
Research Submissions

CME **Patterns of Diagnosis and Acute and Preventive Treatment for Migraine in the United States: Results from the American Migraine Prevalence and Prevention Study**

Seymour Diamond, MD; Marcelo E. Bigal, MD, PhD; Stephen Silberstein, MD; Elizabeth Loder, MD; Michael Reed, PhD; Richard B. Lipton, MD

Objective.—To describe the patterns of medical treatment for migraineurs in the United States.

Background.—Over the past decade, many new treatments for migraine have become available and awareness of migraine has improved. However, there is little information about the patterns of medical treatment in the US society.

Design/Methods.—A validated self-administered headache questionnaire was mailed to a random sample of 120,000 US households. Each household member with severe headaches was asked to complete the survey. The questionnaire assessed headache features, disability, and patterns of medical treatment. Subjects were classified according to their use of headache preventive medication, as current users, coincident users (using effective medications for other medical reasons), lapsed users (had used in the past but not at the time of the survey), or never users.

Results.—In 162,576 participants, the prevalence of migraine was 17.1% in women and 5.6% in men. Only 56.2% of those with migraine had ever received a medical diagnosis. Ninety-eight percent of the migraineurs used acute treatment for their migraine attacks. Forty-nine percent (49%) usually used over-the-counters, 20% usually used prescription medications, and 29% used both. Only 12.4% of migraineurs indicated that they were taking a migraine preventive medication, but 17.2% were using medications with potential antimigraine effects for other medical reasons. Current or past use of preventive medication was more likely in women than men (odds ratio [OR] = 1.37, 95% confidence interval [CI] 1.27-1.48), increased with age and individuals with high MIDAS grade (Grade IV vs I, OR 2.35, 95% CI 2.09-2.64). Preventive medication use increased with awareness of migraine and with illness severity.

Conclusions.—Migraine remains undertreated in the US population. Barriers to preventive treatment are greater in younger age groups, men, and people unaware that they have migraine.

Key words: migraine, prevalence, treatment, prevention

(*Headache* 2007;47:355-363)

For CME, visit <http://www.headachejournal.org>

From the Department of Neurology, Albert Einstein College of Medicine, Bronx, NY (Drs. Bigal and Lipton); Montefiore Headache Center, Bronx, NY (Drs. Bigal, Diamond, and Lipton); The New England Center for Headache, Stamford, CT (Dr. Bigal); Jefferson Headache Center, Thomas Jefferson University Hospital, Philadelphia, PA (Dr. Silberstein); Spaulding Rehabilitation Hospital, Boston, MA (Dr. Loder); Vedanta Research, Chapel Hill, NC (Dr. Reed); and Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, NY (Dr. Lipton).

Address all correspondence to Richard B. Lipton, The Albert Einstein College of Medicine—Neurology, 1165 Morris Park Avenue, Bronx, New York, NY 10461.

Accepted for publication August 23, 2006.

Migraine is a chronic neurological disorder characterized by recurrent episodes of headache and associated symptoms.¹ It is a major cause of absenteeism from and decreased productivity at work and demonstrably reduces health-related quality of life.^{2,3}

The epidemiology of migraine has been extensively studied. For adult populations, estimates of migraine prevalence range from 3.3% to 21.9% for women and 0.7% to 16.1% for men.⁴ Much of the variation among studies is accounted for age, gender, case definition, and region of the world.¹ In the United States, prior studies show that the prevalence of migraine is approximately 18% in women and 6% in men.^{5,6}

Migraine imposes an enormous burden on the sufferers, their family, and on society.^{2,4,7,8} Nonetheless, migraine remains underdiagnosed and undertreated in the United States. The proportion of migraineurs using only over-the-counter (OTC) medications to treat their headaches was 57% in 1999, compared with 59% in 1989.^{5,6,9} Preventive medications are rarely used, even by individuals enrolled in health plans.¹⁰

The US Headache Consortium provides guidelines for the use of acute and preventive medications.^{11,12} These guidelines recommend that migraineurs with moderate or severe attacks should be treated with specific acute antimigraine medications.¹¹ Migraine prevention is recommended in individuals with frequent headaches as well as attacks that remain disabling despite optimal acute treatment. The goals of prevention are to reduce migraine attack frequency, prevent migraine-related disability, and improve health-related quality of life.

While the patterns of acute treatment use have been extensively studied, much less is known about the proportion of migraineurs using preventive medications. Estimates of the proportion of migraineurs in the general population who are candidates for preventive treatment and the fraction of those individuals who receive prevention are lacking. While underuse of preventive treatment is widely cited as a barrier to optimal migraine outcomes,¹³ quantitative data on patterns of use are needed.

The American Migraine Prevalence and Prevention (AMPP) study aims to close this gap by reevaluating the epidemiology, the burden, and the patterns of

healthcare utilization for migraine. In this article, we explore patterns of acute and preventive treatment for migraineurs in the United States and the demographic factors and clinical features of headache associated with treatment patterns.

METHODS

Sample.—The AMPP was modeled on the methods of the American Migraine Study 1 and 2.^{5,6,9} A validated self-administered headache questionnaire was mailed in June 2004 to a stratified random sample of 120,000 US households, drawn from a 600,000-household nationwide panel maintained by the National Family Opinion. The panel comprised sampling blocks, each containing 5000 households, which are constructed to be representative of the US population in terms of census region, population density, age of the head of the household, household income, and number of household members. Demographic and census information is obtained from each household during an initial recruitment mailing and routinely updated. Roughly 30% of each sampling block is updated and/or replaced every 2 years.

Survey.—Initial screening questions were completed by the head of the household, who reported the total number of household members and the number of household members suffering from at least occasional self-defined severe headache. Each household member with severe headaches was then asked to complete the remainder of the survey questions.

The survey consisted of 21 questions assessing headache features including unilateral head pain, pulsating/throbbing pain, nausea, vomiting, sensitivity to light, sensitivity to sound, visual scotoma (shimmering lights, circles, or other shapes, or colors prior to a headache), and numbness of the lips, tongue, fingers, or legs before the onset of headache. In addition, the survey included the Migraine Disability Assessment (MIDAS) questionnaire.¹⁴ MIDAS was used to divide patients into 4 grades using previously validated and well-accepted scores.¹⁴ Finally, the questionnaire assessed patterns of headache diagnosis and treatment with acute and preventive medications (see below).

Migraine Case Definition.—A diagnosis of migraine was assigned based on criteria outlined in the

Second Edition of the International Classification of Headache Disorders (ICHD-2).¹ Migraine was identified if a respondent reported at least 1 severe headache in the previous 12 months, but less than 15 severe headaches in the prior month, with unilateral or pulsatile pain, and either nausea, vomiting, phonophobia with photophobia, or visual or sensory aura before the headache. If these criteria were not met, respondents with severe headache were classified as suffering from “other severe headaches.”

The survey had been previously validated, using the first edition of the ICHD-1 as a gold standard,¹⁵ in a population sample of migraineurs and controls with other types of headache. The validation sample was identified by a telephone interview survey and then assessed in person and assigned a definitive diagnosis by a physician with expertise in headache. The sensitivity of the survey for this sample was 100%; the specificity was 82.3%.⁶ Although the questionnaire was not revalidated for the ICHD-2, the migraine criteria remained essentially unchanged relative to the ICHD-1.

Patterns of Migraine Treatment.—Subjects were asked a series of questions about acute and preventive treatment. The acute treatment options queried were no treatment, treatment with OTCs only, treatment with prescription medications only, or treatment with both OTCs and prescription medications.

Subjects were then asked if they have ever taken prescription medication for a headache on a daily basis to help prevent headache from happening in the first place. Those who responded positively were asked if they were currently taking such medications. Those who were not currently taking were asked when they stopped their preventive medication. Finally, subjects were asked about daily medications they were using for reasons other than to treat their headaches. Based on the answers obtained, migraineurs were divided into 4 categories of preventive medication use: 1—“Never users” have never taken preventive medications; 2—Current users were taking preventive drugs specifically prescribed for their headaches at the time of the survey; 3—Lapsed users had used preventive medications for headache in the past, but were not using at the time of the survey. Lapsed users were subdivided into categories of short-term lapsed (<1 year) and long-term lapsed (1 year or more); and 4—

Coincident users were using medications that are accepted to be effective preventive migraine medications (β -blockers, tricyclic antidepressants, calcium-channel blockers, certain antiepileptic drugs), but for medical reasons other than headache.

Data Analysis.—Data were summarized using descriptive tables. Log-linear models were used to model gender-specific prevalence estimates of migraine (1-year period prevalence) by age, race, urban versus rural residence, household income, and region of the country.

Logistic regression was used to identify factors associated with patterns of acute medication use and, in separate models, patterns of preventive treatment. For these analyses, patterns of acute medication were dichotomized into nonprescription acute treatment (no medication and OTC medication) versus prescription medication (usually prescription and prescription plus OTC). Similarly, patterns of preventive treatment were grouped as current and lapsed versus never used. The coincident group is excluded. The degrees of freedom for each test equaled the number of categories for that predictor minus 1. Crude and adjusted odds ratios (ORs) were calculated using logistic regression, where one level of the predictor is set as the reference group. Ninety-five percent confidence intervals (CIs) are provided for all ORs. All CIs not containing the value 1 indicate that factor is a statistically significant predictor with a *P* value of <.05.

RESULTS

Sample.—The instrument was mailed to 120,000 households selected to be representative of the US population with respect to gender, age, and census region. Surveys were returned from 77,879 households (65% response) yielding data for 162,576 household members aged 12 or older. Response rates did not differ by gender, region, regional population density, or household income. Details of the sample, as well as a detailed discussion on migraine prevalence, are presented in a companion paper. In brief, 132,674 women were contacted and 85,284 participated in the survey (response rate of 64%); for men, 124,665 were contacted and 77,292 (response rate of 62%) participated. There were 18,968 individuals aged 12 or older (1-year period prevalence 11.7%) who met ICHD-2 criteria

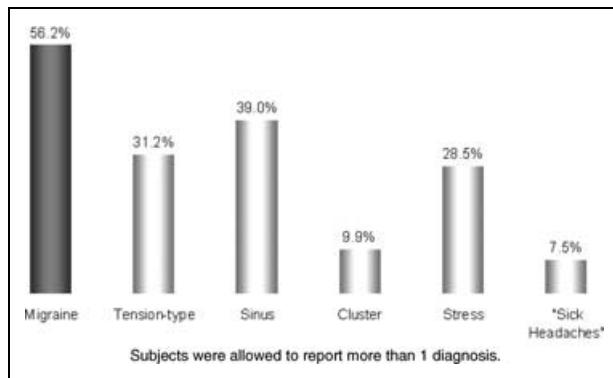


Fig 1.—Proportion of persons with ICHD-2 migraine reporting specific headache diagnosis.

for migraine. The 1-year prevalence of migraine in women was 17.1%, while it was 5.6% in men.

Self-Awareness of Migraine.—Just 56.2% of those with an ICHD-2 diagnosis of migraine, according to our survey, reported that they ever received a medical diagnosis of migraine. Sinus headache (39%), tension-type headache (31%), and stress headache (29%) were common self-reported diagnoses among migraineurs (subjects could list more than one probable diagnosis) (Fig. 1).

Patterns of Use of Acute Treatment.—Only 2.1% of the migraineurs surveyed did not usually treat their typical migraine attacks with an acute treatment. Most (49%) treated their attacks with OTCs only, while 20.1% used prescription medication only. A total of 28.8% sometimes use OTCs and sometimes use prescription medication for their acute treatment.

Prescription Acute Medication Use.—Use of prescription medication was more common in women than men (OR = 1.54, 95% CI 1.43-1.63) and increased with age (Table 1). Table 2 displays the patterns of acute treatment for migraine with regard to the clinical features, frequency, and disability of migraine. Acute prescription medication was used more frequently in those with typical migraine features, such as unilateral pain (OR = 1.29, 95% CI = 1.21-1.36), extremely severe pain (OR = 2.4, 95% CI = 2.2-2.5), associated symptoms, and aura. The odds for prescription use increased with attack frequency and disability as measured by MIDAS grade.

Patterns of Use of Preventive Treatment.—In our survey 38.7% had ever used a migraine preventive treatment for the treatment of migraine. Just

Table 1.—Patterns of Acute Treatment of Migraine by Sociodemographic Characteristics

Sociodemographic Features	None N (%)	Usually OTC N (%)	Usually Prescription N (%)	Both N (%)	Odds Ratio for Prescription Medication Use* (95% CI)
Total	388 (2.1%)	9125 (49.0%)	3736 (20.1%)	5364 (28.8%)	
Gender					
Male	123 (2.9%)	2415 (56.5%)	684 (16.0%)	1056 (24.7%)	1
Female	265 (1.8%)	6710 (46.8%)	3052 (21.3%)	4308 (30.1%)	1.54 (1.43-1.65)
Age					
<18	16 (1.9%)	499 (60.6%)	130 (15.8%)	178 (21.6%)	1
18-29	72 (2.3%)	1711 (55.6%)	471 (15.3%)	823 (26.7%)	1.21 (1.03-1.42)
30-39	86 (2.0%)	2228 (52.2%)	675 (15.8%)	1277 (29.9%)	1.41 (1.21-1.64)
40-49	90 (1.8%)	2375 (47.5%)	1026 (20.5%)	1506 (30.1%)	1.72 (1.48-2.00)
50-59	62 (1.8%)	1503 (42.5%)	939 (26.6%)	1030 (29.1%)	2.10 (1.80-2.46)
60-69	37 (2.7%)	547 (40.0%)	365 (26.7%)	418 (30.6%)	2.24 (1.88-2.68)
70+	25 (4.6%)	262 (47.7%)	130 (23.7%)	132 (24.0%)	1.53 (1.23-1.90)
Income					
<\$22,500	136 (2.7%)	2409 (47.8%)	1053 (20.9%)	1446 (28.7%)	1
\$22,500-39,999	81 (2.2%)	1915 (51.9%)	688 (18.6%)	1009 (27.3%)	0.87 (0.80-0.94)
\$40,000-59,999	60 (1.8%)	1649 (49.9%)	616 (18.7%)	977 (29.6%)	0.95 (0.87-1.04)
\$60,000-89,999	61 (1.6%)	1623 (48.2%)	700 (20.8%)	980 (29.1%)	1.02 (0.93-1.11)
\$90,000+	50 (1.6%)	1529 (47.6%)	679 (21.2%)	952 (29.7%)	1.05 (0.96-1.15)

*Comparing usually prescription and both, with none or usually OTC. Odds ratio adjusted by sociodemographic features, age, and gender.

Table 2.—Patterns of Migraine Acute Medication Use by Migraine Symptoms and Migraine Severity

	None % (N) n = 373	OTC % (N) n = 8921	Prescription % (N) n = 3584	Both % (N) n = 5073	Odds Ratio of Prescription* (95% CI)
Selected pain features					
Unilateral	54.2% (202)	52.2% (4661)	57.6% (2065)	59.2% (3002)	1.29 (1.21-1.36)
Throbbing	72.9% (272)	78.2% (6975)	78.3% (2806)	81.8% (4148)	1.15 (1.07-1.24)
Extreme severe	39.7% (147)	26.3% (2334)	50.8% (1815)	44.1% (2222)	2.40 (2.25-2.55)
Associated symptoms					
Nausea	67.0% (250)	70.6% (6298)	79.4% (2847)	78.3% (3970)	1.55 (1.45-1.66)
Photo	76.9% (287)	77.8% (6937)	85.6% (3068)	85.6% (4340)	1.70 (1.57-1.84)
Phono	71.0% (265)	72.9% (6505)	80.2% (2876)	81.3% (4126)	1.58 (1.47-1.61)
Blurring vision	46.9% (175)	35.8% (3190)	51.5% (1844)	50.2% (2549)	1.81 (1.71-1.93)
Aura					
Visual aura	39.1% (146)	29.8% (2655)	41.4% (1485)	39.3% (1992)	1.56 (1.46-1.66)
Sensory aura	12.1% (45)	8.3% (740)	15.0% (539)	14.8% (751)	1.90 (1.73-2.09)
Days with headache per month					
<1 Month*	34.0% (127)	26.1% (2324)	23.0% (824)	18.1% (918)	1
1-4	53.9% (201)	62.8% (5602)	61.7% (2213)	64.2% (3256)	1.33 (1.23-1.43)
5-8	8.8% (33)	7.9% (707)	10.5% (375)	12.1% (612)	1.88 (1.68-2.10)
9-14	3.2% (12)	3.2% (288)	4.8% (172)	5.7% (287)	2.15 (1.84-2.52)
Disability—MIDAS grade					
Grade 1	73.7% (275)	70.6% (6300)	60.8% (2180)	56.4% (2861)	1
Grade 2	11.8% (44)	14.0% (1246)	15.0% (536)	16.1% (818)	1.37 (1.26-1.49)
Grade 3	7.5% (28)	8.7% (777)	12.0% (431)	14.3% (727)	1.88 (1.70-2.07)
Grade 4	7.0% (26)	6.7% (598)	12.2% (437)	13.1% (667)	2.31 (2.08-2.56)

*Comparing usually prescription and both, with none or usually OTC.
Odds ratio adjusted by gender, sociodemographic features, and age.

12.4% were current users. An additional 17.2% were coincidental users, meaning that they reported taking a known migraine preventive but denied taking a medication to prevent their migraines. The majority of

lapsed users had lapsed in the past 1 year (short-term lapsed) (Fig. 2). Overall, 29.6% of migraineurs were currently or coincidentally using a preventive medication.

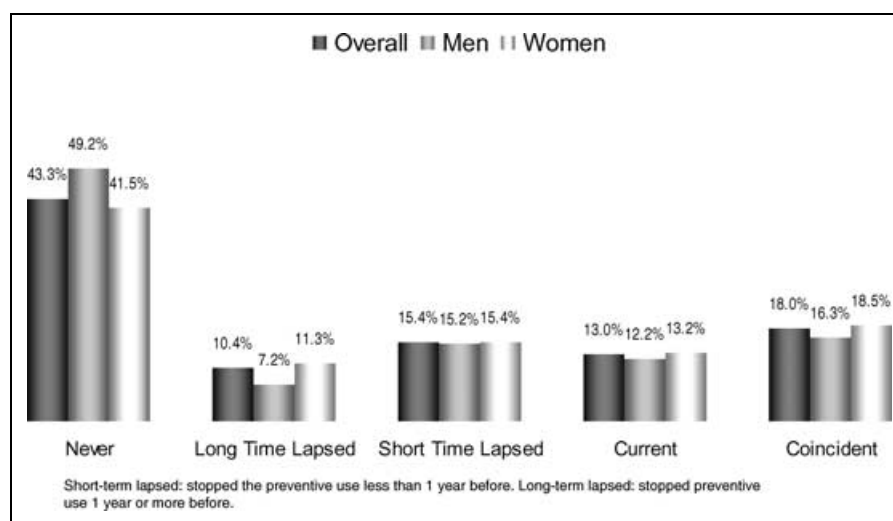
**Fig 2.—Proportion of migraineurs by gender and category of use for migraine preventive medications.**

Table 3.—Patterns of Preventive Treatment of Migraine by Sociodemographic Characteristics

	Never Used n (%)	Lapsed Users n (%)	Current Users n (%)	Coincident Users n (%)	Odds Ratio* (95% CI)
Total (%)	8025 (43.3%)	4774 (25.7%)	2409 (13.0%)	3338 (18.0%)	
Gender					
Male	2093 (49.2%)	950 (22.3%)	519 (12.2%)	695 (16.3%)	1
Female	5932 (41.5%)	3824 (26.8%)	1890 (13.2%)	2463 (18.5%)	1.37 (1.27-1.48)
Age					
<18	532 (64.8%)	160 (19.5%)	88 (10.7%)	41 (5.0%)	1
18-29	1673 (54.6%)	771 (25.2%)	304 (9.9%)	315 (10.3%)	1.38 (1.16-1.63)
30-39	2082 (48.9%)	1113 (26.2%)	462 (10.9%)	599 (14.1%)	1.62 (1.38-1.91)
40-49	2072 (41.7%)	1246 (25.1%)	714 (14.4%)	940 (18.9%)	2.03 (1.72-2.39)
50-59	1149 (32.6%)	937 (26.6%)	555 (15.7%)	886 (25.1%)	2.79 (2.35-3.30)
60-69	377 (27.8%)	384 (28.3%)	212 (15.6%)	383 (28.2%)	3.39 (2.78-4.14)
70+	140 (25.4%)	163 (29.6%)	74 (13.4%)	174 (31.6%)	3.63 (2.81-4.70)
Income					
<\$22,500	1731 (34.5%)	1415 (28.2%)	871 (17.4%)	995 (19.9%)	1
\$22,500-39,999	1603 (43.4%)	998 (27.0%)	412 (11.2%)	681 (18.4%)	0.66 (0.60-0.73)
\$40,000-59,999	1533 (46.6%)	815 (24.8%)	370 (11.2%)	571 (17.4%)	0.59 (0.53-0.65)
\$60,000-89,999	1612 (48.1%)	800 (23.9%)	374 (11.2%)	563 (16.8%)	0.55 (0.50-0.61)
\$90,000+	1546 (48.3%)	746 (23.3%)	382 (11.9%)	528 (16.5%)	0.55 (0.50-0.61)

*Comparing ever users (current + lapsed) with never used. Coincident users were excluded. Odds ratio adjusted by age, gender, and sociodemographic features.

Compared to those who never used a preventive, ever use of preventives (current + lapsed) was more likely in women than in men (OR = 1.37, 95% CI 1.27-1.48), increased with age and decreased with household income (Table 3).

Relative to those who never used preventive medication, ever users were more likely to have unilateral pain (OR = 1.2, 95% CI = 1.13-1.29) and extremely severe pain (OR = 1.78, 95% CI = 1.66-1.91), associated symptoms (photophobia, OR = 1.2, 95% CI = 1.1-1.4; phonophobia, OR = 1.3, 95% CI = 1.2-1.5) and any form of aura (visual aura—OR = 2.0; sensory aura—OR = 3.6). Frequency and disability were strong predictors of ever using a preventive medication (Table 4).

Migraineurs were less likely to be currently using a preventive medication if, relative to a self-diagnosis of migraine, they had a self-diagnosis of sinus headache (OR = 0.7, 95% CI = 1.1-1.9). They were more likely to be current preventive users if they reported having cluster headache (1.7, 1.1-1.9) or “sick headaches” (1.7, 1.4-2.0), and as likely to be currently using if they self-reported a diagnosis of tension headaches or stress headaches.

COMMENTS

Since the publication of the American Migraine Study 2 in 1999,⁹ several new acute treatments and a new preventive therapy have been approved for migraine.⁶⁻¹⁸ Both American Migraine Studies showed that the burden of migraine in the United States was substantial and that migraine was prevalent, disabling, underdiagnosed, and undertreated.^{5,6,9} Our findings suggest the following: (1) A substantial proportion of migraineurs are moderately or severely disabled; (2) Just 56% of the migraineurs know that they have migraine; (3) Although almost all migraineurs use acute treatments, nearly half treat their acute attacks with OTC medications exclusively. Just 20% use prescription medications only, to treat most of the attacks; (4) Only 12% are currently using a medication specifically prescribed for migraine. More subjects are coincident than current preventive users; (5) Subjects are more likely to use acute or preventive prescription medications if they have headache-related disability or typical migraine symptoms (unilateral pain, associated symptoms, etc), perhaps because these features increase the likelihood that they will consult a physician or receive an accurate diagnosis.

Table 4.—Patterns of Migraine Preventive Medication Use by Migraine Symptoms and Migraine Severity

	Never Used n (%) n = 7874	Lapsed Users n (%) n = 4608	Current Users n (%) n = 2180	Coincident Users n (%) n = 3229	Odds Ratio* (95% CI)
Pain features					
Unilateral	4217 (53.6%)	2593 (56.3%)	1360 (62.4%)	1727 (53.5%)	1.20 (1.13-1.29)
Throbbing	6239 (79.2%)	3648 (79.2%)	1771 (81.2%)	2499 (77.4%)	1.04 (0.96-1.12)
Pain-free intervals	5185 (65.7%)	2950 (64.0%)	1344 (61.7%)	2182 (67.6%)	0.90 (0.84-0.96)
Extreme severe	2394 (30.6%)	1858 (40.5%)	1113 (51.4%)	1128 (35.1%)	1.78 (1.66-1.91)
Associated symptoms					
Nausea	5764 (73.2%)	76.0% (3500)	76.8% (1675)	73.7% (2381)	1.17 (1.09-1.27)
Photo	6288 (79.9%)	83.8% (3862)	83.0% (1809)	81.4% (2629)	1.28 (1.18-1.39)
Phono	5896 (74.9%)	78.7% (3625)	79.5% (1734)	76.3% (2465)	1.26 (1.16-1.36)
Aura					
Blurring vision	36.3% (2858)	49.4% (2275)	55.3% (1205)	43.3% (1398)	1.85 (1.73-1.97)
Visual aura	29.6% (2334)	40.4% (1863)	42.5% (927)	35.1% (1134)	1.66 (1.55-1.77)
Sensorial aura	7.4% (583)	14.6% (673)	22.2% (484)	10.0% (323)	2.56 (2.31-2.86)
Frequency of headaches					
<1 month	27.2% (2145)	21.7% (999)	11.4% (249)	24.7% (797)	1
1-4	62.5% (4919)	64.4% (2966)	62.3% (1359)	61.3% (1980)	1.51 (1.39-1.64)
5-8	7.5% (589)	10.0% (459)	16.6% (361)	9.7% (313)	2.39 (2.11-2.72)
9-14	2.8% (221)	4.0% (184)	9.7% (211)	4.3% (139)	3.07 (2.57-3.67)
Disability—MIDAS grade					
Grade 1	70.6% (5558)	61.4% (2828)	51.7% (1128)	64.4% (2080)	1
Grade 2	13.8% (1086)	16.1% (741)	14.8% (322)	15.0% (484)	1.38 (1.25-1.51)
Grade 3	9.0% (710)	12.7% (583)	14.5% (316)	10.6% (342)	1.78 (1.60-1.98)
Grade 4	6.6% (520)	9.9% (456)	19.0% (414)	10.0% (323)	2.35 (2.09-2.64)

*Comparing current and lapsed (ever users) with never used. Coincident users were excluded. Odds ratio adjusted by age, gender, and sociodemographic features.

Relative to prior reports, the proportion of migraineurs who report a physician diagnosis has steadily increased. While this reflects substantial progress, migraine remains underdiagnosed. A number of factors may explain why individuals with symptoms of migraine do not receive medical diagnosis.¹⁹ Migraineurs may not seek medical care for migraine;²⁰ they may seek care but not receive a diagnosis; or they may be diagnosed but fail to remember a diagnosis.²¹ It is well established that lack of consultation for headache is a major contributing factor to underdiagnosis.¹³

More migraineurs are using acute prescription treatment than 15 years ago. In 1989, 59% of the migraineurs used only OTCs,⁶ compared with 57% in 1999⁹ and 49% currently. However, given the increase in consultation rate and the introduction and better comprehension of the triptans, the changes in the rates of acute prescription medication use are modest.

We found that only 12% of migraineurs are currently taking preventive medication for migraine. Another 17% receive drugs that may be effective for migraine (β -blockers) but deny that they are for headache. The majority of patients who ever received a prescription preventive specifically for migraine discontinued using it.

Data from epidemiological studies conducted in other countries help to put our findings in context. The FRAMIG 2000, a population-based survey of medical and therapeutic management of migraine in France, assessed 312 migraineurs, first identified from a representative sample of 4689 adult subjects.²² Although a higher proportion (80%) of migraineurs was aware that they had migraine, a minority (18%) had medical follow-up for migraine. Only 6% of the subjects in the survey were current users of preventive medication. Similarly, a recent study conducted in Latin America showed that just 42% of migraineurs had ever

consulted a doctor for headache.²³ Consultation rates varied from a low of 36% in Ecuador to a high of 49% in Colombia. On average, only 35% of migraineurs in Latin America had ever received a medical diagnosis of migraine, and preventive medication was used by less than 2%.

According to the US Headache Consortium Guidelines, prescription preventive medication is warranted for migraineurs with frequent or disabling attacks.¹¹ Although data correlating the patterns of prescription care received by participants of this study with current Guideline recommendations will be presented in a separate paper, 29.4% of the subjects who never received preventive migraine treatment had some headache-related disability, and 15.6% were at least moderately disabled. In the lapsed group, 36.7% had some disability and 22.6% had at least moderate disability. From a healthcare perspective, better identification of migraineurs in need of specific acute and preventive therapies should be a priority.

This study has limitations. First, the validated questionnaire was applied in just those with a self-defined severe headache. As migraine attacks do not have to be severe, we may have missed individuals with less severe migraine. However, migraine prevalence overall and by age, gender, and disability profiles in this study are very similar to other studies that did not select for severe headaches.^{7,22} We conclude that substantial underascertainment is unlikely. Second, selection bias, whereby individuals with a physician diagnosis of migraine may have been more likely than undiagnosed migraineurs to respond to the survey, might have led to an overestimation of the values for some study parameters. Strengths of this study include the robust sample size (it is the largest migraine epidemiological study conducted to date), and the use of questionnaires that allow comparisons with the American Migraine Study 1 and 2.^{5,6,9}

In summary, the AMPP study demonstrates that, despite a slow increase in diagnosis and treatment rates in the past 15 years, migraine remains an undertreated illness. The extraordinary medical advances coupled with education initiatives seen in the headache field in the past decade have not translated into a proportionate increase in the use of prescription medicines for migraine management. These data highlight the

need for professionals to renew their commitment to recognizing and effectively managing this important health problem. Educational initiatives should focus on the benefits of preventive therapies in minimizing current pain and disability, as well as potentially reducing future pain and disability by changing outcomes.

Acknowledgments: This study was sponsored by the National Headache Foundation through a grant from Ortho-McNeil Neurologics, Inc.

Conflict of Interest: The authors received research support from several pharmaceutical companies that market OTCs, acute and preventive medications, including OMP.

REFERENCES

1. Headache Classification Subcommittee of the International Headache Society. The International Classification of Headache Disorders, ed. 2. *Cephalalgia*. 2004;24(suppl 1):1-15.
2. Stewart WF, Shechter A, Lipton RB. Migraine heterogeneity. Disability, pain intensity, and attack frequency and duration. *Neurology*. 1994;44(suppl 4):S24-S39.
3. Lipton RB, Hamelsky SW, Stewart WF. Epidemiology and impact of migraine. In: Silberstein SD, Lipton RB, Dalessio DJ, eds. *Wolff's Headache and Other Head Pain*. New York, NY: Oxford University Press; 2001:85-107.
4. Scher AI, Stewart WF, Lipton RB. Migraine and headache: A meta-analytic approach. In: Crombie IK, ed. *Epidemiology of Pain*. Seattle, WA: IASP Press; 1999:159-170.
5. Lipton RB, Stewart WF, Diamond S, Diamond ML, Reed M. Prevalence and burden of migraine in the United States: Data from the American Migraine Study II. *Headache*. 2001;41:646-657.
6. Lipton RB, Stewart WF, Simon D. Medical consultation for migraine: Results from the American Migraine Study. *Headache*. 1998;38:87-96.
7. Rasmussen BK. Epidemiology of headache. *Cephalalgia*. 1995;15:45-68.
8. Lipton RB, Bigal ME, Kolodner K, Stewart WF, Liberman JN, Steiner TJ. The family impact of migraine: Population-based studies in the USA and UK. *Cephalalgia*. 2003;23:429-440.
9. Lipton RB, Diamond S, Reed M, Diamond ML,

- Stewart WF. Migraine diagnosis and treatment: Results from the American Migraine Study II. *Headache*. 2001;41:638-645.
10. Patel NV, Bigal ME, Kolodner KB, Leotta C, Lafata JE, Lipton RB. Prevalence and impact of migraine and probable migraine in a health plan. *Neurology*. 2004;63:1432-1438.
 11. Silberstein SD, Rosenberg J. Multispecialty consensus on diagnosis and treatment of headache. *Neurology*. 2000;54:1553-1555.
 12. Matchar DB, Young WB, Rosenerg J, et al. Multispecialty consensus on diagnosis and treatment of headache: Pharmacological management of acute attacks. *Neurology* 2000;54:www.aan.com/public/practiceguidelines/03.pdf.
 13. Lipton RB, Amatriek JC, Ferrari MD, Gross M. Migraine. Identifying and removing barriers to care. *Neurology*. 1994;44(suppl 4):S63-S68.
 14. Stewart WF, Lipton RB, Dowson AJ, Sawyer J. Development and testing of the Migraine Disability Assessment (MIDAS) Questionnaire to assess headache-related disability. *Neurology*. 2001;56(6 suppl 1):S20-S28.
 15. Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. *Cephalalgia*. 1988;8(suppl 7):1-96.
 16. Mathew NT, Hettiarachchi J, Alderman J. Tolerability and safety of eletriptan in the treatment of migraine: A comprehensive review. *Headache*. 2003;43:962-974.
 17. Balbisi EA. Frovatriptan succinate, a 5-HT_{1B/1D} receptor agonist for migraine. *Int J Clin Pract*. 2004;58:695-705.
 18. Silberstein SD, Neto W, Schmitt J, Jacobs D, MIGR-001 Study Group. Topiramate in migraine prevention: Results of a large controlled trial. *Arch Neurol*. 2004;61:490-495.
 19. Stang PE, Sternfeld B, Sidney S. Migraine headache in a pre-paid health plan: Ascertainment, demographics, physiological and behavioral factors. *Headache*. 1996;36:69-76.
 20. Osterhaus JT, Gutterman DL, Plachetka JR. Health care resources and lost labor costs of migraine headaches in the United States. *Pharmacoeconomics*. 1992;2: 67-76.
 21. Tepper SJ, Dahlof CG, Dowson A, et al. Prevalence and diagnosis of migraine in patients consulting their physician with a complaint of headache: Data from the Landmark Study. *Headache*. 2004;44:856-864.
 22. Lucas C, Chaffaut C, Artaz MA, Lanteri-Minet M. FRAMIG 2000: Medical and therapeutic management of migraine in France. *Cephalalgia*. 2005;25:267-279.
 23. Morillo LE, Alarcon F, Aranaga N, et al. Latin American Migraine Study Group. Clinical characteristics and patterns of medication use of migraineurs in Latin America from 12 cities in 6 countries. *Headache*. 2005;45:118-126.