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Opioid Use Among Adolescent Patients Treated for Headache

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A B S T R A C T

Purpose: To determine the pervasiveness of opioid prescribing for adolescents with headache and patient and provider characteristics associated with likelihood of opioid prescribing.
Methods: This observational cohort analysis used commercial medical and pharmacy claims between January 1, 2007 and December 31, 2008. Included were adolescents (13–17 years of age) with newly diagnosed headache, ≥2 distinct claims for headache, and ≥12 months health plan eligibility preindex and postindex. Adolescents with a trauma diagnosis at any point were excluded. The primary outcome was current practice patterns, measured by a number of opioid claims, a percentage of patients prescribed opioids, a number of opioid prescriptions per year, a length of opioid therapy, and a frequency of specific comorbidities. A secondary outcome characterized providers and practice settings, comparing patients who received opioids with those who did not.
Results and conclusions: Of 8,373 adolescents with headache, 46% (3,859 patients) received an opioid prescription. Nearly half (48%) received one opioid prescription during follow-up; 29% received ≥3 opioid prescriptions. Of those with opioid prescriptions, 25% (977 patients) had a migraine diagnosis at index date. Among adolescents who received opioids, 28% (1,076 adolescents) had an emergency department (ED) visit for headache during follow-up versus 14% (608 adolescents) who did not receive opioids ($p < .01$). ED visits with a headache diagnosis during follow-up were strongly correlated with opioid use after adjusting for other covariates (odds ratio, 2.02; 95% confidence interval, 1.79–2.29). Despite the treatment guidelines recommending against their use, a large proportion of adolescents with headache were prescribed opioids. ED visits were strongly correlated with opioid prescriptions.

IMPLICATIONS AND CONTRIBUTION

Adolescents often received opioids for treatment of headache contrary to recommendations. Rates of opioid prescription in this population were higher than previously reported, likely due to the use of medical and pharmacy claims that allowed for a more comprehensive capture of prescription drug use than medical record or facility-based studies.

Headache commonly occurs in children. An estimated 37 million children aged 4–17 years had a notable headache in the previous year [1], and 54% of school-aged children reported having a headache at least once weekly for 4 weeks in a row [2]. Headache not only causes physical pain and distress but also hampers social activities, interferes with school assignments, and potentially contributes to emotional or behavioral issues and difficulties relating to other children [3–6]. Despite the prevalence and related effects, treatment options for pediatric headache, including migraine, are limited. The few prospective, controlled clinical studies for serotonin 5-HT_1 receptor antagonists (triptans) for the treatment of migraine in adolescents

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largely failed to duplicate the efficacy results seen in adults [7–12], although nasal sumatriptan has shown effectiveness in children [13–15]. As a result, nonprescription analgesics are considered first-line treatment for pediatric migraine; nasal sumatriptan may also be considered [4,7,16,17].

Headache, migraine in particular, is a common complaint in the emergency department (ED), and opioids are frequently prescribed for adults and children despite the guidelines endorsing nonsteroidal anti-inflammatory drugs or triptans as first-line therapy [18–23]. In the ED, both adults and children with migraine receive opioids more often than any other recommended nonopioid medication, including triptans or antiemetics [18,22]. Opioids, although effective in relieving pain, are not effective for treating migraine [24], and the American Academy of Neurology states that opioids should be used only as rescue therapy for acute migraine in specific situations [25].

Definitive evidence-based treatment guidelines are lacking for children with headache [26], a problem heightened by the fact that children who seek ED care tend to have treatment-resistant headache [27]. In a study of treatment choices for pediatric headache in four EDs, opioids were used in 12% of cases overall and in 6% as first-line therapy [26]. Pediatric and adolescent use of opioids is a concern. The risk of abuse is higher among young adults (from 18 to 30 years of age) compared with older adults (>65 years) [28] and also among those with mental health disorders [29]. Furthermore, frequent use of opioids or other acute pain medications may lead to the development of medication overuse headache in patients with previously episodic migraine [30].

This study originated with discussions between leadership within the American Academy of Pediatrics and WellPoint, Inc. The question of interest presented to WellPoint was "to what extent do current practice patterns for treatment pediatric headache align with practice guidelines?" An advisory group was convened to address this issue, including representatives from the American Academy of Pediatrics, the American Academy of Neurology, and the American Academy of Family Physicians. The group met in person several times as well as through conference calls. The findings reported here highlight the analysis carried out as a result of this advisory group's initial questions.

This study was designed to determine the pervasiveness of opioid prescribing in adolescents with headache and to determine patient and provider characteristics associated with a higher level of opioid prescribing. This study was unique in that we were able to capture prescription drug use in a more comprehensive fashion compared with a medical record or facility-based study; therefore, we observed much higher rates of opioid prescribing as compared to previous studies on opioid use in this population.

Methods

Study design and setting

This retrospective, observational cohort analysis used commercial claims data compiled from the HealthCore Integrated Research Environment. HealthCore Integrated Research Environment is an integrated medical, pharmacy, and eligibility claims dataset of commercially insured patients, containing claims data for 14 major commercial health plans across the United States representing approximately 45 million total unique lives, with eligibility dating back to 2006.

As a noninterventional, retrospective claims analysis, this study was conducted in compliance with state and federal laws, including the Health Insurance Portability and Accountability Act of 1996. All claims date were from a limited dataset with de-identified patient information. No patients were directly involved in the study; therefore, review by an Institutional Review Board was unnecessary.

Selection of participants

Claims data for adolescents aged 13–17 years on the date of the first headache diagnosis claim (index date) were included in the analysis. All patients had at least two distinct medical claims for headache as identified by diagnosis codes found in the *International Classification of Diseases*, *Ninth Revision*, *Clinical Modification* (Appendix A; all Appendices can be found in the online edition of this article) during the study identification period (January 1, 2007–December 31, 2008). To be included in the study, patients were required to have at least 12 months of health plan eligibility before and after the index date. The study cohort was identified and followed using claims data from their index date (for at least 1 year) until December 31, 2010 or disenrollment from the health plan.

Patients were excluded if they had a claim with a headache diagnosis in the preindex period (12 months before the index date) or a diagnosis code indicating head trauma at any time from the preindex through the follow-up periods (Appendix B).

Outcomes

The primary outcome of interest was the current practice patterns related to the use of opioids among adolescent patients who experience chronic headache. The number of opioid claims per patient and overall during the follow-up period was calculated, along with the percentage of patients prescribed opioids. Additionally, the number of opioid prescriptions per year, the length of opioid therapy, and the frequencies of specific comorbidities were determined from the claims.

A secondary outcome was a characterization of the providers and practice settings comparing the patients receiving opioids with those who did not.

Analysis

Descriptive summary statistics, including mean, standard deviation, and median, were provided for continuous variables; counts and percentages were provided for categorical variables. Unadjusted differences in baseline demographic characteristics were compared using nonparametric analysis of variance methods for continuous variables and Chi-square tests for categorical variables. All statistical tests were two sided and performed at a 5% level of significance. All confidence intervals (CIs) were two-sided 95% CIs.

The variables of interest included age, gender, geographic region, length of patient follow-up, headache diagnosis on index date, change in headache diagnosis category following index date, provider specialty on index diagnosis, number of physician office visits since index date, days between first and last headache diagnosis, number of ED visits during follow-up period (inclusive of index date), diagnostic procedures (e.g., magnetic