



Frequent Nausea in Episodic Migraine (EM) is Associated with Increased Health Care Utilization and Costs: Results from the American Migraine Prevalence and Prevention (AMPP) Study

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BACKGROUND

- Migraine attacks with nausea, compared to those without, are associated with greater pain severity¹, poorer response to oral triptans², poor quality of life³, and greater impairment in functional ability⁴.
- Nausea also adversely affects patients' medication-taking behavior by causing delay or avoidance of oral medications⁵. Moreover, delayed administration of triptan tablets has therapeutic consequences in that triptan tablets are less effective when administered later in the migraine episode versus early when pain is still mild⁶.
- A recent study⁷ of migraine-associated nausea utilized population data from the American Migraine Prevalence and Prevention (AMPP) Study survey and compared persons with high-frequency, headache-related nausea vs. those with no/rare nausea. Nausea was associated with significantly ($p \leq 0.05$) greater odds of experiencing other headache symptoms, being disabled or on medical leave, having more headache-related disability and being dissatisfied with medication.

References: ¹Kelman L. Ceph. 2006;26:548-553. ²Diener HC, et al. Neurology 2004;63:520-524. ³Holroyd, KA, et al. Ceph. 2007;27:1156-1165. ⁴Tkachuk GA, et al. Headache 2003;43:950-959. ⁵NHF, patient survey, Apr. 2010. ⁶Valade D. Ceph. 2009;29:15-21. ⁷Lipton, RB, et al. Submitted, Headache.

OBJECTIVE

The current study was conducted to extend prior work by assessing healthcare resource utilization (HRU) and estimating direct healthcare costs as a function of nausea frequency in persons with episodic migraine (EM).

METHODS

- ICHD-2 criteria were used to identify respondents with EM (<15 headache days/month) using 2009 AMPP survey symptom data.
- Respondents rated headache-related nausea as occurring *none of the time*, *rarely*, *< half the time*, or *≥ half the time* with their headaches and provided data from the preceding 12 months on outpatient and inpatient medical encounters, as well as lifetime CT scan and MRI testing. Cost estimates were obtained from public sources (Table 2).
- The trend for the effect of increasing nausea frequency on one or more visits vs. no visits to healthcare providers was assessed using generalized linear models (GLM) with a binomial distribution. Corresponding trend odds ratios (OR) and 95% confidence intervals (CI) were generated for each utilization variable.
- A second set of regression analyses were conducted where sociodemographics (age, gender, income, race, household size, region) and a symptom severity composite score (sum of ratings for unilateral pain, pulsatile pain, pain worsened by activity, photophobia, phonophobia) were added as covariate adjustments.

CONCLUSIONS

- These results extend previous observations from AMPP data showing an association between frequent headache-related nausea and high symptom burden and disability, even after controlling for demographics and symptom severity (Lipton RB, et al. Submitted, Headache). Herein, we show that frequent nausea is associated with elevations in the direct costs of medical care.
- Estimated annual per person direct care costs for headache among persons reporting headache-related nausea *≥ half the time* versus *never* were 1.7 times higher for PCP/OB-GYN visits, 2.2 times higher for neurology/headache specialist visits, 5.4 times higher for ED/UC visits, and 8.2 times higher for overnight hospital stay costs. The trends in utilization and costs are particularly concerning given that half (49.5%) of this US population-based sample of migraineurs fell in the highest nausea frequency category (nausea *≥ half the time*).
- Longitudinal analyses have also been completed to assess the impact of persistent headache-related nausea on disease burden and outcomes.

RESULTS

- The sample included 11,792 severe headache sufferers; 6,448 met ICHD-2 criteria for EM and provided nausea frequency data. Demographics (Table 1) were generally similar across nausea subgroups. The majority of respondents were female, Caucasian, ≥ 35 years of age, and evenly distributed across household income categories. 49.5% reported frequent nausea with headache.
- Frequent nausea was associated with significantly ($p < .05$) more HRU for all categories (Table 3) except pain clinic, mental health and chiropractic/acupuncture/other alternative care visits, even after adjusting for demographic and symptom severity covariates.

Table 2. HRU Costs, Data Sources and Past 12-Month Mean Number of Healthcare Encounters, Hospital Stays and Lifetime Diagnostic Testing; Data Used to Calculate Mean Yearly Cost per Respondent (Base is the Total N for Each Nausea Group).

Healthcare Encounter Type	Description of Services	Cost†	Nausea Frequency Group (%)			
			Never n=446	Rarely n=942	<Half the Time n=1,887	≥Half the Time n=3,213
			Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Primary Care visit/OBGYN Physician visit	*Office visit established patient level III	\$66	0.18 (0.76)	0.25 (0.97)	0.30 (0.96)	0.50 (1.61)
Nurse Practitioner or Physician's Assistant visit	*Office visit established patient that may not require presence of physician	\$19	0.02 (0.25)	0.04 (0.4)	0.05 (0.39)	0.09 (0.67)
Neurologist/Headache Specialist visit	*Office visit established patient level IV	\$98	0.07 (0.48)	0.13 (0.72)	0.09 (0.52)	0.22 (1.1)
Pain Specialist visit	*Injection, diagnostic, or therapeutic substances	\$99	0.03 (0.59)	0.03 (0.55)	0.05 (0.59)	0.06 (0.79)
Mental Health visit	*Psychologist (60 min.), Psychiatrist (30 min.), Social Worker (60 min)	\$74	0.03 (0.58)	0.06 (0.63)	0.06 (0.83)	0.07 (0.82)
Chiropractic/Acupuncture or other Alternative Care	*For headache/pain (15 min.)	\$35	0.29 (2.48)	0.46 (2.92)	0.38 (2.65)	0.38 (2.82)
Emergency Department/Urgent Care Visit	**For migraine	\$447	0.03 (0.26)	0.06 (0.71)	0.07 (0.78)	0.22 (1.71)
Overnight Hospital Stay	**Daily cost for migraine	\$2,819	0.01 (0.08)	0.02 (0.25)	0.03 (0.47)	0.06 (0.89)
CT Scan	*+Head or brain without contrast (includes professional and technical cost components)	\$239	NA	NA	NA	NA
MRI	*+Brain/Brain stem without contrast (includes professional and technical costs components)	\$424	NA	NA	NA	NA

†Based on CPT-4 coding, Current procedural terminology, 4th edition; MAG Mutual Physician's Fee and Coding Guide
 **Based on ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; Health Care Utilization Project
 †Centers for Medicare & Medicaid
 †Unit cost estimates presented in 2010 USD

Table 3. Headache-Related Healthcare Utilization by Nausea Frequency Group for Office Related Services and for Hospital and Diagnostic Related Services (N=6448).

Healthcare Encounter Frequency	Nausea Frequency Group (%)				Unadjusted Odds Ratios For Trend (95% CI) [p value]	Adjusted* Odds Ratios For Trend (95% CI) [p value]
	Never n=446	Rarely n=942	<Half the Time n=1,887	≥Half the Time n=3,213		
Office-based Healthcare Provider Services						
Primary Care/Obstetrics-Gynecology % with ≥1 Visit in Past 12 Months	8.8	11.2	15.8	20.6	1.41 (1.30, 1.52) [<0.001]	1.33 (1.22, 1.45) [<0.001]
Nurse Practitioner/Physician Assistant % with ≥1 Visit in Past 12 Months	0.7	2.0	2.5	3.8	1.52 (1.25, 1.85) [<0.001]	1.41 (1.14, 1.74) [<0.01]
Neurologist/Headache Specialist % with ≥1 Visit in Past 12 Months	3.1	6.2	4.6	8.2	1.33 (1.18, 1.51) [<0.001]	1.17 (1.03, 1.34) [<0.05]
Pain Clinic % with ≥1 Visit in Past 12 Months	0.5	1.0	1.4	1.6	1.31 (1.01, 1.71) [<0.05]	1.26 (0.95, 1.68) [=0.107]
Mental Health % with ≥1 Visit in Past 12 Months	0.2	1.4	1.1	1.2	1.17 (0.89, 1.53) [=0.266]	1.21 (0.90, 1.62) [=0.198]
Chiro/Acup/Alternative Medicine % with ≥1 Visit in Past 12 Months	3.3	5.4	5.5	5.9	1.12 (0.99, 1.27) [=0.065]	1.03 (0.90, 1.18) [=0.627]
Hospital and Diagnostic Related Services						
Emergency Dept/Urgent Care Visit % with ≥1 Visit in Past 12 Months	1.9	2.5	3.0	7.3	1.85 (1.56, 2.19) [<0.01]	1.74 (1.46, 2.09) [<0.001]
Overnight Hospital Stay % with ≥1 Stay in Past 12 Months	0.7	0.9	0.8	1.8	1.50 (1.12, 2.00) [<0.01]	1.61 (1.17, 2.21) [<0.005]
CT Scan % with Lifetime Scan	36.5	37.2	35.0	43.4	1.14 (1.08, 1.20) [<0.001]	1.10 (1.03, 1.16) [<0.005]
MRI % with Lifetime Scan	40.1	46.0	42.7	49.5	1.12 (1.06, 1.18) [<0.001]	1.07 (1.01, 1.13) [<0.05]

*Adjusted models include demographics and symptom severity composite score as covariates.

Table 1. Sociodemographic Characteristics of the Sample (N=6,448)

Sociodemographics		Nausea Frequency Group (%)			
		Never n=446	Rarely n=942	<Half the Time n=1,887	≥Half the Time n=3,213
Gender	Male	37.4	28.6	23.2	17.6
	Female	62.6	71.4	76.8	82.4
Age Group	18-24 years	3.8	1.7	2.2	2.0
	25-34 years	10.3	9.1	10.1	9.8
	35-44 years	20.4	21.2	22.7	19.7
	45-54 years	26.7	27.0	28.6	31.8
	55-64 years	24.4	24.9	24.4	25.3
	65+ years	14.3	16.0	11.9	11.4

Figure 1: Office-based Costs per Respondent

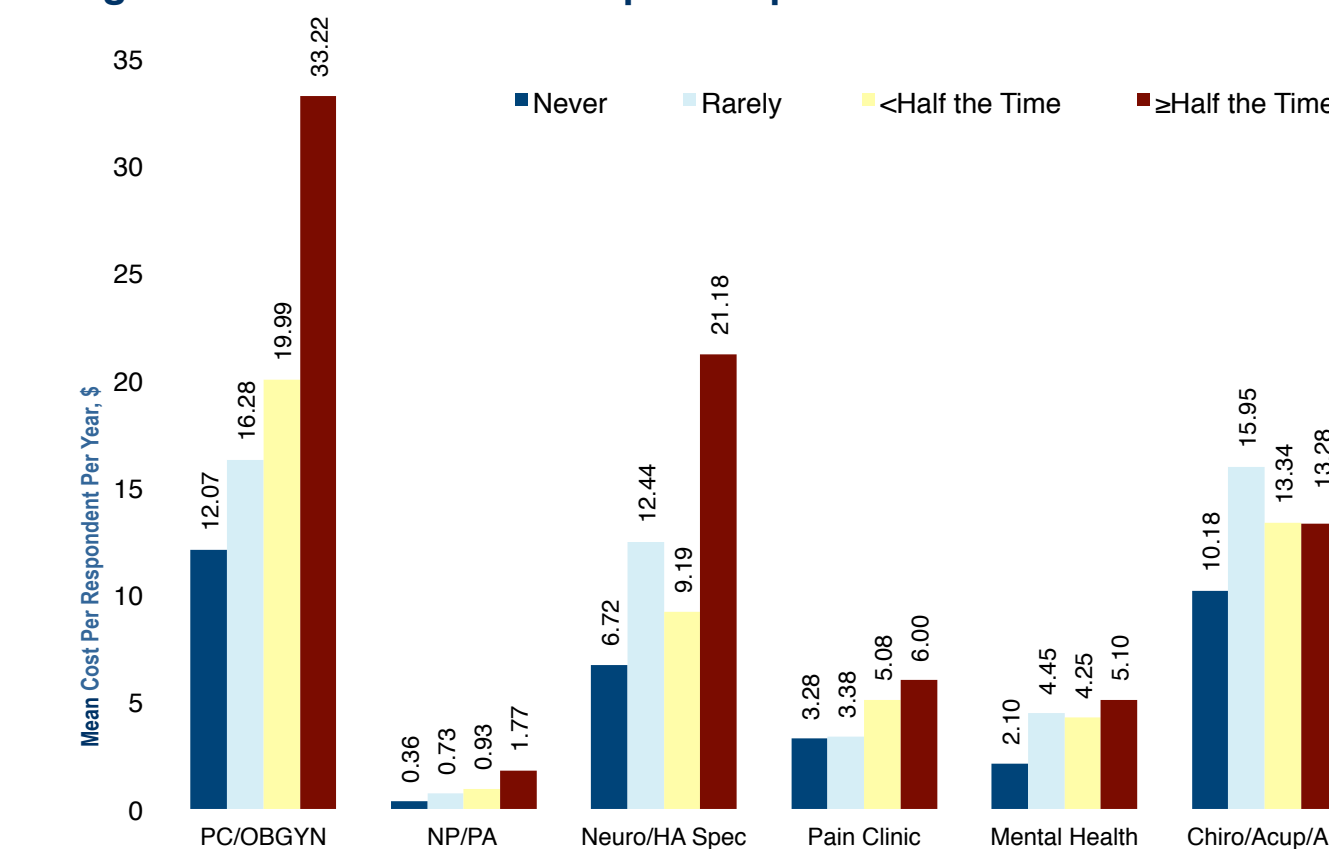


Figure 2: Hospital/Diagnostic Costs per Respondent

