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## Survey of opioid and barbiturate prescriptions in patients attending a tertiary care headache center

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### Abstract

**Objective**—To educate physicians about appropriate acute migraine treatment guidelines by determining 1. Where headache patients were first prescribed opioids and barbiturates, and 2. The characteristics of the patient population who had been prescribed opioids and barbiturates.

**Background**—Several specialty societies issued recommendations that caution against the indiscriminate use of opioids or barbiturate containing medications for the treatment of migraine. These medications are still being prescribed in various medical settings and could put headache specialists in a difficult position when patients request these agents.

**Methods**—Patients presenting to a headache center comprised of eight physicians were asked to complete a survey that assessed headache types, comorbid conditions, and whether they had ever been prescribed opioids or barbiturates. If they responded affirmatively to the latter question, they

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were asked about the prescribing doctor, medication effectiveness, and whether they were currently on the medication. Data collection took place over a one month period.

**Results**—244 patients were given the survey and 218 of these patients completed it. The predominant diagnosis was migraine (83.9%). More than half of the patients reported having been prescribed an opioid (54.8%) or a barbiturate (56.7%). About one fifth were on opioids (19.4%) or barbiturates (20.7%) at the time of completing the survey. Most patients reported being on opioids for more than two years (24.6%) or less than one week (32.1%). The reasons most frequently cited for stopping opioids were that the medications did not help (30.9%) or that they saw a new doctor who would not prescribe them (29.4%). Among patients who had previously been on barbiturates, 32.2% had been on these for over 2 years. Most patients (61.8%) stopped barbiturates because they did not find the medication helpful, while 17.6% said they saw a new doctor who would not prescribe them. The physician specialty most frequently cited as being the first prescriber for opioids was emergency medicine (20.2%) with family doctors and general neurologists the next groups at 17.7% each. General neurologists were the most frequent (37.8%) first prescribers of barbiturates.

**Conclusions**—Approximately 20% of patients presenting to a headache center reported current use of opioids and/or barbiturates. ED physicians were reported to be the most frequent first prescribers of opioids and general neurologists were the most frequent first prescribers of barbiturates. Taken as a whole, these data provide a useful snapshot of the wide variety of physician specialties that might benefit from additional education on the appropriate use of opioids and barbiturate-containing medications in patients with headaches.

### Keywords

Headache; Education; Opioids; Barbiturates; Guidelines

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### Background

Opioids are frequently prescribed for the treatment of chronic headache disorders such as migraine despite authoritative recommendations that they should be used sparingly in such circumstances. For example, data from Brennan show that opioids are frequently prescribed in the primary care setting.<sup>1</sup> Similarly high levels of use were seen in a study of emergency department treatment of headache.<sup>2</sup>

These prescribing practices are at odds with recommendations contained in the American Academy of Neurology Practice Parameter on headache<sup>3</sup> and also with the Choosing Wisely recommendations from the American Headache Society.<sup>4</sup> Both groups recommend that opioids and barbiturates should not be first-line treatments for recurrent, benign headache conditions. Migraine and other primary headache disorders are conditions of long duration that often begin in early adulthood. Once established, drug use patterns can be difficult to alter; in some patients their intermittent use may increase the likelihood that dependence or addiction problems will develop, or lead to the development of medication overuse headache. Data from the American Migraine Prevalence and Prevention (AMPP) study suggest that among survey respondents who were using opioids for treatment of migraine, almost 17% potentially fit DSM-IV criteria for drug dependence.<sup>5</sup>

The purpose of this study was to identify patients in a specialty headache center who had ever been prescribed opioids or barbiturates for headache, and then establish which medical practitioner had originally prescribed the medications. We further sought to characterize patterns of medication use and patient perceptions of the effectiveness of these medications.

## Methods

The study was carried out at the John R. Graham Headache Center at the Brigham and Women's Faulkner Hospital in Boston. This is a tertiary care academic headache center with a census of over 3500 new and follow-up adult visits per year. At the time of the survey there were six attending headache specialists and two fellows. In consultation with these physicians, we developed and piloted a written survey for patients. The survey asked about basic demographic information, headache diagnosis, certain medical diagnoses/headache comorbidities (depression, anxiety, substance abuse, stroke, heart attack and high blood pressure), and headache frequency. Patients were asked whether they had ever been prescribed an opioid or barbiturate medication from a list of options. Patients who had received these medications were asked what type of physician initially prescribed the opioid medication, whether or not they found the medication effective and whether they were still using them at the time of the survey. Those who had stopped using the medications were asked how long they had used the medication and the reason they stopped taking it. The survey is contained in the appendix. The study received ethical approval from the Partners Healthcare Institutional Review Board. Written patient consent was not required; rather, consent was implied by completion of the survey.

The survey was administered to patients presenting to the Headache Center for care on scheduled workdays from May 12, 2014 to June 12, 2014. One of the authors (MM) checked the clinic schedule for each day, and on the evening prior to the clinic day, gave clinic administrative assistants a folder containing enough surveys for all patients scheduled to be seen in clinic that day. The date was written on the back of each survey to keep track of when it was administered. The administrative assistants were instructed to offer a survey to all patients when they checked in for their scheduled visit. All adult patients visiting the headache center were eligible for the survey if they could read and write English. The survey was provided with a cover letter instructing patients that completing the survey was voluntary and that their answers would be confidential and not shared with their treating physicians. They were asked not to complete the survey if they had previously taken it. Once the survey was completed, patients were instructed to put it into a box in the waiting room. Surveys were collected from the box at the end of each week and were organized into completed survey folders for each workday based on the date written on the back. At the end of each week, the number of surveys remaining in each weekday folder that was given to the administrative assistants was also tallied. This constituted the number of undistributed surveys. The schedule for each day was reviewed again to determine the number of patients actually seen in clinic, accounting for cancellations, no-shows and last minute add-ons. Then, the number of surveys that were not distributed (remaining in each folder) was subtracted from the total number of patients seen that day. This number corresponded to the number of surveys we report as distributed. The number of surveys completed each day was

tallied. The response rate was determined by dividing the number of surveys completed over the number distributed, corrected for no-shows, add-ons and cancellations

### Statistical Analyses

A research assistant (KL) entered the data from the surveys using SPSS version 20.<sup>6</sup> Using the SPSS program, descriptive statistics were used to analyze baseline characteristics. Frequency tables were run to determine the number and percentage of patients with each headache type: Migraine, cluster, tension, medication overuse, post-traumatic, or other. The survey was formatted such that patients could select more than one headache type. We then performed descriptive analyses of the self-described headache frequency, their self-report of medication use, its effectiveness, the prescriber type who first prescribed the medication, and reason for no longer being on the medication. 95% Confidence Intervals (CIs) of the percentages were calculated using GraphPad.<sup>7</sup> Missing data were listed below the tables/figures indicating a reduction in the N.

### Results

Among the 539 patients who were seen in the clinic during the study period, 244 patients (45.3%) were given the survey. The survey was completed by 218 of these patients, for a response rate of 89.3%. Thus, 40.4% of all patients seen in the headache center during the study period completed the survey. One survey had internal inconsistencies (stated had not been on barbiturate containing medications but then checked off the type of physician who had prescribed barbiturate containing medications, checked off that was currently on barbiturate containing medication but then stated was no longer taking it). This survey was excluded for a total of 217 surveys included for analyses.

Table 1 shows the demographic characteristics of the patients who completed the survey. The mean age was  $42 \pm 14.25$  years and most (78.7%) were female, consistent with the epidemiology of the predominant self-reported diagnosis of migraine (83.9%). While 16.6% reported having hypertension, only 2.8% reported a history of stroke and none reported a history of heart attacks. Psychiatric co-morbidities were more common, with depression reported in 38.7% and anxiety reported in 46.1%. The majority of patients (52.3%) had 15 or more headache days. (Table 2)

More than half of the patients reported having been prescribed an opioid (119/217 [95% CI: 48.2, 61.3%]) or a barbiturate (123/217 [95% CI: 50.0, 63.1%]). (Table 3) About one fifth were on opioids (42/217 [95% CI: 14.6, 25.2%]) and barbiturates (45/217 [95% CI: 15.9, 26.6%]) at the time of completing the survey. Of those prescribed an opioid, 63.0% (75/119 [95% CI: 54.1, 71.1%]) found the drug effective. Similarly, 64.2% (79/123 [95% CI: 55.4 to 72.2%]) of patients stated that the barbiturate containing medication was effective. As shown in Figure 1, more than half of the patients reported being on opioids for more than two years (14/57 [95% CI: 15.1, 37.2]) or less than one week (18/57 [95% CI: 21.0, 44.5%]). Among patients who had previously been on barbiturates, about one third (19/59 [95% CI: 21.6, 44.9%]) had been on these for over 2 years. Only 6.8% (4/59 [95% CI: 2.2, 16.6%]) had been on barbiturates for less than one week. Reasons for stopping the opioids and barbiturates are displayed in Figure 2. Most patients, 61.8% (42/68 [95% CI: 49.9, 72.4%])

stopped barbiturates because they did not find the medication helpful, while 17.6% (12/68 [95% CI: 10.2, 28.5%]) said that they saw a new doctor who would not prescribe them. The reasons for stopping the opioids were more varied: 30.9% (21/68 [95% CI: 21.1, 42.7%]) did not find it effective, 29.4% (20/68 [95% CI: 19.9, 41.2%]) saw a new doctor/would not prescribe it, and 25.0% (17/68 [95% CI: 16.2, 36.5%]) did not like it/side effects.

Figure 3 shows the specialty of the physician reported to be the first prescriber of the opioid. Although patients were asked to indicate the doctor who first prescribed them the opioid containing medication, many reported multiple doctors. The results for this question are thus only reported for those respondents who only checked off one physician type (N=79 for opioids, N=45 for barbiturates). The physician specialty most frequently cited as being the first prescriber for opioids was emergency medicine (20.0%) closely followed by family doctors (17.7%) and general neurologists (17.7%). General neurologists were the most frequent (37.8%) first prescribers of barbiturates.

## Discussion

In our study examining the providers who first prescribed opioids and barbiturates in the headache patient population and the factors associated with discontinuing these medications, we found the following themes: 1. Opioids and barbiturates are still being used in headache patients despite increased awareness of their problematic side effects. 2. While most (two thirds of patients) found opioids or barbiturates helpful, many did not like them, were limited by side effects, or did not find them to be helpful (especially barbiturates). 3. A variety of physician types are prescribing opioids and barbiturates but emergency medicine physicians are the physicians most often first prescribing the opioids, while neurologists are the physicians most often initially prescribing barbiturates.

Consistent with national trends, our study reaffirmed prior studies by suggesting that opioids are continuing to be used in the treatment of migraine. Guidelines suggest that these medications should not be used as first line treatment of migraine.<sup>3,4</sup> Yet, close to 20% of our patients reported currently being on opioids or barbiturates. Our results for current opioid use are similar to the findings in the population based American Migraine Prevalence and Prevention (AMPP) study, sampling nearly 6,000 migraineurs, which found 16% to be current opioid users. Our results had more patients who had ever been prescribed opioids compared to the AMPP study (55.8% vs. 30%, respectively).<sup>5</sup> We likely had more current or past opioid users because our study population consisted of people visiting a headache center, suggesting more disabling and refractory headaches than the general population. It is also concerning that about one fifth of patients were on barbiturate containing medications because there is inadequate evidence (Level C) that these medications are effective acute migraine medications.<sup>8</sup>

About half of the patients took opioids for a month or less, but about one quarter reported taking opioids for over two years. The figure for opioids appears somewhat U-shaped and there are two possible explanations for this, neither of which is mutually exclusive: 1. Patients were only prescribed a short course of opioids because of the concern for long term opioid use. 2. Patients either found these medications effective and continued them for an

extended period of time or found them ineffective and discontinued their use shortly after initiation. Our results are similar to those reported in a study of more than 36 million pharmacy claims from 6.8 million insured Americans who filled at least one opioid prescription from 2009 until 2013.<sup>9</sup> Study results indicated that nearly half of the patients prescribed an opioid for more than 30 days continued to use the medications for three years or longer. Taken together, these results are concerning. The AAN position paper on opioid use states, “Whereas there is evidence for significant short-term pain relief, there is no substantial evidence for maintenance of pain relief or improved function over long periods of time without incurring serious risk of overdose, dependence, or addiction.”<sup>3</sup> Moreover, chronic use of prescription opioids raises the risk for death.<sup>10</sup> For example, in a prospective study of 13,127 adults in Denmark, the risk of all-cause mortality was almost two times higher among long-term opioid users, compared to those without chronic pain.<sup>10</sup>

Our results are similar to prior reports of high comorbid rates of depression and anxiety in migraineurs. In the general population, depression and anxiety likely affect at least 20% of pain patients<sup>11</sup> and as high as 50 to 80% in treatment settings.<sup>12</sup> The co-morbidity between pain and negative affect is of particular clinical concern, because such patients are known to experience less analgesia from opioid medications, and may be at elevated risk for developing dependence.<sup>13,14</sup>

In a study examining opioid prescription characteristics in 2009, the main prescribers were primary care physicians followed by internists and in certain age groups, emergency physicians.<sup>15</sup> In our study examining opioid prescriptions, ED physicians were reported the most frequently as being the first to prescribe opioids. Thus, further educational interventions to increase awareness of acute migraine treatment guidelines should be targeted at ED physicians so that they may consider changing their prescribing patterns. General neurologists most frequently were the first to prescribe barbiturates, so additional continuing medical education courses could help improve awareness in this population.

The AMPP study found that monotherapy was uncommon among opioid users; 93.8% used more than one class of acute headache medication including NSAIDs, triptans, ergotamines, and barbiturates among others.<sup>5</sup> We did not assess for NSAIDs or migraine specific medications, however, we did find that 6.9% of the patients were currently taking both barbiturates and opioids, and this is concerning because of the risk for respiratory depression with concurrent use of both medications. National surveys have consistently shown that the vast majority of fatal overdoses occur in the context of both opioid and sedative use.<sup>16</sup> As such, patients using both medications are more likely to experience serious adverse effects.

Two thirds of the study patients had high frequency, chronic or continuous headaches. None of our subjects reported having a prior myocardial infarction and only 6 patients had a history of stroke. Thus, history of prior MI or stroke is unlikely to be a reason for prescribing opioids and barbiturates over triptans.

Our study had several limitations. First, although we aimed to distribute the survey to all eligible patients during the study period, in a busy headache clinic this proved difficult. Our survey was distributed with the help of our headache center staff. Of those offered the survey



to complete, the high response rate of 89.3% suggests that this is a highly motivated group of patients. However, our low survey completion rate of 41.4% (the percent of people offered the survey from those seen in clinic) is an indicator of the difficulty in distributing the survey in a high volume busy clinical setting, reflecting the difficulty of adding an additional research task to a busy clinical role. As this was a voluntary anonymous survey, we do not have data for the non-responders. However, we have no reason to think that respondents differ in any systematic way from those who did not receive or complete the survey. Nonetheless, caution should be observed in generalizing our findings to the general population of headache patients. Second, given that our study was conducted in a tertiary care headache center, and our study population has a high disease burden, these results may not be generalizable to other populations. The patients might have more difficult to treat disorders and be more disabled. This might also account for the high use of opioids and barbiturate-containing medications. Third, data were self-reported anonymously without confirmation from a health care provider, a medical record review, or pharmacy record review, leading to the possibility of limitations of recall or inaccurate recall. We were unable to ascertain whether the medications were prescribed appropriately i.e. as a last resort or because of contraindications to alternative medications. The opioids may have been prescribed for reasons completely appropriate such as post-operative convalescence or brief use in self-limited pain conditions. For example, 13.8% of the respondents who noted “other” for the initial prescription of opioids may have been referring to opioids prescribed by surgeons for post-operative pain. However, it would be unlikely for general neurologists and internists to be the initial prescriber for post-operative pain management. Nevertheless, this weakness in study design limits the extent to which our results can be interpreted. Our analyses did not differentiate between the various opioids used in the treatment of migraine, including butorphanol nasal spray, which has level A evidence. Additionally, the subject matter is sensitive and patients might hesitate to report this information accurately. Given the high response rate to the survey, and the assurance of anonymity, however, we think that respondents’ answers are likely to be accurate. The sample size of n=218 limits our ability to conduct further analyses.

We attempted to limit the length of the survey, and as such, there are omissions which limit the interpretation of the data. The survey could have asked for participants to provide diagnoses given by prior providers. We do not know the headache frequency at the time when the medications were initially prescribed. The headache frequencies may have been very low or the medications may have been prescribed only as “rescue” medications, for example to avoid an emergency department visit. We also do not know the exact dates when opioids or barbiturates were first prescribed. Thus, we cannot evaluate possible changes in prescribing patterns over time. Also, the survey did not list the word “butalbital” and only used the words “barbiturate,” “fioricet” and “fiorinal.” Thus, patients may not have recognized that they were taking this class of medication.

## Conclusion

Our findings show that opioids and barbiturates are commonly prescribed to patients with headaches. In this sample of patients from a specialty headache clinic, roughly 1 in 5 patients were using opioids or barbiturates, and about half had been prescribed these

medications at some point in the past for their headaches. The initial prescriptions for these medications had been generated by physicians in a wide variety of specialties, but ED physicians were reported to be the most frequent first prescribers of opioids and general neurologists were the most frequent prescribers of barbiturate-containing medications. Primary care physicians (internists and family medicine physicians) were also identified as frequent first prescribers of these medications. Taken as a whole, these data provide a useful snapshot of the wide variety of physician specialties that might benefit from additional education about the appropriate use of opioids and barbiturate-containing medications in patients with headache.

### Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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### Appendix A

1. Sex: \_\_\_\_\_

2. Age: \_\_\_\_\_

3. Have you ever been diagnosed with any of the following? Please circle all that apply.

High Blood Pressure    Stroke    Heart Attack    Depression    Anxiety    Substance Abuse

4. Which of these headaches do you have? Please circle all that apply: migraine, cluster headache, tension type headache, medication overuse headache (headache from too much medication), post-traumatic headache (headache from head injury), other: \_\_\_\_\_

5. How many days a month do you have any sort of headache? \_\_\_\_\_

6. Have you ever been prescribed any of the following medications? Please circle all that apply.

Morphine/MS Contin, Hydromorphone/Dilaudid, Fentanyl/Duragesic, Codeine, Meperidine/Demerol, Oxycodone/Oxycontin/Percocet, Hydrocodone/Vicodin/Lortab, Tramadol/ Ultram, Butorphanol/Stadol

If no, please proceed to question 12.



**7. If yes, who FIRST prescribed the medications listed above?** Please circle the one that applies. If you have been on more than one of the medications listed above, please choose your answer based on the first medication you were prescribed.

Internal Medicine Practitioner	Emergency Department Practitioner	Urgent Care Center Practitioner
Family Medicine Practitioner	Pain Clinic Practitioner	Ob-Gyn Practitioner
General Neurologist	Headache Specialist	Other: _____

**8. In what year were you first prescribed the medication?** \_\_\_\_\_

**9. Did you find the medication(s) effective?** Yes No

**10. Are you currently on the medication(s)?** Yes No

**If you answered no:**

**a) For how long were you on the medication(s)?** Please indicate # of days/months/ years \_\_\_\_\_

**b) Why did you stop the medication(s)?**  
\_\_\_\_\_

**12. Have you ever been prescribed Fioricet, Fiorinal, or another barbiturate containing medication?** Yes No

If no, you are at the end of the survey.

**13. If yes, who FIRST prescribed the fioricet or fiorinal?** Please circle the one that applies.

Internal Medicine Practitioner	Emergency Department Practitioner	Urgent Care Center Practitioner
Family Medicine Practitioner	Pain Clinic Practitioner	Ob-Gyn Practitioner
General Neurologist	Headache Specialist	Other: _____

**14. In what year were you first prescribed the medication?** \_\_\_\_\_

**15. Did you find the medication effective?** Yes No

**16. Are you currently on the medication?** Yes No

**17. If you answered no,**

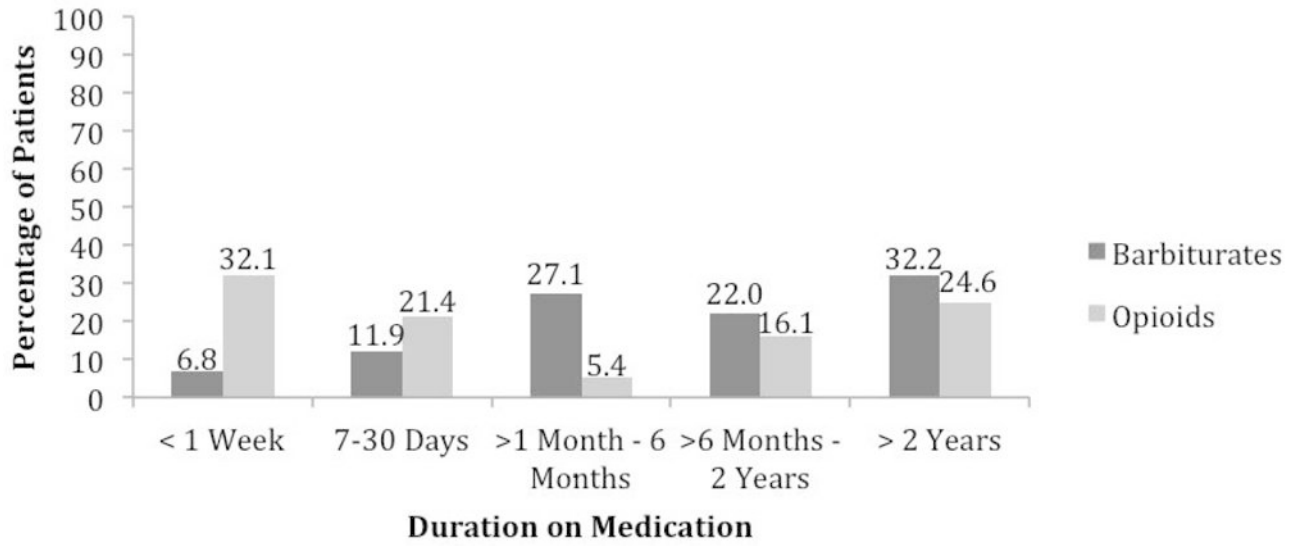
**a. For how long were you on the medication?** Please indicate # of days/months/ years \_\_\_\_\_

**b. Why did you stop the medication?** \_\_\_\_\_

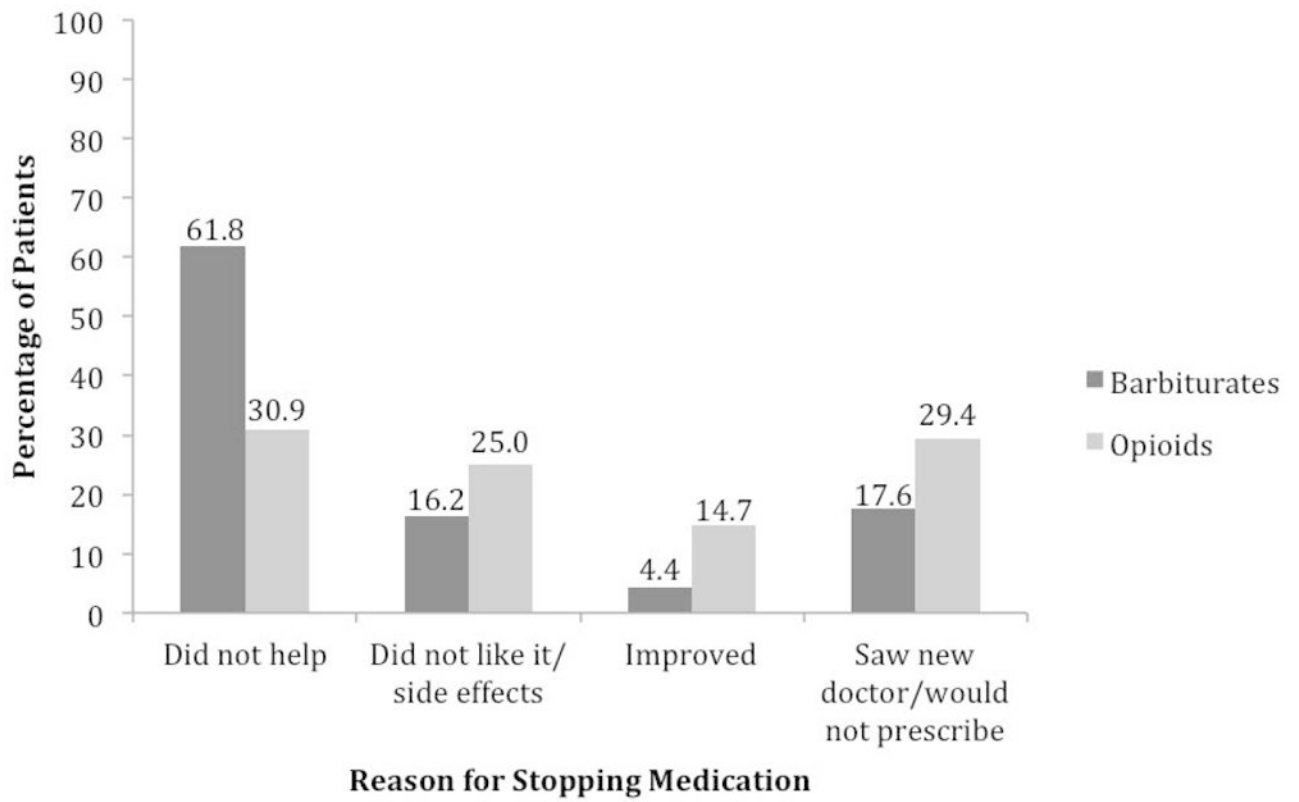
Thank you for participating in this survey.

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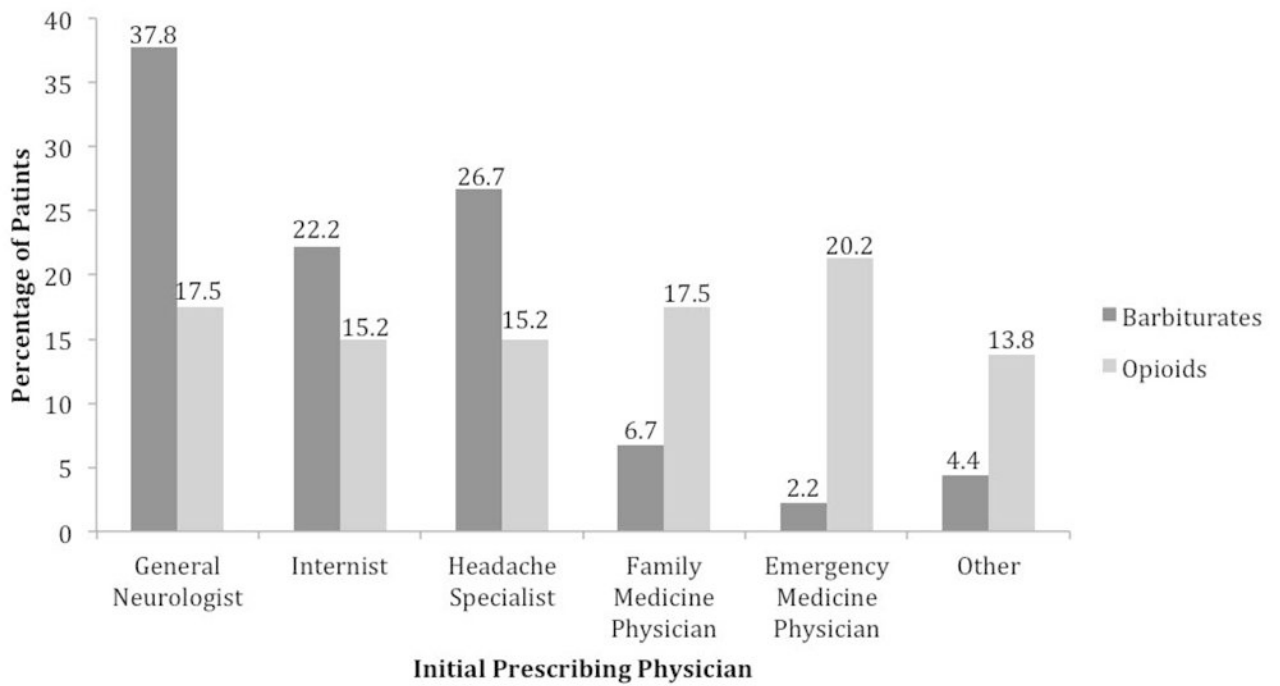
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**Figure 1.**  
 Duration on Opioids and Barbiturates for Headache (of those who stopped)\*  
 \*missing data for barbiturates, n=19, missing data for opioids, n=20



**Figure 2.**  
Reason for Stopping Opioids and Barbiturates for Headache Treatment\*  
\*missing data for opioids, n=9; missing data for barbiturates, n=10



**Figure 3.**  
 Initial Prescribing Doctor of Opioids and Barbiturate containing medications for Headache\*  
 \*45 patients answered the barbiturate question with only one physician type, 79 patients answered the opioid question with only one physician type

**Table 1**

Patient Demographics and Diagnoses of Adults who Completed the Survey

<b>Characteristics and Diagnoses</b>	<b>n=217</b>
<b>Gender (% Female)</b>	80.2
<b>Age (mean + standard deviation)</b>	42 ±14.15
<b>Headache Type *</b>	n
Migraine	182 (83.9)
Medication Overuse	15 (6.9)
Post-Traumatic	21 (9.7)
Other	131 (60.3)
<b>Other Diagnoses</b>	n (%)
High Blood Pressure	36 (16.6)
Stroke	6 (2.8)
Heart Attack	0 (0)
Depression	84 (38.7)
Anxiety	100 (46.1)
Substance Abuse	11 (5.1)

\* Patients could choose more than one headache type so percentages do not equal 100

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**Table 2**

Headache Frequency of Adults who Completed the Survey \*

Headache Frequency	n (%)
Low frequency (less than 10 days/month)	74 (35.2)
High frequency(10-14 days a month)	26 (11.4)
Chronic (15+ days a month)	110 (52.4%)

\*  
7 patients did not answer this question

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**Table 3**

## Medication History\*

<b>Opioid</b>	<b>n (%)</b>
Prescribed Opioid	119 (54.8)
Found Opioid Effective	75 (34.6)
Currently On Opioid	42 (19.4)
<b>Barbiturates</b>	<b>n (%)</b>
Prescribed Barbiturates	123 (56.7)
Found Barbiturates Effective	79 (64.2)
Currently On Barbiturates	45 (20.7)

\* Based on the results of 217 surveys analyzed

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