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Trends in the Prescription of Opioids for Adolescents with Non-cancer Pain

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Abstract

Objectives—Opioids are among the most commonly abused drugs among adolescents and the prescription of these drugs has increased over the last decade. The goal of the current study is to examine trends and factors associated with prescription opioid use among adolescents with common non-cancer pain (NCP) conditions, sampled from two contrasting populations.

Methods—We conducted a secondary data analysis examining time trends from 2001 to 2005 in opioid use in two dissimilar populations: a national, commercially-insured population and a state Medicaid plan. We examined trends in mean dose prescribed, mean number of prescriptions, and types of medications given, as well as clinical and demographic features of adolescents receiving opioids.

Results—In 2005, 21% of adolescents with common NCP conditions in HealthCore and 40.2% of adolescents with NCP in Arkansas Medicaid had received prescription opioids. The majority of opioid prescriptions in both 2001 and 2005 were for DEA Schedule II and III short acting opioids. In both samples, rates of prescription were higher for adolescents with comorbid mental health diagnoses compared to those without and for adolescents with multiple pain conditions compared to a single pain condition.

Discussion—Prescription of opioids among adolescents with NCP is common and the prescription rate is higher among adolescents with multiple pain conditions and comorbid mental

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health disorders. Further research is necessary to determine risk factors for abuse and misuse of opioids in adolescents to help develop guidelines for use in this age group.

Keywords

Pain; Adolescents; Opioids

Introduction

Opioids are among the most commonly abused drugs among adolescents, second only to marijuana in prevalence of use. In 2009, 9.2% of 12th graders reported prior-year illicit use of non-heroin opioid narcotics with increasing popularity of prescription opioids such as Vicodin, Percocet, Codeine, and OxyContin.¹ Nineteen percent of new users of illicit drugs reported that they initiated drug abuse with nonmedical use of pain relievers.² The main source of abused opioids reported by adolescents is prescription medications, either from their own prescription or that of a friend or family member.²

In the past few decades, opioid prescriptions have significantly increased.^{3,4} In particular, there has been an increase in the use of these medications for non-cancer related chronic pain conditions.⁵ Among adults, it is estimated that 90–95% of opioids are prescribed for chronic non-cancer pain and approximately 3% of the US general population without cancer receives opioids more than 30 days per year.⁶ While some have seen this as improving care for chronic pain there has also been concern about increases in opioid abuse and overdose.⁷

There have been only two studies evaluating opioid prescription rates among adolescent populations. A Norwegian study of overall number of prescriptions in the country found that there was a 35% increase in dispensings of opioids among children and adolescents between 2005 and 2007 but that the overall rate of use remained low when compared to adult populations.⁸ A recent US study using ambulatory care visits for adolescents and young adults as the unit of analysis, found that prescriptions of controlled medications more than doubled between 1994 and 2007 and that opioids were the most commonly prescribed controlled substance.⁹ In the US study, back/musculoskeletal pain was the most common indication given for prescription of any controlled substance. When examining specific visit types, they found that opioids were prescribed at 21% of adolescent visits for back pain, 11% of visits for musculoskeletal pain, and 13% of visits for headache.

The current study aims to provide further information regarding opioid use in this age group by examining trends in the annual prevalence of opioid use among adolescents who have had a coded diagnosis of back pain, headache, and/or joint pain sampled from two contrasting populations and to present demographic and clinical factors associated with opioid use among youth with these pain concerns.

Methods

As we hypothesized that the prevalence of substance use would differ based on insurance status and in particular that substance use and mental health concerns would be more prevalent in a Medicaid population,¹⁰ we purposely selected two insured populations (private insurance and a Medicaid program) that would represent a diversity of health care experiences and would provide contrasting but complementary perspectives on opioid use.

The HealthCore Integrated Research Database (HIRDsm) was used to examine trends in a privately insured population. HIRD contains medical and pharmacy administrative claims

and health plan eligibility data from five large commercial health plans representing the West, Midwest, and Southeast regions of the United States.

Arkansas Medicaid was used to examine trends in a high-risk Medicaid population. Compared to individuals with commercial insurance, Medicaid recipients are likely to have less access to the fee-for-service system and are more likely to use publicly funded systems for health care. Also, Medicaid patients are likely to have more physical and mental health problems as these are more common in low SES populations.¹¹ They also are likely to have fewer options for mental health services given limited reimbursement for common mental health problems like anxiety and depression. Additionally, Arkansas is located in the southern region of the US which has been shown to have high levels of opioid use in prior studies.¹²

Given the demographic and regional differences between these two populations, analyses were conducted separately for each population and results were highlighted that reflect similarities in trends rather than those that are different between the populations.

Both datasets contain information on administrative claims from January 1, 2001 to December 31, 2005. The administrative claims files describe transactions between providers and the health plans including paid claims for physicians and other clinicians, hospital, and outpatient prescriptions. The files contain encrypted identifiers that permit patient-level linkages to be constructed between all medical services and patient eligibility and demographic information. All patient identifiers necessary to build linkages across files and time were encrypted to comply with all HIPAA requirements to construct research analytic files. All research procedures were approved by the Institutional Review Boards at the University of Washington, University of Arkansas for Medical Sciences and through an IRB used by HealthCore.

Inclusion Criteria

Individuals were sampled based on the presence of ICD-9-CM codes for common non-cancer pain (NCP) conditions for which long-term opioids are used: back/neck pain (ICD-9 CM codes 721.0x, 721.1x, 721.3x–721.9x, 722.0x, 722.2x, 722.3x, 722.7x, 722.8x, 722.9x, 723.xx, 724.xx, 737.1, 737.3, 738.4, 738.5, 739.2, 739.3, 739.4, 756.10, 756.11, 756.12, 756.13, 756.19, 805.4, 805.8, 839.0, 839.1, 839.2, 839.42, 846, 846.0, 847.0, 847.1, 847.2, 847.3, 847.9), headache (ICD-9-CM codes ≥ 346 and < 347 , or 307.81), and joint/arthritis pain (ICD-9-CM codes ≥ 710 and < 720 or ≥ 725 and < 740).¹³ The dataset includes all individuals (aged 13–17 years) who were enrolled for at least 9 months out of the year and had at least one of the pain diagnoses meeting inclusion criteria with or without an opioid prescription in any year from 2001–2005. Individuals were excluded if they had a cancer diagnosis (other than nonmelanoma skin cancer).

Data available included age, gender, details on opioid use (days supplied, dose, class of opioid medication, number of prescriptions), type(s) of NCP (back/neck, joint, headache), number of pain conditions, and number and type of mental health diagnoses (categorized as adjustment disorder, anxiety disorder, personality disorder, mood disorder, substance disorder, or other).

Analyses

First, we calculated the yearly prevalence of opioid prescription use within HealthCore and Arkansas Medicaid for each year using the total number of adolescents with a qualifying NCP condition for that year as a denominator. We investigated time trends from 2001 to 2005 in the mean number of prescriptions given, the mean dose, and total annual morphine

equivalents, as well as the number of adolescents receiving more than 30 days and more than 60 days of opioids. The types of opioids prescribed were examined using National Drug Codes for drugs in the long-acting Schedule II, short acting Schedule II, and Schedule III and IV categories. We analyzed trends in the proportion of adolescents receiving opioids by demographic features (age, sex) as well as by clinical features shown to be associated with increased risk for chronic use and abuse among adults (number of pain conditions and mental health comorbidity).^{14–16} Finally, to examine the impact of clinical factors on likelihood of the prescription of opioids, relative risks were calculated examining the association between mental health conditions and number of pain conditions and opioid use. All analyses were performed using SAS 9.1 (SAS Institute, Cary, NC).

Results

In HealthCore, 39,566 adolescents met criteria for a qualifying NCP condition in 2001. The number of enrollees with these conditions increased annually such that 64,354 adolescents met criteria in 2005. Similarly in Arkansas Medicaid the population of adolescents with NCP conditions increased from 7,384 in 2001 to 15,346 in 2005. In both samples, adolescents with NCP tended to be in the 15–17 age range (62% of the sample in HealthCore and 60% in Arkansas Medicaid) compared to the 13–14 year old age range. The population with NCP conditions in both samples was evenly distributed between males and females. The most common qualifying NCP diagnosis was joint pain (81% of adolescents with NCP in HealthCore and 74% in Arkansas Medicaid) followed by back/neck pain (33% of adolescents with NCP in HealthCore and 37% in Arkansas Medicaid) and headache (6% of adolescents with NCP in HealthCore and 9% in Arkansas Medicaid). The percent of adolescents with two or more pain diagnoses increased between 2001 and 2005 from 15% to 19% of adolescents in HealthCore and from 14% to 19% of adolescents in Arkansas Medicaid.

From 2001 to 2005, the percent of adolescents with comorbid mental health disorder diagnoses increased from 8% to 10% of adolescents with NCP in HealthCore and 19% to 22% in Arkansas Medicaid. In 2005, the most common mental health disorders were mood disorders (5.5% of HealthCore adolescents and 14.7% of Arkansas Medicaid adolescents), anxiety disorders (3.4% of HealthCore adolescents and 7.0% of Arkansas Medicaid adolescents), adjustment disorders (2.5% of HealthCore adolescents and 5.0% of Arkansas Medicaid adolescents) and substance abuse disorders (1.1% of HealthCore adolescents and 2.4% of Arkansas Medicaid adolescents).

Use of opioids was approximately twice as high among Arkansas Medicaid adolescents with NCP diagnoses as compared to HealthCore adolescents with NCP diagnoses. Between 2001 and 2005, the use of opioids among those with qualifying NCP conditions remained steady in the HealthCore population and had a very modest rate of increase in the Arkansas Medicaid population (Figure 1). The percent of adolescents with NCP receiving opioids in HealthCore was 20.7% in 2001 and 21.1% in 2005. In Arkansas Medicaid, the percent of adolescents with the NCP conditions receiving opioids increased gradually from 38.2% in 2001 to 40.2% in 2005.

Among adolescents with NCP who received opioids in Arkansas Medicaid, there was a statistically significant increase between 2001 and 2005 in the number of days of opioids supplied from a mean of 11.5 to 13.0 days. But there were no significant differences in either sample. In 2005, the mean number of days of opioids supplied was not different between 2001 and 2005 in the number of days supplied in the HealthCore sample or in the number of prescriptions given and milligrams of morphine equivalents 7.5 (SD = 16) for adolescents in HealthCore and 13 (SD = 33) for adolescents in Arkansas Medicaid. The mean number of

prescriptions was 1.5 (SD = 1.3) for HealthCore and 2.1 (SD = 2.5) for Arkansas Medicaid. The mean milligrams of total annual morphine equivalents was 318.8 (SD = 799.3) for adolescents in HealthCore and 529.6 (SD = 2727.6) in Arkansas Medicaid. Chronic use of opioids also did not significantly increase during this time period. In 2005, 2.4% of adolescents in HealthCore and 6.7% of adolescents in Arkansas Medicaid had received greater than a 30 day supply of opioids while 0.8% of HealthCore and 2.6% of Arkansas Medicaid adolescents received greater than a 60 day supply.

The increase in opioid prescriptions between 2001 and 2005 was predominantly due to an increased use of short acting medications (Table 1). The use of long acting opioids was infrequent and relatively stable during this time period in both populations.

Tables 2 and 3 show trends in demographic and clinical factors in the use of any opioid medications among adolescents with a qualifying NCP condition in HealthCore and Arkansas Medicaid. Use remained relatively stable among the HealthCore sample and increased for most demographic and clinical groupings among the Arkansas Medicaid sample. Rates of rise within each demographic group were similar in magnitude to the overall increase in use in each population sample.

Rates of prescription were highest in both years and in both samples among older adolescents, adolescents with multiple pain conditions compared to 1 pain condition, and in adolescents with at least one mental health disorder compared to those without. In 2005, 15–17 year olds in the HealthCore population were 70% more likely to receive opiates than 12–14 year olds (RR = 1.70, CI: 1.64–1.76) and 15–17 year olds in the Arkansas Medicaid population were 34% more likely than 13–14 year olds (RR = 1.34, CI: 1.28–1.40). Adolescents with two or more pain conditions in the HealthCore population were 28% more likely to receive opiates than those with only one (RR = 1.28, CI: 1.22–1.34) and adolescents with two or more pain conditions in the Arkansas Medicaid population were 91% more likely (RR=1.91, CI: 1.76–2.07) than those with only one. Similarly, in 2005 adolescents with one or more mental health conditions were 37% more likely to have received opioids than those with no mental health conditions in the HealthCore population (RR=1.37, CI: 1.29–1.45) and 41% more likely in the Arkansas Medicaid population (RR=1.41, CI: 1.30–1.52). In 2005, 26.1% of HealthCore adolescents and 46.7% of Arkansas Medicaid adolescents with both a NCP diagnosis and comorbid mental health diagnoses were prescribed opioids.

Discussion

Our results from two sociodemographically diverse health care plans demonstrate that the rate of prescription of opioids among adolescents is high: between 20 and 46% of adolescents receiving diagnoses of back pain, headache, and joint pain in these two samples were prescribed an opioid in 2005. However, unlike the adult population, in which the prevalence of opioid prescriptions has been rapidly increasing, the prevalence of opioid use among teens did not rise in the HealthCore sample and had only a modest rate of rise in the Arkansas Medicaid sample.

The pattern of use among adolescents was also different from what has been seen in adult populations. Among adults, previous studies with these data found that the increase was predominantly among Schedule II medications, both short and long acting.⁵ Our data suggest that among adolescents opioid use is predominantly short term and acute, 10–15 days supply over 1.5 to 2 prescriptions with short acting formulations (Schedule II, III and IV). It is possible that this reflects decreased frequency of chronic versus acute pain in the adolescent age group, as well as differences in provider prescription patterns. Although we

identified youth with pain complaints that are more likely to be chronic in the general population, we were unable to track individuals over time and do not know if these were indeed chronic pain conditions.

We found that use of opioids increases with age as youth move through adolescence. It is likely that part of this increase reflects the increased prevalence of pain complaints as adolescents move through puberty and in to early adulthood.¹⁷ Depression also increase in prevalence during adolescence and has been shown to be associated with increased somatic complaints.¹⁷ Finally, it may also reflect changes in provider behavior including increased comfort of providers in prescribing these medications as youth age or as they move into the adult care system.

Our data also suggest that while opioid use is frequent in all adolescents with NCP, the rate of use is higher among adolescents with comorbid mental health disorders. Youth with mental health disorders are also at higher risk for suicide and substance use,¹⁸ and thus it may be particularly important to monitor what happens to these medications following prescription. Use is also higher among youth with two or more pain complaints compared to a single pain complaint. Adults with two or more pain complaints have been shown to have a 3- to 4-fold increased rate of mental health diagnoses versus those with 0 to 1 pain complaints.¹⁹ With our cross-sectional data it is not possible to assess the direction of these associations. It is possible that adolescents with higher psychiatric or pain comorbidity are more likely to be prescribed these medications or that providers are more likely to code multiple diagnoses and mental health disorders in adolescents who are being prescribed opioid medications. Youth with depression have more somatic complaints (including pain) and are higher utilizers of medical services.²⁰ This increased exposure to medical systems with somatic complaints could potentially lead to more prescription of opiates. Prospective studies in adults suggest that individuals with mental health disorders are at increased risk for subsequent persistent use of opioids.¹⁶ In a recent study of data from the National Survey of Drug Use and Health, adolescents were more likely to report non-prescription use of pain medications if they had used mental health services in the prior year, perceived their health as poor, or had more visits to the emergency department or hospitalizations.²¹ Though indirect data, this suggests that adolescents may have similar risk factors for misuse of these drugs as adults and that the adolescents who are at highest risk for non-prescription use are also more likely to receive opioid prescriptions.

This study has two main limitations. First, the populations studied may not be generalizable to all populations but were selected to examine opiate prescription trends from two quite different samples. Compared to the national Medicaid average, Arkansas Medicaid covers a higher percentage of the total population, pays less per participant, and has a relatively high percentage of poverty-related eligibles. Additionally, the southern region of the US is the region with the highest opioid use in multiple prior studies.¹² Thus, the rates of opioid use in Arkansas Medicaid may not be representative of all state Medicaid programs. Second, we are limited in the conclusions we can draw from administrative data. Since the prescriptions do not have linked diagnoses, we do not have specific information on the diagnoses for which opioids were prescribed including information on the chronicity of pain or the appropriateness of opioid treatment. Further study is needed to evaluate if the rate of prescription of opioids is appropriate. The strengths of this study include the large sample size and the availability of data from two very different insured populations.

While it is reassuring that the prevalence of opioid use is not rising among adolescents, the overall high rate of prescriptions for NCP among adolescents still deserves attention. Prescription opioids increase the potential supply of opioids in the community that may subsequently be used for non-prescription purposes either by the adolescents or someone

else. A recent study found that there was a significant correlation between the rate of opioid prescriptions in a community and non-medical use and emergency department visits related to the use of these medications.²² A large supply of opioids in the community is also of concern because opioids are the most common cause of prescription drug intentional overdose²³ and the rate of death from poisoning involving opioid analgesics has been rising over the past decade.²⁴ Studies suggest that an increased supply of prescription opioid analgesics is associated with increased rates of drug poisoning mortality at the community level.²⁵

Recently the FDA began the process to institute Risk Evaluation and Mitigation Strategies (REMS) for long-acting opioid pain medications including fentanyl, morphine and oxycodone in order to prevent the abuse of these medications.²⁶ However, these strategies do not address the use of acute medications. As these strategies are enacted, consideration needs to be given to the supply of opioid medications and how prescription frequency in the community (including prescriptions to adults and teens) affects the risk of adolescent abuse and overdose with these medications. As opioids are often prescribed for acute episodes of pain and may not be fully consumed, policymakers may also want to consider standardizing procedures and facilities for disposing of unused medications so that they are not available to adolescents in the community.

The challenge of balancing adequate pain relief with minimizing the risks of opioid abuse, misuse and overdose is perhaps more acute in adolescents than in adults. This is because the risks of prescription opioid abuse and misuse are highest in adolescents and young adults but at the same time untreated pain may impact ability to engage in normal developmental activities. There is an urgent need for information among clinicians and policymakers concerning the development of guidelines for the appropriate use of opioid medications among adolescents. To inform these guidelines, further studies are needed to better understand the role of patient and provider factors in the prescription of these medications among youth, as well as to gather information on risk factors for use, abuse, and misuse of opioids among adolescents with pain.

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Figure 1.
Trends in the prescription of opioids for adolescents with CNCP in HealthCore and Arkansas Medicaid

Table 1

Opioid type

Variables	HealthCore				Arkansas			
	2001 (N=39,566)	2005 (N=64,354)	% change from 00'05	P-value	2001 (N=7,384)	2005 (N=15,346)	% change from 00'05	P-value
Schedule II Long Acting Opioid	47 (0.12%)	89 (0.14%)	0.02%	0.398	22 (0.30%)	37 (0.24%)	-0.06%	0.430
Schedule III, IV Short Acting Opioids	7678 (19.41%)	12621 (19.61%)	0.20%	0.415	2543 (34.44%)	5790 (37.73%)	4.8%	<0.001
Schedule II Short Acting Opioids	970 (2.45%)	1744 (2.71%)	0.3%	0.011	367 (4.97%)	898 (5.85%)	0.88%	0.007

Table 2

Changes in use of opioids for adolescents with NCP diagnoses from 2000 to 2005 by demographic groupings in HealthCore

HealthCore				
	2001 (N = 39,566)		2005 (N = 64,354)	
	Total N	% Receiving Opioids	Total N	% Receiving Opioids
Age				
13–14 years	15,323	14.8%	24,635	14.7%
15–17 years	24,243	24.5%	39,719	25.0%
Sex				
Female	19,417	20.8%	31,447	21.0%
Male	20,149	20.7%	32,906	21.1%
Number of Pain Diagnoses				
1	33,473	19.9%	51,900	20.2%
2	5,870	25.0%	11,969	23.9%
3 or more	223	42.6%	485	37.7%
Site of Pain (non-exclusive)				
Joint Pain	30,371	21.5%	52,222	21.6%
Back/Neck Pain	13,353	21.2%	21,380	21.4%
Headache	2,158	24.0%	3,691	25.6%
Number of Mental Health Diagnoses				
None	36,555	20.3%	57,995	20.5%
1 or more	3,011	25.7%	6,359	26.1%
Type of Mental Health Disorder				
Mood Disorder	1,717	26.9%	3,531	26.9%
Anxiety Disorder	844	27.5%	2,175	27.6%
Adjustment Dis.	827	21.8%	1,630	22.8%
Substance Abuse	324	29.9%	718	33.0%

Table 3

Changes in use of opioids for adolescents with NCP diagnoses from 2000 to 2005 by demographic groupings in Arkansas Medicaid

Arkansas Medicaid				
	2001 (N = 7,384)		2005 (N = 15,346)	
	Total N	% Receiving Opioids	Total N	% Receiving Opioids
Age				
13–14 years	2,968	28.9%	6,132	33.3%
15–17 years	4,416	41.7%	9,214	44.7%
Sex				
Female	3,807	39.4%	7,689	42.1%
Male	3,575	33.6%	7,641	38.3%
Number of Pain Diagnoses				
1	6,364	34.7%	12,500	37.2%
2	963	46.8%	2,671	52.2%
3 or more	57	71.9%	175	67.4%
Site of Pain (non-exclusive)				
Joint Pain	5,191	37.8%	11,360	41.0%
Back/Neck Pain	2,610	39.0%	5,601	44.5%
Headache	660	38.6%	1,406	46.2%
Number of Mental Health Diagnoses				
None	5,997	35.0%	11,980	38.4%
1 or more	1,387	43.5%	3,366	46.7%
Type of Mental Health Disorder				
Mood Disorder	871	44.3%	2,262	49.2%
Anxiety Disorder	368	44.3%	1,072	49.3%
Adjustment Dis.	443	38.1%	769	42.1%
Substance Abuse	110	50.4%	364	55.2%