFO

Article history:

Received 16 April 2018

Received in revised form

5 March 2019

Accepted 6 March 2019

ABSTRACT

Background: Pain impacts the lives of millions of community-dwelling older adults. An important characteristic of pain is “pain interference” which describes the influence of pain on function. A description of pain interference is limited in rural settings where the number of older adults is expected to increase, and health disparities exist.

Aims: The purpose of this study was to describe pain interference and analgesic medication use, highlighting those that may be potentially inappropriate in a sample of rural community-dwelling older adults.

Design: This secondary analysis was from a cross sectional study.

Sample and Settings: Data were analyzed from a sample of 138 rural community-dwelling older adults.

Methods: Statistical analyses were performed on demographics, health characteristics, pain interference, and potentially inappropriate analgesic medication data.

Results: Pain interference with work activity was reported by 76% of older adults overall, with 23% reporting moderate and 4% extreme interference, and 41% reported sleep difficulty due to pain. Higher pain interference was significantly associated with higher body mass index, more health providers, and the daily use of non-steroidal anti-inflammatory drugs (NSAIDs). Older women experienced more sleep difficulties due to pain. Over-the-counter analgesics were used most frequently by rural older adults to manage pain. Of most risk was the daily use of NSAIDs, in which only 30% used medications to protect the gastrointestinal system.

Conclusions: Older adults in rural settings experience pain interference and participate in independent-medicating behaviors that may impact safety.

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Introduction

In the United States, nearly 19 million community-dwelling older adults report pain (Patel, Guralnik, Dansie, & Turk, 2013). Pain is often a symptom related to chronic diseases that commonly occur in older adults. The primary treatment approach for pain in older adults includes the use of analgesic medications, but the risk of side effects makes management difficult. Pain is known to interfere with physical and emotional function in older adults; however, little is known about current pain interference and analgesic management in older adults in rural communities

(Mobily, Herr, Clark, & Wallace, 1994). Older adults experience health characteristics associated with living in rural areas, such as higher rates of chronic disease, and higher body mass index (BMI), that affect the experience of pain and its treatment (Bolin et al., 2015). With anticipated growth in the number of older adults living in rural settings, understanding pain and its management are essential to promote quality of life in this vulnerable population (Johnson & Winkler, 2015). The purpose of this article is to describe levels of pain interference, analgesic medication use, and potentially inappropriate analgesics used in a sample of independent rural-dwelling older adults.

Pain

Pain is multifactorial and is a symptom that influences quality of life (Wranger, Rennemark, Berglund, & Elmståhl, 2014). Community-dwelling older adults with pain are twice more likely

This work was supported by the Jonas Center for Nursing Excellence.

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<https://doi.org/10.1016/j.pmn.2019.03.001>

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to report higher mobile disability, poorer health, and functional impairment than older adults without pain (Chen, Hayman, Shmerling, Bean, & Leveille, 2011; Patel et al., 2013; Reyes-Gibby, Aday, & Cleeland, 2002). Pain is compounded by chronic disease and is associated with conditions such as poor sleep and poor cognitive function (Power, Perruccio, & Badley, 2005). Older adults are often diagnosed with diseases such as osteoarthritis and neuropathy, where pain is a major symptom (Baker et al., 2017; Reid, Eccleston, & Pillemer, 2015). These conditions have been noted to negatively affect individuals as they age (Eslami, Zimmerman, Grewal, Katz, & Lipton, 2016; Van Der Leeuw et al., 2015). Reyes-Gibby et al. (2002) found that even when considering frequent visits to providers, community-dwelling older adults self-reported lower health status as a result of pain. Older adults with more physician office visits were 36% more likely to report poor health status as a result of pain. The authors suggest that higher office visits were an indication of unresolved or untreated pain (Reyes-Gibby et al., 2002).

Pain Interference in Community-Dwelling Older Adults

Pain interference is defined as the impact of pain on normal activities and function (Wilson, 2014). Two recent studies document prevalent pain interference among community-dwelling older adults with 36% to 52% reporting some level of interference (Eslami et al., 2016; Przekop, Haviland, Oda, & Morton, 2015). Using one item from the 36-Item Short Form Health Survey and 12-Item Short Form Health Survey (SF-12) for evaluating pain interference, Eslami's sample of 667 older adults identified 38% with moderate and 14% with severe, whereas Przekop's sample of 9,506 older adults found 17% with moderate or severe pain interference. Van Der Leeuw et al. (2015) found that 16.5% of urban community-dwelling older adults reported moderate pain interference, and 38% reported no interference from pain. Although research has explored reports of pain interference in community-dwelling older adults, current reports on pain interference in rural settings are unknown. One of the few studies that examined pain interference was an analysis conducted more than 20 years ago in rural older adults. In this large sample the researchers found that pain had the greatest impact on work activities, movement, and sleep (Mobily et al., 1994).

Among community-dwelling older adults, high pain interference has been associated with characteristics such as older age, being female, lower education, high BMI, poorer sleep, and symptoms of depression (Przekop et al., 2015). High BMI has been related to chronic disease and musculoskeletal pain, which can have an impact on function in older adults (Seaman, 2013). Eslami et al. (2016) reported that being overweight or obese was associated with pain interference in community-dwelling older women in particular. Pain interference also may lead to depression, anxiety, and psychological aspects related to falls such as fear of falling (Arola, Nicholls, Mallen, & Thomas, 2010; Eslami et al., 2016; Stubbs et al., 2014). The impact of pain on function and aspects of quality of life are important outcomes that guide pain goal establishment. Determination of treatment effectiveness and understanding these factors in rural community-dwelling older adults is important.

Analgesic Medication Use

Pain in older adults is traditionally managed with pharmaceutical products (Reid et al., 2015). Published resources guide the health care provider's pharmacologic pain management in older adult populations (Abdulla et al., 2013; American Geriatrics Society 2015 Beers Criteria Update Expert Panel, 2015). Common analgesic medications typically recommended include acetaminophen,

nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, and adjuvant drugs for neuropathy (Marcum, Duncan, & Makris, 2016; Qato, Wilder, Schumm, Gillet, & Alexander, 2016). Many of these analgesic medications are not without risks, especially in older adults.

Older adults also have been reported to take more over-the-counter (OTC) analgesic medications than prescription medications for pain (Sawyer, Bodner, Ritchie, & Allman, 2006). Cautions are raised regarding nonopioid medications such as NSAIDs used for chronic pain, opioids, and adjuvant analgesics because of physiologic changes of aging and comorbidities that influence response to medications (Bressler & Bahl, 2003; Kaye et al., 2014). It is essential to understand analgesic use behaviors in community-dwelling older adults, especially if use is without direction, prescription, or advisement from a health care provider.

The Beers Criteria (2015) are a resource for health care providers caring for patients 65 years and older. Prescribed and OTC drugs with increased risk for adverse events in adults 65 years of age and older are classified as potentially inappropriate medications (PIMs) and listed in the Beers Criteria. A PIM is a medication that has a higher risk of adverse effects versus the benefit (American Geriatrics Society Beers Criteria Update Expert Panel, 2015). The use of PIMs has been associated with poorer self-reported physical functioning in rural community-dwelling older adults (Shade et al., 2017).

Health Characteristics in Rural America and Disparities

The population of older adults is predicted to grow in rural areas as retirees migrate to small towns and young adults migrate to urban areas (Baernholdt, Yan, Hinton, Rose, & Mattos, 2012; Johnson & Winkler, 2015). The percentage of older adults in rural settings is 15% compared with 12% in urban areas (Bolin et al., 2015). The reports of pain interference may be higher in rural areas. Compared with those living in urban areas, rural adults have higher BMIs, higher rates of chronic disease, and experience health service disparities. Examples of health service disparities include, but are not limited to inadequate access to health care, lack of continuity of care, and limited primary health care provider knowledge about pain (Befort, Nazir, & Perri, 2012; Mezei, Murinson, & Johns Hopkins Pain Curriculum Development Team, 2011; Ng et al., 2014). Rural settings also lack geriatric and pain specialists or providers with training regarding overall pain and pain interference (Park, Park, & Park, 2016). As a result of health provider shortages and limited access in rural areas, older adults may seek health care from several different providers or travel distances to receive care from specialists (Bolin et al., 2015; Eaton et al., 2018). Each of the factors mentioned may affect recognition and management of pain and increased pain interference among rural older adults.

The lack of an understanding of pain, nonadherence to medication regimens, and the use of multiple health providers have been reported to be associated with the inappropriate use prescribed and OTC analgesics among older adults (Albert et al., 2014; Mowbray & Quinn, 2015). Older adults in rural areas may risk worse outcomes stemming from adverse medication-related issues as a result of limited access to health care (Abdulla et al., 2013; Docking et al., 2015; Reid et al., 2015; Rural Health Information Hub, 2016). Although Rudd's (2016) findings raised concerns about a higher death rate from the inappropriate use of opioids among rural community-dwelling older adults, Karp et al. (2013) reported that only 7% chronically used opioid analgesics and 46% used nonopioid analgesic medications for pain. Rural-dwelling older adults who independently medicate with analgesics may have inadequate

relief of symptoms, use additional PIMs, and have an increased risk of adverse events.

Objectives

Pain interference and associated analgesic use in older adults may be influenced by the unique health characteristics in rural settings. The first objective is to describe the levels of pain interference reported by a sample of rural community-dwelling older adults. Second, we examined the relationships among pain interference and individual demographic characteristics and health characteristics. The third objective was to describe the analgesic medications used, focusing on the identification of potentially inappropriate analgesics. In the fourth objective, we examined the relationships between pain interference and use of potentially inappropriate analgesic medication.

Methods

Design

This study is a secondary analysis of data collected in 2015 conducted through in-person medication review, interviews, questionnaires, and medical record abstraction from a previously published descriptive study that focused on individual characteristics, self-reported health status, and self-reported adverse drug events associated with the use of PIMs to avoid in 138 rural older adults (Shade et al., 2017). In this secondary analysis we examined demographic characteristics, health characteristics, pain interference with work activity, sleep, and analgesic medication use. Because of limitations in the data collected on pain in the primary study, we were unable to consider pain severity or other qualities such as pain location. The University of Nebraska Medical Center's Institutional Review Board approved the original study.

Sample

The participants (N = 138) in our sample were community-dwelling older adults recruited from a medical clinic and resided in areas designated as rural or small-town rural, according to Rural-Urban Commuting Area codes 7-10 in Nebraska (Cromartie & Bucholtz, 2008). Participants were men and women, aged 65 years or older, who took three or more prescribed medications the previous month for chronic disease diagnoses. A full description of the original study, including participant recruitment, screening, and procedures, was previously published (Shade et al., 2017).

Measures

Demographic and Health Characteristics Data

Demographic data included the participant's age, gender, education, marital status, and income collected via questionnaire. Health characteristics included current measured height and weight for BMI calculation and the number of health providers seen. The participant's medical records were reviewed to obtain health characteristic data related to medical diagnoses and common diseases associated with pain.

Pain Interference

A comprehensive assessment of pain interference in older adults includes establishing the impact of pain on activities of function such as daily activity, social functioning, and sleep (Reid et al., 2015). For this secondary analysis, one item from a quality-of-life instrument, specifically the interference of pain with work, and one item from a sleep quality instrument, specifically the

interference of pain on sleep, was used to measure pain interference. Version 2 of the SF-12 instrument includes eight health status concepts that comprise physical and mental component scores: physical functioning, role functioning (physical), body pain, general health, vitality, social functioning, role functioning (emotional), and mental health. For this secondary analysis, we focused on the scale dimension of body pain. Pain interference was measured using SF-12 item 8, "During the past four weeks, how much did pain interfere with your normal work including both work outside the home and housework?" Participants could answer *extremely, quite a bit, moderately, a little bit, or not at all* (Ware, Kosinski, & Keller, 1996). The participants in the study were aged 65 years and older and 77% of participants declared they were retired. In rural areas individuals may still do activities they perceive as work outside the home although they are formally retired from official employment. We measured the impact of pain on sleep with item 5i on the Pittsburgh Sleep Quality Index (PSQI): "During the past month, how often have you had trouble sleeping because you have pain?" Participants could answer *three or more times a week, once or twice a week, less than once a week, or not in the past month* (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The Cronbach α scores for the entire instruments in this study were .77 for the SF-12 and .74 for the PSQI.

Analgesic Medications

Prescribed and OTC medications taken in the last month were collected and recorded from the bottles and one-on-one medication review and interviews (Sarzynski, Luz, Rios-Bedoya, & Zhou, 2014). Prescribed medications were recommended for use or obtained with a health provider prescription from the pharmacy. Medications that were used without the recommendation of the participant's health care provider were independently obtained. During the medication review and interview, participants were asked if they experienced relief of pain symptoms after using the medication. The recorded medications were compared with each participant's medical record. Analgesic medications identified in the Beers Criteria category "Medications to Avoid" were classified as a PIM (American Geriatrics Society 2012 Beers Criteria Update Expert Panel, 2012). Although the Beers Criteria were updated in 2015, there were no additions or deletions of analgesic medications to the classification of medications to avoid. The first author categorized medications as a PIM versus non-PIM. Each PIM and non-PIM was reviewed with a pharmacist with expertise in geriatric pharmacology. Disagreements on medications were deliberated until 100% consensus was achieved on PIM categorization. Medications such as NSAIDs have been reported to cause adverse events within 30 days; therefore, for this secondary analysis the daily use of NSAID medications for pain in the last month was considered a risk in older adults and classified as inappropriate or PIM (Gupta & Eisen, 2009).

Analysis

Descriptive statistics were performed to examine demographic and health characteristics, pain interference, sleep, pain medication, and PIM use. We determined frequencies to describe the characteristics and distribution of the data. To explore relationships, nonparametric statistical correlations were used to account for positive skewness and data that were not normally distributed. Spearman rank order correlations (ρ) were conducted to examine relationships among pain interference with work activities and sleep, demographic and health characteristics data, and daily PIM analgesic medications. The predetermined two-tailed α was .05, and the statistical software used in this analysis was SPSS Version 25 (IBM Corp., Armonk, NY, USA).

Results

Participant Characteristics

Table 1 includes the demographic and health characteristics data for the sample. Male (56%) and female (44%) participants were mostly married (74%), with 31% having a college education and earning a variety of incomes. Participants were diagnosed with an average of six (standard deviation 1.9) chronic conditions and several, such as arthritis (19%), were associated with pain. The mean BMI was 30.5 kg/m², with 37% classified as overweight, and 46% of participants classified as obese.

Pain Interference in Rural Community-Dwelling Older Adults

According to item eight on the SF-12, 76% (n = 106) of participants reported pain interference in the past month that affected normal work activities in and outside the home. Individuals reported a range of pain interference levels; 23% reported none, 38% reported a little bit, 23% reported moderate, 12% reported quite a bit, and 4% reported extreme levels. According to item 5i on the PSQI, 41% of participants reported trouble sleeping in the past month because of pain. In fact, 12% of this sample reported difficulties once or twice a week, and 29% reported difficulties three or more times a week.

Table 2 presents the relationships between pain interference with work activity and demographic and health characteristics. No statistically significant correlations were found between pain interference with work activities and age, education level, marital status, income, or the number of chronic diseases. Small positive correlations were found among pain interference with work activities and BMI ($\rho = 0.17$, $p = .048$) and the number of providers ($\rho = 0.27$, $p = .001$). A higher BMI and increased number of health providers were associated with higher pain interference. A small negative correlation was noted between gender and trouble sleeping because of pain ($\rho = -0.18$, $p = .036$); more women (33.8%; n = 26) than men (23%, n = 14) self-reported trouble sleeping because of pain three or more times a week.

Table 1
Demographic and Health Characteristics (N = 138)

Demographic	Mean (SD)	N (%)
Age	78 (7.4)	
Male		77 (56)
Female		61 (44)
8th through 12th grade education		95 (69)
College or trade school education		43 (31)
Married/cohabitating		101 (74)
Single/divorced		36 (26)
Income (N = 127)		
10k to 39k		71 (55)
40k to 69k		41 (32)
70k to >100k		15 (13)
Health characteristics		
BMI		
Normal weight (18.5 to <25.0)		23 (17)
Overweight (25 to <30.0)		51 (37)
Obese (>30)		64 (46)
No. of chronic diseases	5.6 (1.9)	
No. of providers	2.0 (0.8)	
Diseases commonly associated with pain		
Arthritis		27 (19)
Gout		8 (6)
Neuropathy		2 (1)
Peptic ulcers		4 (3)
Peripheral vascular disease		7 (5)
Venous stasis ulcers		4 (3)

SD = standard deviation; BMI = body mass index.

Table 2

Spearman Rank Order Correlations Among Pain Interference with Work Activities and Sleep—Demographic and Health Characteristics (N = 138)

	Pain Interference (ρ)	Difficulty Sleeping Because of Pain (ρ)
Age	-0.01	-0.04
Gender	0.05	-0.18*
Education	-0.09	-0.06
Marital status	0.00	0.10
Income	-0.15	-0.07
Body mass index	0.17†	0.05
No. of providers	0.27†	0.07

* $p < .05$ (two-tailed).

† $p < .01$ (two-tailed).

Characteristics of Analgesic Medication Use by Rural Community-Dwelling Older Adults

Of the participants in this study, 79% (n = 109) used analgesic medications at least once a month. Regardless of the medication used, 88% of participants (n = 96) who used analgesic medications reported relief of pain symptoms after taking analgesics. The characteristics of pain medication types used are in Table 3. The frequency of overall prescribed and OTC analgesic medication use varied; 32% (n = 45) used them once a month, 14% (n = 20) used them weekly, and 32% (44) used them daily.

Daily analgesic medications were prescribed by health care providers and obtained over the counter without a health provider prescription. As shown in Table 4, 65% of “daily” analgesic medications were classified as PIMs, and many of the PIMs (59%) being used daily were NSAIDs. Other PIMs such as antidepressants, skeletal muscle relaxants, and combination pain relievers with a first-generation antihistamine were used less often. Daily NSAID use was not associated with age, education level, marital status,

Table 3

Characteristics of Pain Medications Used in the Previous Month (N = 138)

Medications Used for Pain	N* (%)
Acetaminophen products (OTC)	
Acetaminophen	46 (34)
Arthritis preparation	3 (2)
Acetaminophen total	
Prescribed and OTC NSAIDs	49 (36)
Naproxen	28 (20)
Ibuprofen	21 (16)
Aspirin-containing products	14 (10)
Meloxicam	3 (2)
Celecoxib	1 (1)
Nabumetone	1 (1)
NSAID total	68 (50)
NSAID or acetaminophen with PM designation (diphenhydramine)	3 (2)
Opioids (prescribed)	
Hydrocodone with acetaminophen	10 (7)
Oxycodone	1 (1)
Tramadol	4 (3)
Fentanyl patch	1 (1)
Skeletal muscle relaxer (prescribed)	
Cyclobenzaprine	1 (1)
Prednisone (Prescribed)	2 (1)
Adjuvant medications (prescribed)	
Tramadol	4 (3)
Gabapentin	3 (2)
Alprazolam	2 (1)
Amitriptyline	1 (1)
Topical creams (OTC)	1 (1)

OTC = over the counter; NSAID = nonsteroidal antiinflammatory drug.

* Analgesics are not mutually exclusive, and there are cases of multiple analgesics being taken by participants.

Table 4
Daily Used Analgesics Classified as Potentially Inappropriate Medications (n = 44)

	n (%)	% Prescribed	% OTC
NSAIDs	26 (59)	27	73
Tricyclic antidepressant	1 (0.2)	100	0
Muscle relaxer	1 (0.2)	100	0
Analgesic with first-generation antihistamine	1 (0.2)	0	100

OTC = over the counter; NSAID = nonsteroidal antiinflammatory drug.

income, or comorbidity. There was a small positive correlation between daily NSAID use and higher pain interference ($\rho = 0.179$, $p = .035$). There was no correlation between trouble sleeping because of pain and the daily use of NSAIDs. Of those using daily NSAIDs, only 30% used a prophylactic medication such as a proton pump inhibitor (PPI) or histamine blocker to decrease stomach acid production for increased protection of the gastrointestinal (GI) system. Thirty-six percent (n = 16) of those who used daily analgesic medications used two or more pain medications, and these included a combination of OTC and prescription drugs.

Discussion

This study explored reported pain interference and analgesic use in rural community-dwelling older adults. Our study confirmed that pain interference was not only a problem, but the patterns of OTC analgesic medication use may increase the rural older adult's risk for adverse events. Older adults with higher pain interference used daily OTC NSAIDs and most did not take prophylactic medications to decrease gastric acid production to minimize the potential for adverse events. A large proportion of older adults in this rural setting were overweight or obese, putting them at greater risk for pain and pain interference. Pain interfered with the rural older adults' functions of work activity, and sleep and these disruptions may influence health status and merit careful consideration in assessment and treatment planning.

Rural community-dwelling older adults in this sample reported some level of pain interference with work activities. Compared with the previous studies in community-dwelling older adults, the rural community-dwelling older adults in this sample reported higher rates of moderate pain interference and similar rates of severe pain interference (Eslami et al., 2016; Przekop et al., 2015; Van Der Leeuw et al. 2015). Compared with the rural sample in Mobily et al. (1994), the rural older adults in this sample reported more pain interference with work activities. These results suggest that in rural areas reports of pain interference by older adults are greater and continue to be a problem.

No associations were found between pain interference and demographic characteristics or the number of chronic diseases, but consistent with other studies, pain interference increased with BMI (Eslami et al., 2016; Przekop et al., 2015). This analysis used data from an adult BMI categorization, yet 46% of the individuals classified as obese. Although older adults tend to have higher BMI and body fat because of age-related loss of muscle, being overweight or obese may affect joints. Osteoarthritis was prevalent in this sample, and the higher BMI may have contributed to additional musculoskeletal pain and thus may have explained the association with increased pain interference (Reid et al., 2015; Seaman, 2013). As previously noted, older adults living in rural areas often have higher BMI (Befort, Nazir, & Perri, 2012; Ng et al., 2014). As rural areas experience an increase in the population of older adults (Baernholdt et al., 2012; Bolin et al., 2015; Johnson & Winkler, 2015), health care providers will need to assess for pain and pain interference in older adults with high BMI.

A similar relationship was found between pain interference and sleep as reported in previously published studies that have been conducted in overall community-dwelling older adults. Although reports were slightly lower than in the study by Mobily et al. (1994), the older adults in this rural sample reported that pain interfered with sleep (Chen et al., 2011; Przekop et al., 2015). Another consistent finding was an association with gender. Female older adults self-reported more trouble sleeping with pain than did male older adults (Arola et al., 2010; Eslami et al., 2016; Przekop et al., 2015; Stubbs et al., 2014). According to Mogil (2012), women report pain more often, are more susceptible to diseases where pain is a symptom, and have greater sensitivity to pain. Participants in this analysis reported arthritis and this type of pain related to joint inflammation that may interfere with sleep in older adults (Power et al., 2005). If not properly managed, sleep difficulties in older adults may contribute to falls, decreased cognitive function, and even increased pain; in rural settings this may present additional challenges with care.

Higher pain interference was associated with having an increased number of health providers. According to Lochner, Goodman, Posner, and Parekh (2013), more than two thirds of Medicare beneficiaries have two or more chronic conditions and about 1 in 7 have six or more. Chronic diseases such as respiratory disorders, diabetes, obesity, and arthritis have an inflammatory component and associated pain. Older adults with multiple chronic conditions account for additional visits to health providers and medication use (Baker et al., 2017; Charlesworth, Smit, Lee, Alramadhan, & Odden, 2015). The older adults in this analysis were diagnosed with an average of six chronic conditions. Although a significant relationship was not found between pain interference and the number of chronic diseases, there is a possibility the older adults in this sample sought care from different providers to manage multiple chronic conditions or poorly managed associated pain (Baker et al., 2017). The use of analgesic medications along with medications to manage multiple chronic conditions may increase the risk of adverse drug-drug or drug-disease events. (American Geriatrics Society 2015 Beers Criteria Update Expert Panel, 2015; Charlesworth et al., 2015).

Given the levels of reported pain interference, it was not surprising to see a variety of prescribed and OTC analgesic medications used by rural-dwelling older adults. As with previous studies, participants used a higher percentage of OTC and nonopioid pain relievers (Karp et al., 2013; Sawyer et al., 2006). Of importance is that our analyses highlighted the daily use of prescribed and OTC medications for pain relief over the past month. Because of the increased risk for drug-drug and drug-disease interactions and adverse events, opioid analgesic medications need to be used with caution in older adults (American Geriatrics Society 2015 Beers Criteria Update Expert Panel, 2015). According to Sawyer et al. (2006), community-dwelling older adults who took OTC analgesics had lower odds of taking prescription analgesics. Recent guidelines and prescribing restrictions for opioid analgesics may promote older adults' reliance on OTC analgesic medications (Albert et al., 2014; Dowell, Haegerich, & Chou, 2016). Although the rural older adults in this sample did not use an abundance of opioids, 36% of those using daily analgesics used two or more. Pain needs to be appropriately assessed and managed to monitor for safety issues related to OTC use.

Many older adults in this sample reported taking acetaminophen. Other than nonpharmacologic strategies, acetaminophen is recommended for first-line pain management, but it is important to consider independent self-management risk (Abdulla et al., 2013; American Geriatrics Society 2015 Beers Criteria Update Expert Panel, 2015; Reid et al., 2015). Older adults may not be

knowledgeable about the age-related dosing recommendations or the amount of acetaminophen contained in other OTC products such as sleep aids, flu and cold medications, or other combination analgesic medications (Albert et al., 2014; Sawyer et al., 2006). A lack of knowledge or awareness may place the older adult at risk for adverse events when independently self-managing with OTC analgesic medications.

The older adults in this study were independently medicating with OTC NSAIDs daily. The most problematic adverse events associated with the use of NSAIDs in older adults is the potential for adverse GI events such as bleeding and cardiovascular events (Marcum et al., 2016). According to the Beers Criteria, chronic use of NSAIDs is to be avoided unless other alternatives are not effective and older adults take medication to protect the GI system (American Geriatrics Society Beers Criteria Update Expert Panel, 2015). Only 30% of those using daily NSAIDs used GI prophylactic medications to help reduce the risk of developing specific adverse GI events. The other 70% may be at increased risk for developing ulcers, bleeding, and perforation (American Geriatrics Society Beers Criteria Update Expert Panel, 2015; Gwee, Goh, Lima, & Setia, 2018). The continuous use of daily OTC NSAIDs may place older adults at risk for several adverse events discussed earlier. In rural settings the lack of health provider monitoring, limited consumer knowledge of health risks, and ease of OTC analgesic medication accessibility could increase risks for negative health outcomes.

Implications for Nursing

Nurses play an important role in assessment, monitoring safe medication use, and patient education, particularly in rural areas with primary health provider shortages (Bolin et al., 2015; Eaton et al., 2018). Because rural older adults tend to have higher BMIs, pain interference needs to be assessed and managed in those who are overweight or obese. Nurses need to consider the importance of pain interference in assessment and warn of the risks when independently medicating with OTC analgesic medications. Nurses need to collaborate with the older adult as a part of the health care team to encourage nonpharmacologic strategies to decrease pain interference.

Implications for nursing research include exploring rural older adults' perceptions and experiences of daily pain interference and impact on quality of life. Future studies could prospectively examine pain interference levels daily and compare levels with both nonpharmacologic and analgesic self-management strategies. Examining health literacy issues could provide insight into decision making for analgesic medications in this population. Community participatory research with older adults in these settings may contribute to the development of interventions that specifically address the needs of those in rural settings. Innovative strategies need to be explored that educate older adults on the safe and effective use of analgesics, particularly those that are OTC.

Strengths and Limitations

This study adds to the science through an exploration of pain interference and analgesic characteristics in a rural sample of older adults. As older adults continue to age and migrate to rural communities, studies are needed to understand health care needs to promote quality care for the management of pain. The present study analyzed data from a robust sample of rural community-dwelling older adults. We analyzed data collected within the last 5 years from rural community-dwelling older adults, with minimal attrition from the parent study. Data collected for medication reviews were obtained through both interviews and recording of

information from medication bottles, methods more reliable than medical record abstraction. A pharmacist with expertise in geriatric pharmacology reviewed the medications categorized as PIMs.

This study had several limitations to acknowledge. The results may not be generalizable to all rural community-dwelling older adults. Data were analyzed from a sample of mostly Caucasian older adults from the rural Midwest with higher education and income levels. Secondary analysis research designs are limited to previously collected data to answer new research questions. In the original study a comprehensive instrument was not used to measure the concept of pain interference; therefore we analyzed single-item data collected from reliable and valid instruments in the original study. This approach has been used in prior published pain interference research (Eslami et al., 2016; Przekop et al., 2015). For this secondary analysis, pain interference was assessed with a single-item measure from the SF-12, a quality of life instrument that focused on the impact of body pain on physical function. Sleep interference was assessed with a single-item measure from the PSQI, an instrument for measuring sleep quality that focused on trouble sleeping because of pain. The use of single items to measure these concepts was a limitation. Future work could include a comprehensive instrument on pain interference. The original study did not collect data on pain severity, type, or duration. These characteristics may have provided additional description of pain in this sample. Even with limitations, this analysis provided insights into reported pain interference and analgesic use among a sample of older adults who often are understudied and informs future research priorities.

Conclusions

This secondary analysis suggests that reports of pain interference in rural-dwelling older adults continue to be high and are associated with health characteristics such as higher BMI. Pain interference and analgesic management are important to assess in rural older adults with multiple chronic conditions. Older individuals who chronically medicate with OTC analgesic medications may not be aware of the potential risks associated with use. Increased efforts are needed for pain prevention and management in older adults. As rural America ages, it is important to understand, assess, and safely manage pain to help maintain a quality of life. Nurses play a key role in prioritizing pain management along with the rural older adult.

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