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ORIGINAL ARTICLES

Association Between Utilization of Chiropractic Services for Treatment of Low-Back Pain and Use of Prescription Opioids

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Abstract

Objective: Pain relief resulting from services delivered by doctors of chiropractic may allow patients to use lower or less frequent doses of opioids, leading to reduced risk of adverse effects. The objective of this investigation was to evaluate the association between utilization of chiropractic services and the use of prescription opioid medications.

Design: The authors used a retrospective cohort design to analyze health insurance claims data.

Setting: The data source was the all payer claims database administered by the State of New Hampshire. The authors chose New Hampshire because health claims data were readily available for research, and in 2015, New Hampshire had the second-highest age-adjusted rate of drug overdose deaths in the United States.

Subjects: The study population comprised New Hampshire residents aged 18–99 years, enrolled in a health plan, and with at least two clinical office visits within 90 days for a primary diagnosis of low-back pain. The authors excluded subjects with a diagnosis of cancer.

Outcome measures: The authors measured likelihood of opioid prescription fill among recipients of services delivered by doctors of chiropractic compared with nonrecipients. They also compared the cohorts with regard to rates of prescription fills for opioids and associated charges.

Results: The adjusted likelihood of filling a prescription for an opioid analgesic was 55% lower among recipients compared with nonrecipients (odds ratio 0.45; 95% confidence interval 0.40–0.47; $p < 0.0001$). Average charges per person for opioid prescriptions were also significantly lower among recipients.

Conclusions: Among New Hampshire adults with office visits for noncancer low-back pain, the likelihood of filling a prescription for an opioid analgesic was significantly lower for recipients of services delivered by doctors of chiropractic compared with nonrecipients. The underlying cause of this correlation remains unknown, indicating the need for further investigation.

Keywords: low-back pain, chiropractic, analgesics, opioid

Introduction

Epidemic of opioid prescribing

More aggressive pain management efforts that began in the 1990s have led to an epidemic of prescriptions for opioid pain medications in the United States (U.S.). More than 650,000 opioid prescriptions are dispensed per day in the United States.[1] An estimated one out of five patients with noncancer pain or pain-related diagnoses is prescribed opioids in office-based settings. Prescribing rates are high among providers of pain medicine, surgery, and physical medicine/rehabilitation, but overall, primary care clinicians account for nearly 50% of opioid prescriptions.[2]

Safety

There is little evidence that opioids improve chronic pain, function, or quality of life, and long-term use of opioids, particularly at higher dosages, is associated with overdose, misuse, abuse, and opioid use disorder.[3] Other adverse effects include

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tolerance, physical dependence, increased sensitivity to pain, constipation, nausea, vomiting, dry mouth, sleepiness, dizziness, confusion, depression, anxiety, itching and sweating, and lower sex drive and energy in men due to reduced testosterone levels.[4] Previous use of prescription opioids is also linked to an increased risk of heroin abuse and addiction.[5] After as few as 5 days of taking opioids, the chance of an opioid-naive patient being a chronic opioid user sharply increases. Even 1 day of opioid exposure carries with it a 6% chance of being on opioids 1 year later, increasing to 13.5% by 8 days and 29.9% by 31 days.[6] Among drug overdose deaths in the United States in 2014, 28,647, 61% involved an opioid.[7] The Centers for Disease Control and Prevention (CDC) reported that prescription opioid consumption and related deaths tripled from 1999 to 2010.[8] Opioids were involved in 75% of pharmaceutical overdose deaths in 2010,[9] and in 2015 over 22,000 deaths involving prescription opioids were recorded—an increase of 19,000 deaths over the previous year.[10]

Costs

The economic impact of the opioid epidemic was estimated to be nearly $56 billion in health and social costs in 2007, and since that time the problem has grown considerably.[11] Sales of prescription opioids in the United States nearly quadrupled from 1999 to 2014,[12] but without any overall change in the amount of pain patients reported.[13] Efforts aimed at curbing the opioids epidemic (including new prescribing guidelines, monitoring programs, enhanced access to treatment of opioid use disorder treatment, screening protocols, treatment contracts, urine testing, regulatory supervising of pain clinics, and law enforcement strategies) have failed to reduce rates of prescribing, misuse, and overdose.[7,14,15]

A pain management alternative: services provided by doctors of chiropractic

Little attention has been paid to the potential of nonpharmacologic pain treatment as an upstream strategy for addressing the opioids epidemic. The Institute of Medicine has recommended the use of nonpharmacologic therapies as effective alternatives to pharmacotherapy for patients with chronic pain.[16] Among U.S. adults prescribed opioids, 59% reported having back pain.[17] Recently published clinical guidelines from the American College of Physicians recommend nonpharmacologic treatment as the first-line approach to treating back pain, with consideration of opioids only as the last treatment option or if other options present substantial harm to the patient.[18] A recent systematic review and meta-analysis found that for treatment of acute low-back pain, spinal manipulation provides a clinical benefit equivalent to that of NSAIDs, with no evidence of serious harms.[19] Spinal manipulation is also shown to be an effective treatment option for chronic low-back pain.[20]

Association between utilization of chiropractic services and use of prescription opioids

A retrospective claims study of 165,569 adults found that utilization of services delivered by doctors of chiropractic was associated with reduced use of opioids.[21] More recently, it was reported that the supply of chiropractors as well as spending on spinal manipulative therapy is inversely correlated with opioid prescriptions in younger Medicare beneficiaries.[22] This finding suggests that increased availability and utilization of services delivered by doctors of chiropractic could lead to reductions in opioid prescriptions. It has been reported that services delivered by doctors of chiropractic may improve health behaviors[23] and reduce use of prescription drugs,[21] but it remains uncertain how the utilization of such services may influence patient use of opioid analgesics. Pain management services provided by doctors of chiropractic may allow patients to use lower or less frequent doses of opioids, leading to lower costs and reduced risk of adverse effects.

The objective of this investigation was to evaluate—among New Hampshire residents with low-back pain—the association between utilization of services provided by doctors of chiropractic and the use of prescription opioid medications. The authors chose New Hampshire because health claims data were readily available for research, and in 2015, New Hampshire had the second highest age-adjusted rate of drug overdose deaths in the United States, a 31% increase from the previous year and more than double the national rate.[7,24] The opioid addiction crisis in New Hampshire crosses all socioeconomic levels, affecting the life of every resident, and has many ''hidden'' side effects in addition to overdose deaths. Opioid use can lead to self-neglect and neglect of loved ones, child and elder abuse, and newborn withdrawal, as well as unemployment and homelessness. Other associated ill-health effects include HIV, Hepatitis C, liver damage, and heart problems.[25]

Practical solutions to this societal crisis are urgently needed. The authors expected this study to generate the outcome that among patients with low-back pain, recipients of services delivered by doctors of chiropractic have a lower likelihood of using prescription opioids, compared with nonrecipients. Such a finding could exert a positive impact on the value of care for patients with low-back pain by pointing to a strategy for reducing unnecessary care, lowering costs, and improving safety.

Materials and Methods

The authors hypothesized that recipients of services delivered by doctors of chiropractic have a lower likelihood of filling a prescription for an opioid analgesic compared with nonrecipients of services delivered by doctors of chiropractic. To test this hypothesis, they used a retrospective cohort design to analyze health insurance claims data. The data source was the all payer claims database administered by the Department of Health and Human Services of the state of New Hampshire, which aggregates health claims data submitted by 26 private and public third-party payers, including preferred provider organizations, health maintenance organizations, and indemnity insurance plans. No Medicare or Medicaid claims were included in the database. This project was conducted subject to the terms of a data user agreement between the principal investigator and the state of New Hampshire. The research methods were reviewed and approved by the Institutional Review Board of the investigator's university. All statistical analyses were performed using SAS (SAS Institute, Cary, NC).

The study population comprised New Hampshire residents aged 18–99 years, enrolled in a health plan in 2013 and 2014, and with at least two clinical office visits within 90 days for a primary diagnosis of low-back pain in 2013. (Subjects with more than one such 90-day period and those with more than two office visits per period were not excluded. Thus, the

Table 1. Subject Characteristics by Cohort

	Recipients of chiropractic services	*Nonrecipients*	p
Cohort: *n* (%)	6868 (51)	6516 (49)	
Sex: *n* (%)			
Female	3637 (53)	3479 (53)	0.61
Male	3231 (47)	3037 (47)	
Age category in years; *n* (%)			
18–34	1312 (19)	1042 (16)	<0.0001
35–64	4308 (63)	4287 (66)	
65–99	1248 (18)	1187 (18)	
Charlson comorbidity score: mean (SD)	0.21 (0.60)	0.34 (0.82)	<0.0001

SD, standard deviation.

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population included subjects with multiple office visits for low-back pain.) The authors excluded subjects with a diagnosis of cancer *in 2013 or 2014.* Among those included in the study population as defined above, they identified two cohorts of subjects: (1) recipients of services provided by doctors of chiropractic (*recipients*) were defined as subjects with at least two office visits for a primary diagnosis of low-back pain, for which the provider was a doctor of chiropractic. (2) *Nonrecipients* were defined as subjects who received no services provided by a doctor of chiropractic.

Following establishment of the cohorts with claims for low-back pain in 2013 data, the authors first compared the cohorts with regard to rates of prescription fills for opioids and associated charges in both 2013 and 2014. Next, they modeled for likelihood of opioid prescription fill in 2014 only to maintain the temporal relationship between inclusion in the cohort and measuring the outcomes. To reduce the potential for selection bias because the cohorts may have differed with regard to their disposition toward use of prescription medications, they used weighted propensity scoring to create equivalent cohorts for comparison.[26] The authors used multiple logistic regression to calculate the estimated probability of each subject to be in each cohort using sociodemographic measures (age, sex, and county of residence). After inversely weighting each subject by the propensity to be in the cohort, they used logistic regression to compare recipients to nonrecipients with regard to likelihood of opioid prescription fill in 2014. They controlled for patient demographics and health status through Charlson comorbidity scoring. Both univariate and multivariate logistic models were developed.

Results

Subject characteristics are tabulated in Table 1. The population was almost equally divided between recipients and nonrecipients of services provided by doctors of chiropractic. The cohorts did not differ by sex. Recipients included a larger proportion of young adults and a smaller proportion of middle-aged adults, compared with nonrecipients. The recipients' cohort was healthier, as measured by Charlson comorbidity score.

The study population comprised 13,384 subjects, with roughly equivalent distribution between cohorts (Table 1). Among 6868 recipients, 19% of subjects filled a prescription for a prescription opioid, compared with 35% of 6516 nonrecipients. Figure 1 illustrates comparative proportions of subjects who filled prescriptions for opioid analgesics, by specific formulation.

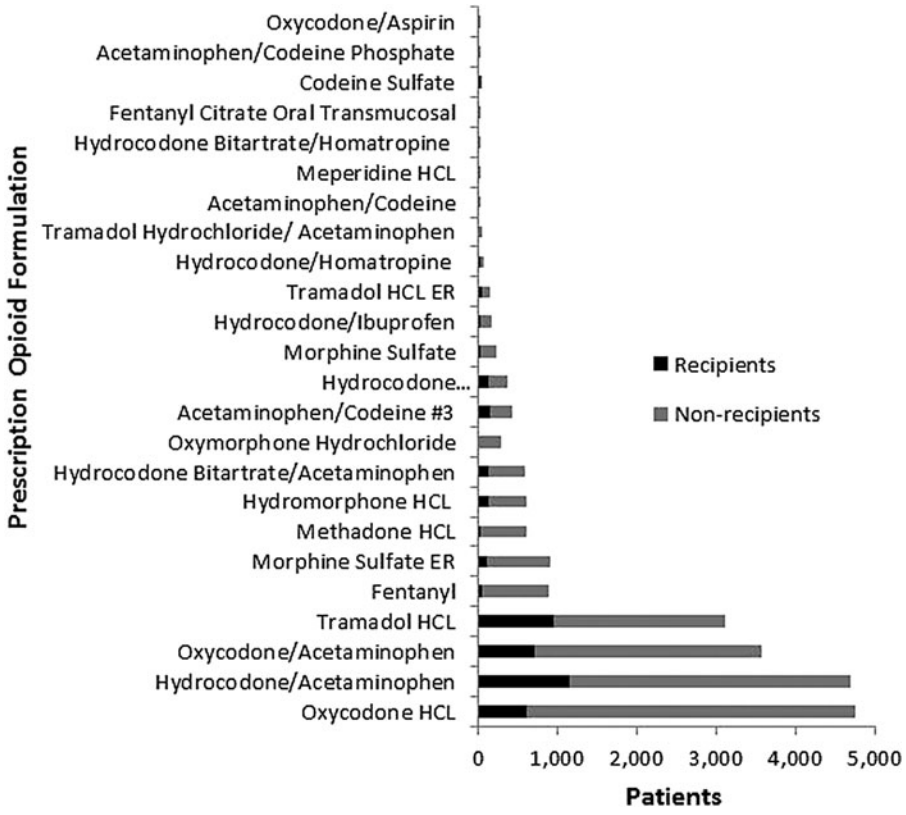

FIG. 1. Patients with low-back pain and prescription fills for opioid analgesics.

Table 2. Charges for Office Visits for Low-Back Pain and for Opioid Prescription Fills

	Recipients			*Nonrecipients*				
Charges	N	*Charges*	*SD*	N	*Charges*	*SD*	*Difference*	p
Clinical (2013)	6866	$1,513	$5,678	6,478	$6,766	$14,550	5253	<0.0001
Opioids (2013)	1523	$154	$563	3317	$592	$2,107	438	<0.0001
Clinical+opioids (2013)	1505	$2,402	$5,256	3142	$6,818	$9,233	4416	<0.0001
Clinical (2014)	3904	$2,066	$7,718	2906	$6,917	$16,193	4851	<0.0001
Opioids (2014)	1286	$204	$579	2274	$921	$2,816	717	<0.0001
Clinical+opioids (2014)	841	$3,697	$7,863	1,381	$7,021	$9,495	3324	<0.0001

Recipients = recipients of chiropractic services; nonrecipients = nonrecipients of chiropractic services; charges = mean annual charges per subject; N = number of subjects; difference = between-cohort difference in charges; p = t-test pooled p value; clinical = services provided in office visits associated with a primary diagnosis of low-back pain.

All categories of charges were significantly lower for recipients compared with nonrecipients (Table 2). In 2013, average annual charges per person for filling opioid prescriptions were 74% lower among recipients compared with nonrecipients. For clinical services provided at office visits for low-back pain, average annual charges per person in 2013 were 78% lower among recipients compared with nonrecipients. The authors found similar between-cohort differences in charges in 2014: annual charges per person were 78% lower for opioid prescriptions and 71% lower for clinical services among recipients compared with nonrecipients.

The adjusted likelihood of filling a prescription for an opioid analgesic in 2014 was 55% lower among recipients compared with nonrecipients (odds ratio 0.45; 95% confidence interval 0.40–0.47; $p < 0.0001$). The authors evaluated both univariate and multivariate logistic models. In models without the propensities and/or Charlson adjustment, they found only small changes in effect, suggesting that the strength of the association between exposure and outcome was independent of case mix.

Discussion

With regard to the use of prescription opioids as well as charges for both opioid prescriptions and clinical services for low-back pain, they found impressive between-cohort differences. However, they were only able to evaluate the correlation between the utilization of services provided by doctors of chiropractic and use of prescription opioids. It was not possible from the available data to infer whether or not utilization of services provided by doctors of chiropractic actually caused a reduction in the likelihood of filling an opioid prescription. The underlying cause of the negative correlation between utilization of chiropractic services and likelihood of opioid prescription fill is unknown

Despite the use of propensity scoring to create equivalent cohorts for comparison, part of the reported effect upon likelihood of prescription fills may have resulted from the cohorts being drawn from different populations, that is, subject characteristics may have differed by cohort due to an unknown factor or factors that confounded the reported correlation. Recipients of services provided by doctors of chiropractic may differ from nonrecipients with regard to beliefs, attitudes, and predisposition to use prescription medications. In a recent national poll, 78% of U.S. adults indicated a preference for alternatives to prescription pain medication, and adults who had never seen a chiropractor were among those most likely to prefer pharmacologic pain treatments.[27] The underlying reasons for such patient preferences are unknown, and further evaluation of differences between patients who do and do not choose pharmacologic therapies for pain may point toward solutions to the opioids crisis. The preponderance of health outcomes result not from clinical interventions, but from personal health behaviors, as well as social and environmental determinants of health. Finally, it is unknown to what extent the effect of exposure to utilization of services provided by doctors of chiropractic may be modified by various aspects of care, including spinal manipulation and other treatments, the chiropractor's recommendations regarding diet and exercise and other influences associated with chiropractic care.

Certain limitations of the research dataset must also be acknowledged. In general, only a limited number of exposure variables were available. No fill dates or diagnoses were available in the pharmacy data. Finally, the authors emphasize that the safety of services provided by doctors of chiropractic was not assessed in this study.

Conclusions

Among New Hampshire adults with office visits for noncancer low-back pain, the adjusted likelihood of filling a prescription for an opioid analgesic was 55% lower for recipients of services provided by doctors of chiropractic compared with nonrecipients. The underlying cause of this correlation is unknown. Average charges per person for chiropractic users—for both opioids and office visits for low-back pain—were also significantly lower compared with nonusers over a 2-year period. Further investigation of these associations should be conducted through analysis of longitudinal data from multiple U.S. states to ascertain the generalizability of these findings and should use rigorous methods to minimize risk of bias.

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Author Disclosure Statement

No competing financial interests exist.

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