

Assessing Chronic Pain Treatment Practices and Evaluating Adherence to Chronic Pain Clinical Guidelines in Outpatient Practices in the United States

Rafia S. Rasu,* Rose Sohraby,[†] Lindsay Cunningham,[‡] and Maureen E. Knell[§]

*Associate Professor and [§]Clinical Associate Professor, Division of Pharmacy Practice and Administration, University of Missouri-Kansas City School of Pharmacy, Kansas City, Missouri.

[†]PGY-2 Critical Care Pharmacy Resident, University Health System, San Antonio, Texas.

[‡]Pediatric Pharmacist, Children's Mercy Hospital, Kansas City, Missouri.

Abstract: Chronic pain is a major health concern in the United States. Several guidelines have been developed for clinicians to promote effective management and provide an analytical framework for evaluation of treatments for chronic pain. This study explores sample population demographics and the utilization of various therapeutic modalities in an adult population with common nonmalignant chronic pain (NMCP) indications in U.S. outpatient settings. A cross-sectional study using the National Ambulatory Medical Care Survey (NAMCS) data from 2000 to 2007 was used to analyze various treatment practices for the management of NMCP and evaluate the results in comparison with guidelines. The study population of 690,205,290 comprised 63% females, with 45.17% of patient visits occurring in primary care settings. Treatment with at least 1 chronic pain medication was reported in 99.7% of patients. Nonsteroidal anti-inflammatory agents were the most common treatment prescribed, with use reported in approximately 95% of the patient visits. No other pain medication drug class or non-medication therapy was prescribed more than 26.4%. These results point to a potential underutilization of many recommended NMCP treatments including combination therapies and the need for enhanced education of chronic pain guidelines.

Perspective: This study, representing over 690 million patient visits, contributes to the relative paucity of data on the use of therapeutic modalities in the management of NMCP. These results may assist clinicians and healthcare policymakers in identifying areas where practices are at odds with guidelines with the goal to improve care.

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Key words: Chronic pain, NAMCS, treatment, pain management, guideline.

Chronic pain, defined as pain that persists beyond the time of normal healing and lasts from a few months to many years, has become increasingly recognized as a significant health problem and identified as a serious public health challenge in the United States.^{1,28,34} The Institute of Medicine's (IOM) 2011 report entitled "Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education and

Research"¹³ reports that an estimated 100 million American adults are affected by chronic pain annually, representing a larger population than those affected by heart disease, cancer, and diabetes combined. A new analysis published as part of the IOM's report estimates the cost of pain management and the economic costs related to disability, lost wages, and decreased productivity to total \$560 to \$635 billion annually.¹³ Because of the complexities involved in the treatment of chronic pain, many patients never attain adequate pain management. Furthermore, chronic pain impacts patients' daily activities, creates a social burden, and is a significant cause of work disability.¹³

While the IOM report advocates for transformative changes in the culture of prevention and treatment of chronic pain on a national level, organizations such as the Institute for Clinical Systems Improvement (ICSI),³ the Wisconsin Medical Society (WMS),⁴³ the American

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Address reprint requests to Maureen E. Knell, PharmD, BCPS, Clinical Associate Professor, Division of Pharmacy Practice and Administration, University of Missouri-Kansas City School of Pharmacy, 2464 Charlotte St, Kansas City, MO 64110. E-mail: knellm@umkc.edu
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Society of Interventional Pain Physicians,⁴⁰ and the American Pain Society and American Academy of Pain Medicine (APS-AAPM)¹¹ have developed clinical guidelines to provide practice-based recommendations to promote improved treatment of nonmalignant chronic pain (NMCP) management. Overall, these guidelines are similar in their recommendations and have several key focuses.

The ICSI guidelines classify recommendations based on 4 types of pain: neuropathic, inflammatory, muscle, and mechanical/compressive.³ The WMS and APS-AAPM guidelines also specify certain treatments for certain types of pain.^{11,43} Each category warrants appropriate management, hence it is important to determine which type or types of pain a patient is experiencing in order to determine the recommended treatments. Effective treatment of pain often requires combinations of therapies. Scientific evidence for the most effective and safest combinations is still lacking and often debated. Another focus of the guidelines is to promote the use of nonmedication treatments, such as physical therapy or cognitive-behavioral therapy, for all patients, usually in conjunction with medications. Differences in gender, age, race, income, ethnicity, and/or duration/intensity of pain have been identified as potential influences to physician-prescribing habits for NMCP.^{12,28,29}

The National Ambulatory Medical Care Survey (NAMCS) is a national probability sample survey of outpatient visits.³¹ A number of studies have evaluated NAMCS data to examine patient and physician characteristics and how these factors influence prescribing.^{5,6,15,36,37,39} A few studies have used NAMCS data to evaluate treatment of certain types of pain including musculoskeletal pain, back and joint disorders, and osteoarthritis.^{4,10,17} To our knowledge, NAMCS data have not been utilized to examine treatments used in a wide range of different types of common NMCP disorders. The IOM's report on Relieving Pain in America calls for better data in order to address the public health challenges of pain. In particular, it cites the need for collection of data on pain incidence, prevalence, treatment, and trends over time.¹³ Assessment of prescribing and usage of various NMCP therapies in comparison with practice guidelines also provides valuable insight to assist in future evidence-based policy-making and contributes to what is currently the paucity of information related to the treatment of chronic pain.

This study was conducted to 1) highlight and identify factors, variations, and current treatment practices in the management of NMCP; and 2) identify if practices are at odds with current clinical practice guidelines, which in turn can provide insight into identifying opportunities to improve care.

Methods

NAMCS

The NAMCS is a national probability sample survey conducted by the Division of Health Care Statistics, National Center for Health Statistics (NCHS), and Centers for Disease Control and Prevention (CDC). The survey instrument and summary statistics for each year are available to

the public on the NAMCS website. Data collection in NAMCS is conducted through the physician or physician staff. The NAMCS data from 2000 to 2007 were used to explore the therapy-prescribing patterns in a national sample of patients with common chronic pain conditions. The basic sampling unit was the physician-patient office visit. Patient information about demographics, insurance, reason for visit, diagnoses, medication(s) prescribed, and therapeutic and preventive services recommended from the office visit forms was collected. Each medication was given a unique NCHS-assigned, 5-digit code applied to each entry mentioned in the NAMCS dataset. Every office visit was assigned a weight to produce nationally representative estimates. All statistics provided in the NAMCS were office visit level data and were analyzed using a multistage estimation procedure in order to produce generalizable results that are reflective of the entire U.S. population. Publicly available online documents provide further details on the NAMCS sampling and weighting methods, as well as processing and estimation/quality control procedures.³¹

Study Design

This study was a cross-sectional study utilizing the NAMCS data from 2000 to 2007 to examine different types of therapy used for common chronic pain conditions. The NAMCS utilized a multistage probability design, and detailed information can be found at the NAMCS website.²⁴ The study also evaluated whether chronic pain medication and nonmedication treatments were prescribed according to clinical practice guidelines or not. The clinical practice guidelines used in this study included ICSI, WMS, and APS-AAPM.^{3,11,43} These 3 guidelines were selected for the purposes of this study because they provided recommendations on common chronic pain conditions in general, rather than a specific type of chronic pain condition or disease state, and they were similar in their recommendations. Although not specifically listed in the 3 guidelines included in the evaluation, the category "diet/nutrition" was included as a nonmedication treatment in this study along with "weight reduction" and "exercise" based on guidelines, research, and expert opinion that suggests that weight loss, achieved through appropriate diet, nutrition, and physical activity, may result in positive outcomes in overweight or obese patients with certain chronic pain conditions such as back pain and osteoarthritis.^{21,23,25,30,33} An established patient visit was defined by NAMCS as a patient who had encountered the provider at least 1 time prior to the recorded visit.³¹

Study Population

The sample included patients aged 18 years and older with common nonmalignant chronic pain, based on International Classification of Diseases (ICD)-9 codes (present as primary, secondary, or tertiary diagnoses) with visits including "chronic problem-routine" and "chronic problem-flare" as a major reason for visits. NAMCS reported a total number of 8.89 billion weighted

outpatient visits in the United States from 2000 to 2007.³¹ On average there were about 1.11 billion outpatient visits per year during this time period.³¹

Recruitment Strategy and Creation of Analytical Datasets

All variables in the study were coded prior to the statistical analysis. Identification of patients with nonmalignant chronic pain was conducted as follows: 1) ICD-9 codes for chronic pain excluding neoplasm ICD-9 codes were used; and 2) "Chronic problem-routine" and/or "Chronic pain-flare" were reported for major reason for the visit. Data for visits that included "chronic problem-routine" and "chronic problem-flare" as the major reason for visit were selected in order to try to eliminate visits related to acute pain diagnoses. Chronic pain indications were further divided into the "General Chronic Pain" ICD-9 code or the 4 classifications of chronic pain—neuropathic, inflammatory, muscle, and mechanical/compressive—as classified by the ICSI guidelines.^{3,22} Table 1 includes a listing of the common pain diagnosis variables categorized by ICSI pain type and the common chronic pain treatments included in this study. ICD-9 codes and common chronic pain treatments were selected by the authors based on expert opinion and published references.^{3,7,11,22,25,32,42,43} Determination of whether chronic pain medications and nonmedication treatments were prescribed according to clinical practice guidelines or not was assessed by utilizing the ICSI, APS-AAPM, and WMS guidelines.^{3,11,43}

Statistical Analysis

All analyses were weighted using NAMCS sampling weights. Statistical analyses of data were conducted using STATA version 12 (StataCorp, College Station, TX) software. The unit of analysis was the individual patient visit. Descriptive statistics for all study variables were performed on weighted data. Descriptive statistics included mean, standard deviation, frequencies, and percentages. This study was institutional review board exempt as these were deidentified data provided by the CDC.

Results

Descriptive Statistics of Sample

Detailed demographic and descriptive characteristics for the sample study population are included in Table 2. According to the NAMCS database, there were 22,967 visits between the years 2000 and 2007. The study population was 690,205,290 (weighted visits). Based on the study inclusion and exclusion criteria, approximately 13% of the total weighted ambulatory care visits in the United States between 2000 and 2007 were identified as having a chronic pain diagnosis. The average age within the study population was 53.3 years. The patient population characteristics included 62.8% females and 87.3% Caucasian. Established patients represented 90.9% of the population. The 3 most utilized physician categories included family medicine, other specialties, and internal medicine, respectively

National Outpatient Chronic Pain Treatment Practices (see Table 2). Approximately 45% of visits were with primary care providers (PCPs). The most frequent patient comorbidities included mental disorders at about 14% and cardiovascular disease at almost 13%. In this study, 29.2% of patients received 5 or more medications.

Chronic Pain Treatment

An overview of medication and nonmedication treatments for chronic pain visits in this study population is shown in Fig 1. Treatment with at least 1 common chronic pain medication was reported in 99.7% and treatment with a medication or a nonmedication treatment was recorded in 99.8% of the visits. Nonsteroidal anti-inflammatory drugs (NSAIDs) were prescribed in approximately 95% of patient visits and acetaminophen encompassed around 2%. Medications in the other antidepressants class and opioid class were the second and third most common type of medication prescribed, with 19.1 and 14.3%, respectively. Use of nonmedication therapy was reported at 26.38%, with exercise (14.9%) followed by diet and nutrition (11.2%) as the most common nonmedication modality.

Table 3 summarizes therapy used in the 5 chronic pain categories including those visits coded as general chronic pain or those more specifically coded with 1 of the 4 different chronic pain types as defined by the ICSI guidelines. The table also indicates which therapies are recommended based on the practice guidelines listed in the table. In each of the 5 groups, analgesics/NSAID treatment was recorded in the ranges of 97 to 99%. In the General Chronic Pain group, other antidepressants at 24.47%, selective serotonin reuptake inhibitors (SSRIs) at 17.73%, and opioid/combination opioid analgesics at 10.52% follow analgesics/NSAIDs as the most prescribed medication treatment. For the neuropathic group, anticonvulsants (19.11%) followed by other antidepressants (15.1%) and opioid/combination opioid analgesics (14.99%) were the most commonly prescribed class of medications used. In the muscle/musculoskeletal group, other antidepressants (21.96%) and opioids/combination opioid analgesics (23.36%) were the next most common treatments reported after the analgesics/NSAIDs. Opioids/combination opioid analgesics (14.89%), corticosteroids (13.30%), and anti-rheumatics/immunologics (12.49%) followed analgesics/NSAIDs as the most common medication treatments in the inflammatory group. Opioids/combination opioid analgesics rated second in use in the mechanical/compressive group at 30.74%, which was associated with the highest opioid use rate for the 5 pain groups. For nonmedication treatments, the number of visits listing exercise as a treatment ranged between 13 and 19.5%. Diet was lowest in the General Chronic Pain group (10.25%) and was highest in the Neuropathic group (23.5%). Psychotherapy was highest in the General Pain group at 12.82%. In the other pain type groups, psychotherapy was not reported above 3.13%.

Discussion

Our evaluation of the NAMCS database in relation to common chronic pain diagnoses provides the

Table 1. Common Chronic Pain Diagnoses & Treatments

DIAGNOSIS	DESCRIPTION/EXAMPLE
General chronic pain	Central pain syndrome, chronic pain due to trauma, chronic postthoracotomy pain, other chronic postoperative pain, other chronic pain, chronic pain syndrome, atypical face pain, pain in limb
Neuropathic pain (peripheral and central)	Complex regional pain syndrome or reflex sympathetic dystrophy, diabetic peripheral neuropathy, diabetic polyneuropathy, peripheral neuropathy, postherpetic neuralgia, trigeminal neuralgia, cranial neuralgia, human immune deficiency virus sensory neuropathy, poststroke pain, multiple sclerosis, phantom limb pain
Muscle pain	Fibromyalgia, myofascial pain syndrome, polymyositis, dermatomyositis, myositis, polymyalgia rheumatica
Inflammatory pain	Arthropathies, rheumatoid arthritis, osteoarthritis, vasculitis
Mechanical/compressive pain*	Low back pain/sciatica (lumbar radiculopathy)/spinal stenosis/spondylolisthesis, neck pain, vertebral compression fracture, cervical radiculopathy
Medication treatment by drug class	
Opioids, opioid-like agents, and combination opioid/analgesics	Codeine and acetaminophen, codeine and aspirin, fentanyl (Duragesic; ALZA Corporation, Vacaville, CA, US†), hydrocodone/acetaminophen, hydrocodone/ibuprofen, hydromorphone, levorphanol, meperidine, methadone, morphine (Avinza; King Pharmaceuticals, Inc, Bristol, Tennessee, US)‡, MS Contin; Purdue Pharma L.P., Stamford, CT, US†, Kadian; Actavis, Piscataway, NJ, US†), oxycodone (Oxycontin; Purdue Pharma L.P., Stamford, CT, US†), oxycodone and acetaminophen, oxycodone and aspirin, oxycodone and ibuprofen, oxymorphone propoxyphene, propoxyphene and acetaminophen, tramadol
Analgesics/NSAIDs (nonselective and selective)	Acetaminophen, aspirin, celecoxib, choline magnesium trisalicylate, diflunisal, magnesium salicylate, salsalate, sodium salicylate, sulindac, diclofenac potassium, etodolac, fenoprofen calcium, ibuprofen, indomethacin, ketoprofen, ketorolac, meclufenamate sodium, mefenamic acid, meloxicam, nabumetone, naproxen, naproxen sodium, oxaprozin, piroxicam, sulindac, tolmetin
Tricyclic antidepressants	Amitriptyline, desipramine, doxepin, imipramine, nortriptyline
SSRIs	Citalopram, escitalopram, fluoxetine, fluvoxamine, paroxetine, sertraline
Other antidepressants	Bupropion, duloxetine, venlafaxine
Anticonvulsants	Carbamazepine, divalproex sodium, gabapentin, lamotrigine, oxycarbazine, phenytoin, pregabalin, tiagabine, topiramate, valproic acid, zonisamide
Antirheumatics/immunologics	Abatacept, adalimumab, anakinra, etanercept, hydroxychloroquine, infliximab leflunomide, methotrexate, rituximab, sulfasalazine
Muscle relaxants	Baclofen, carisoprodol, chlorphenesin, chlorzoxazone, cyclobenzaprine, metaxalone, methocarbamol, tizanidine, orphenadrine, carisoprodol with aspirin, carisoprodol with aspirin and codeine, methocarbamol with aspirin, orphenadrine with aspirin and caffeine
Topical products	Capsaicin, lidocaine (patches)
Corticosteroids (tablets, solutions, and injections)	Betamethasone acetate, betamethasone sodium phosphate, dexamethasone acetate, dexamethasone sodium phosphate, hydrocortisone acetate, hydrocortisone sodium succinate, methylprednisolone acetate, prednisone, prednisolone sodium phosphate, prednisolone tebuate, triamcinolone acetonide, triamcinolone diacetate, triamcinolone hexacetonide
Nonmedication treatment	Diet/nutrition, mental health/stress management, psychotherapy, exercise, physiotherapy, weight reduction

NOTE. Table references.^{3,7,11,32,42,43}

*Some mechanical/compressive pain also results in neuropathic pain by diagnosis.

†Indicates searched by brand name for long-acting opioid formulation for completeness.

Table 2. Descriptive Characteristics of the Study Population

VARIABLE	WEIGHTED FREQUENCY, N*	ESTIMATED PROPORTION (%)
Total population	690,205,290	—
Age (mean, SE)		53.27, .16 (range 18–100)
18–34	79,787,732	11.56
35–49	192,222,173	27.85
50–64	211,340,860	30.62
≥65	206,854,525	29.97
Gender		
Male	256,480,286	37.16
Female	433,725,004	62.84
Race		
Caucasian	602,273,136	87.26
African Americans	63,982,030	9.27
Hispanic ethnicity	52,662,664	7.63
Other†	238,120,823	3.45
Visit type		
Established patients	627,396,609	90.9
Nonestablished patients	62,808,681	9.1
Primary care physician‡		
Internal medicine	138,110,079	20.01
Family medicine	158,609,176	22.98
General practice	15,046,475	2.18
Total	311,765,729	45.17
Physician specialty		
Pain medicine	828,246	.12
Psychiatry	78,545,362	11.38
Orthopedic surgery	93,936,940	13.61
Rheumatology	38,168,353	5.53
Neurology	32,715,731	4.74
Other specialty	149,429,445	21.65
Total	393,624,077	57.03
Presence of comorbidity		
Kidney disease	4,831,437	.70
Metabolic disorder	9,869,936	1.43
Liver disease	1,380,411	.20
Alcohol dependence and drug use	7,454,217	1.08
Human immune deficiency virus	1,242,370	.18
Cardiovascular disease	87,518,031	12.68
Diabetes mellitus	38,099,332	5.52
Mental disorders	99,596,623	14.43
Sleep disorders	13,942,147	2.02
Gastrointestinal disorders	3,589,068	.52
Other comorbidities§	231,839,957	33.59
Receive ≥5 medications	201,539,945	29.20

NOTE. These numbers do not indicate the prevalence of common chronic pain diagnoses in the United States, but the prevalence in the sample chosen for this study based on our study design criteria.

*Weighted population determined by multiplying the yielded percentage from NAMCS and the total patient visits (690,205,290). Values were rounded to nearest whole number.

†Other race category included Asian, Native Hawaiian/Other Pacific Islander, American Indian/Alaska Native, and “more than one race reported.”

‡Primary care physician: including Internal Medicine, Family Medicine, and General Practice physician specialties.

§Only top 3 diagnosis codes were taken into consideration for reporting.

opportunity to evaluate the number of U.S. provider visits related to NMCP, patient characteristics, and the reported prescribing trends for therapies used in treatment. The analysis of the data collected from NAMCS captured over 690 million weighted visits from 2000 to 2007 reporting common chronic pain. Therefore, based on our study design criteria, common chronic pain-related visits comprised 13% of the total national ambulatory care visits. While this does not indicate prevalence of chronic pain in the U.S. population, it does provide a picture of how often common chronic

pain is reported as the primary, secondary, and/or tertiary diagnosis during outpatient visits. When evaluating chronic pain prevalence in a population, there are wide variations in reported incidence of chronic pain based on the varying definitions of chronic pain and populations studied. In 1998, Verhaak et al⁴¹ reviewed international population-based surveys finding chronic pain prevalence varying widely between 2 and 40% with an overall prevalence of approximately 10%. A World Health Organization study from the same year reported an overall pain prevalence of 22% in a sample

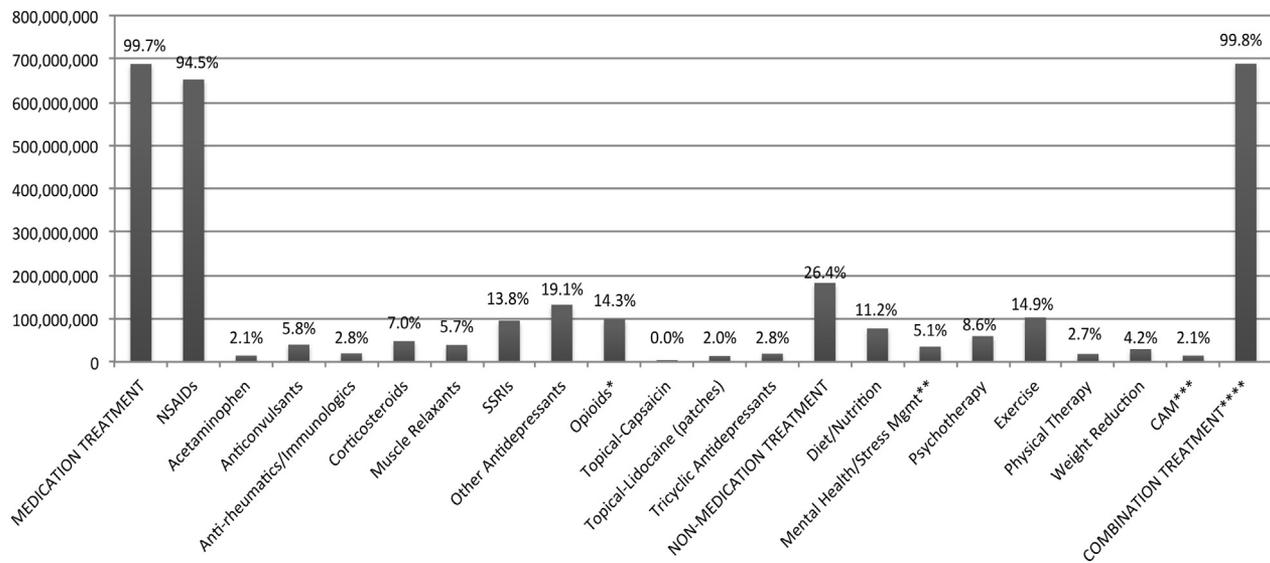


Figure 1. National treatment overview for chronic pain visits 2000–2007. Y axis represents patient visits; X axis represents type of chronic pain management. *Opioids include opioids, combination opioid-analgesics (includes tramadol); **Includes stress management, depression screening, other mental health counseling, mental health provider seen; ***Complementary alternative medicine; ****Medication or nonmedication treatment.

of international primary care patients.²⁰ In a population-based survey among a nationally representative probability sample in the United States, Portenoy et al³⁵ reported prevalence at 28 to 39%. In 2010, Johannes et al²⁴ reported a chronic pain prevalence of 30.7% based on a large Internet survey in U.S. adults.

There was a significantly greater number of females within the study population (62.8%). Our results are consistent with findings from a number of other studies.^{18,19,27} In general, women have a higher occurrence of pain conditions, including fibromyalgia, osteoarthritis, and chronic widespread pain.^{18,19} Some studies report evidence showing gender differences in regards to pain sensitivity and analgesic responses.^{8,14,27} Additional research is needed to confirm the potential mechanisms and treatment implications of these differences.

A significantly greater number of Caucasian patients were present in our study (87%) compared to minorities. Growing evidence suggests that racial/ethnic minorities suffer at a higher rate from unrelieved pain compared with Caucasians. A review by Shavers et al³⁸ cites a number of complex reasons for racial/ethnic disparities in pain management including limited access to care and treatments; differences in attitudes, beliefs, knowledge, and behaviors among practitioners and patients; and miscommunication and/or misinterpretation of pain and severity. According to the Portenoy et al³⁵ study assessing U.S. population-based pain differences among Caucasians, African Americans, and Hispanics, Caucasian subjects had experienced pain for a significantly longer period of time than the other groups; however, this population also had a lower average pain severity. Because there was a significantly larger proportion of recorded physician visits with Caucasians in the study population, this could support the concept that Caucasians may have better access to

providers and treatments compared to other ethnic groups.

Another finding of interest was that 45.2% of visits were with PCPs, compared to only .12% of visits to pain medicine specialists. This finding parallels results from a national mail survey published by Breuer et al⁹ that reported that PCPs treated 52% and pain physicians treated 2% of chronic pain patients in the United States. Combining this result with the low rate of patient visits to pain medicine specialists supports the notion that the demand for pain services far exceeds the availability due to a limited number of pain specialists available nationally.¹³ The low rate of visits to pain medicine specialists in the NAMCS sample may also reflect variations in types of physician specialties and the coding in the NAMCS database because providers who treat pain usually come from a variety of fields including anesthesiology, physical and rehabilitation medicine, occupational medicine, psychiatry, and neurology, and may be coded as these specialties rather than pain medicine specialists in the NAMCS database. These rates illustrate that PCPs must often address and treat patients with NMCP in their practice and highlight the need for an increased emphasis on a 2-phase approach to improve the treatment of NMCP. This includes 1) the need for better pain management training and improved competence in chronic pain management for PCPs; and 2) the need for more pain specialists available to collaborate with PCPs and treat the most complicated NMCP within their specialty practices. Such initiatives are also supported by recommendations in the IOM's 2011 *Relieving Pain in America* report.¹³

This analysis also provides insights on reported prescribing practices by health care providers for patients diagnosed with common NMCP conditions and whether these practices are consistent with pain guidelines. As we expected, the analgesic/NSAID class

Table 3. NAMCS 2000–2007 Treatment Prevalence Based on Chronic Pain Type

TYPE OF CHRONIC PAIN	ESTIMATED% IN TOTAL SAMPLE (N AS WEIGHTED FREQUENCY)	THERAPY PRESCRIBED	SUPPORTED BY PRACTICE GUIDELINE	ESTIMATED% WITHIN PAIN TYPE		
General chronic pain	64.15% (N = 442,766,693)	Medication Treatment				
		Analgesic/NSAIDs	ICSI, WMS	99.01		
		Opioids/combination opioid-analgesics	WMS	10.52		
		Tricyclic antidepressants	WMS	2.41		
		SSRIs	WMS	17.73		
		Other antidepressants	X	24.47		
		Anticonvulsants	WMS	5.81		
		Antirheumatics/immunologics	X	.09		
		Muscle relaxants	X	3.94		
		Topical products	WMS			
		Corticosteroids (tablets, solutions, and injections)	WMS	5.05		
		Nonmedication Treatment				
		Diet/nutrition*	X	10.25		
		Mental health/stress management	ICSI, WMS	6.53		
		Psychotherapy	ICSI, WMS	12.82		
		Exercise*	WMS	13.18		
		Physical therapy	WMS	2.13		
		Weight reduction*	X	3.95		
		Complementary alternative medicine	ICSI	1.05		
Neuropathic	3.29% (N = 22,707,754)	Medication Treatment				
		Anticonvulsants	ICSI, WMS	19.11		
		Tricyclic antidepressants	ICSI, WMS	6.31		
		SSRIs	ICSI	11.07		
		Topical-lidocaine (patches)	ICSI, WMS	.77		
		Other antidepressants	ICSI	15.1		
		Opioids/combination opioid-analgesics	ICSI, WMS	14.99		
		Topical-capsaicin	ICSI, WMS	.23		
		Analgesic/NSAIDs	X	96.99		
		Nonmedication Treatment				
		Diet/nutrition*	X	23.5		
		Mental health/stress management	ICSI, WMS	2.05		
		Psychotherapy	ICSI, WMS	2.48		
		Exercise*	ICSI, WMS	17.09		
		Physical therapy	ICSI, WMS	2.09		
		Weight reduction*	ICSI, WMS	5.7		
		Complementary alternative medicine	ICSI	.65		
		Muscle/musculoskeletal	4.32 % (N = 29,816,868)	Medication Treatment		
				Analgesic/NSAIDs	ICSI, WMS	97.85
Muscle relaxants	ICSI, WMS			14.44		
Tricyclic antidepressants	ICSI			7.90		
SSRIs	WMS			13.76		
Other antidepressants	ICSI			21.96		
Opioids/combination opioid-analgesics	ICSI, WMS			23.36		
Nonmedication Treatment						
Diet/nutrition*	X			13.20		
Mental health/stress management	ICSI			6.09		
Psychotherapy	ICSI			3.13		
Exercise*	ICSI			19.51		
Physical therapy	ICSI			2.88		
Weight reduction*	X			3.82		
Complementary alternative medicine	ICSI			2.05		
Inflammatory	16.24% (N = 112,089,339)			Medication Treatment		
				Analgesic/NSAIDs	APS-AAPM, ICSI	98.58
				Opioids/combination opioid-analgesics	APS-AAPM, ICSI, WMS	14.89
				Tricyclic antidepressants	ICSI	2.24
		SSRIs		4.57		
		Muscle relaxants	ICSI	2.82		
		Other antidepressants	ICSI	6.22		
		Topical-capsaicin	ICSI	.01		

Table 3. Continued

TYPE OF CHRONIC PAIN	ESTIMATED% IN TOTAL SAMPLE (N AS WEIGHTED FREQUENCY)	THERAPY PRESCRIBED	SUPPORTED BY PRACTICE GUIDELINE	ESTIMATED% WITHIN PAIN TYPE
		Antirheumatics/immunologics	APS-AAPM, ICSI	12.49
		Corticosteroids	APS-AAPM, WMS	13.30
		Nonmedication Treatment		
		Diet/nutrition*	X	13.12
		Mental health/stress management	ICSI	2.27
		Psychotherapy	ICSI	.27
		Exercise*	ICSI	16.53
		Physical therapy	ICSI	2.39
		Weight reduction*	X	4.70
		Complementary alternative medicine	ICSI	.62
Mechanical/compressive	13.97% (N = 96,421,679)	Medication Treatment		
		Analgesics/NSAIDs	ICSI	97.77
		Tricyclic antidepressants	ICSI	3.15
		SSRIs		5.92
		Other antidepressants	ICSI	8.79
		Opioids/combination opioid-analgesics	ICSI, WMS	30.74
		Nonmedication Treatment		
		Diet/nutrition*	X	8.98
		Mental health/stress management	ICSI	2.19
		Psychotherapy	ICSI	.94
		Exercise*	ICSI	19.27
		Physical therapy	ICSI	5.95
		Weight reduction*	X	4.48
		Complementary alternative medicine	ICSI	1.26

Abbreviation: X, not recommended for pain type or not included as recommendation in the 3 referenced practice guidelines.

*The nonmedication treatments, "Diet/nutrition," "Exercise," and "Weight reduction," were included in the analysis even when not supported by the 3 reference practice guidelines. See Study Design section in the text for further discussion.

was the most common medication class used by patients in the NAMCS database. This is consistent with various pain guidelines that recommend analgesics/NSAIDs as first-line options for most chronic pain indications.^{3,11,43} However, when further evaluating our results, there were a number of findings that were unexpected. First, we were surprised that analgesic/NSAID use was so high, with rates of 97 to 99% in all chronic pain types analyzed. To further investigate the analgesic/NSAID class we divided the class to determine the amount of aspirin and acetaminophen reported. For aspirin, which is more commonly employed in contemporary practice for cardiovascular protection rather than treatment of painful inflammatory conditions, reported use was only 4%. Use of the non-anti-inflammatory analgesic acetaminophen, excluding acetaminophen-opioid combination products, was very low at 2%. In both cases, the low reported use of aspirin and acetaminophen may be related to a lack of reporting of over-the-counter (OTC) products, despite the fact the NAMCS questionnaire does request inclusion of OTCs in the medication list. However, the small number of patients who, according to NAMCS, took acetaminophen as compared to NSAIDs was unexpected, since acetaminophen is often recommended as the initial medication treatment for almost any type of pain except neuropathic pain.^{2,3,21} NSAID use might be more likely to be reported since these products are available as prescription products in addition to OTC. Or, it could indicate that patients who report chronic

pain or have chronic pain diagnoses have already tried and failed acetaminophen therapy by the time they visit their physicians.

While NSAID use is supported by the guidelines, some cautions and caveats exist. NSAIDs do incur inherent risks, and awareness of these risks has been heightened recently with evidence of increased cardiovascular events associated with many NSAIDs.²⁶ The European Medicines Agency has issued a new caution in their guidelines about risk for thrombotic events correlated with NSAIDs, specifically with high doses for long-term use. The European Medicines Agency added, however, that the benefits in the usage of nonselective NSAIDs outweigh the risks, when used appropriately, and when the patients' gastrointestinal, cardiovascular, and renal risk factors are considered.¹⁶ The American Geriatrics Society (AGS) takes a stronger stance and recommends avoidance of NSAIDs in patients aged 75 and older due to cardiovascular and gastrointestinal complications. Instead, the AGS Panel recommends acetaminophen as first-line therapy for chronic pain, except for patients with hepatic dysfunction. It further recommends nonmedication therapies such as localized heat and cold treatments in patients with arthritis. Recommendations from the panel state that nonselective NSAIDs and cyclooxygenase-2 (COX-2) selective inhibitors should be considered rarely and used with caution in highly selected individuals. The guideline further recommends that older patients with moderate-to-severe pain,

pain-related functional impairment, or diminished quality of life due to pain be considered for opioid therapy.² Therefore, recent recommendations include a more cautious approach with NSAIDs, which may warrant less NSAID use in the future. One final concern about reported NSAID consumption in the NAMCS data is found in the neuropathic group where analgesic/NSAID use was 97%, yet NSAIDs are not considered effective therapy for neuropathic pain.

In comparison to the high rate of NSAIDs, no other medication class or nonmedication therapy was reported more than approximately 26% in the total study population, possibly signaling underutilization of other medication classes and nonmedication therapies, especially since guidelines support the use of combination therapy. In particular, we observed a lower percentage of opioid/combo opioid-analgesic utilization than anticipated. While opioid/combo opioid-analgesic usage was highest at almost 31% in the mechanical compressive group, this drug class was only prescribed 10.52% of the time in the general pain group. Although opioids are sometimes avoided in NMCP and do have potential for abuse when used inappropriately, all chronic pain guidelines included in this analysis state they are appropriate options and should be used in combination when other therapies have failed to provide adequate pain relief. Tricyclic antidepressants and anticonvulsants, commonly recommended as effective agents for neuropathic pain, were only prescribed 6.31 and 19.11%, respectively, in the neuropathic group, also indicating potential underutilization of first-line therapies.

There are limitations to this study. As previously discussed, the population was predominately Caucasian, so treatment practices may not be representative for minority or ethnic populations. Using ICD-9 codes, reason for visits, and codes for medication and nonmedication therapies may have limitation based on the coding in the database. In particular, since nonmedication therapies are described in general categories such as "Physical Therapy," "Psychotherapy," and "Complementary Alternative Medicine," particular nonmedication chronic pain treatments such as spinal manipulation, transcutaneous electrical nerve stimulation units, or cognitive and behavioral therapies cannot be specifically evaluated and may not be adequately included under the nonmedication categories. In addition, the NAMCS database only includes primary, secondary, and tertiary ICD-9 codes and data entry for 6 to 8 medications (depending on the year surveyed). Therefore, a comprehensive list of the patients' ICD-9 codes and medications may not be provided, which likely underestimated the chronic pain-related visit prevalence in this sample population and the treatments that patients used for chronic pain. Because of the nature of the database, we are unable to determine that the medications we selected to analyze for the treatment of chronic pain were prescribed for the chronic pain indications we selected. However, since these medications were included in the database and

National Outpatient Chronic Pain Treatment Practices where indicated are appropriate to treat chronic pain, it is reasonable to consider such medications as potentially treating chronic pain along with possible other comorbid conditions. While antidepressants could be used primarily for the treatment of depression rather than pain, we chose to include them in our analysis since mental disorders are a common comorbidity with pain. Not surprisingly, mental disorders were one of the highest comorbidities in this NAMCS population. Because depression, along with other mental disorders, is closely linked with chronic pain and several antidepressants are recommended in the treatment of chronic pain, we felt it was important to include these drug classes in our analysis. From the surveys, medications were recorded if they were ordered, supplied, administered, or continued. Therefore, we cannot determine when the pain medication was initiated or the duration of treatment from the reported visit. Another drawback of the database is that no pain scores or assessments of pain were recorded so there is no way to determine if pain was controlled or uncontrolled at the visit. The database does not include any questions that address medication adherence. It does not evaluate whether the patient is actually taking the medication, what dose is used, whether the medication is taken on an as-needed basis or scheduled, or what pain medications the patient has tried and found to fail in the past. In addition to limitations to the database, there are also limitations to the guidelines used in this analysis because not all the guidelines evaluate all treatment options or categorize them in the same way. Furthermore, due to the limitations of chronic pain research, many of the guideline recommendations are based on expert consensus rather than data from evidence-based medicine.

In conclusion, these findings give much-needed insight into national prescribing practices and the reported usage of various treatments for various types of NMCP in a large outpatient population over an 8-year period. Evaluation of treatment practices for this chronic pain population showed a high use of NSAIDs, a low use of acetaminophen, and a likely underutilization of other guideline-recommended chronic pain therapies including medication, nonmedication, and combination therapies. These findings suggest the need for further research to investigate and corroborate or contrast treatment patterns for chronic pain in various patient populations. In addition these results support the need for a heightened awareness in the promotion of the use of NMCP management guidelines, particularly in primary care practices, to diminish the public health burden of chronic pain and effectively implement treatment options to better manage NMCP for the individual patient.

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