Relation of Headache Frequency to Healthcare Utilization, Work Productivity, and Total Costs: Results from the American Migraine Prevalence and Prevention (AMPP) Study

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Background

- Approximately 12% of the United States (U.S) population experience migraine headaches each year; the majority (63%) have between 1-4 headaches each month, while approximately 14% have more than 4 headaches per month.[1]
- In addition to its detrimental effects on function, health and quality of life, migraine imposes a considerable financial burden on migraineurs, their families, employers and insurers.[2,3]
- Less is known about the incremental economic impact of headache frequency on healthcare resource utilization, work productivity and costs in those with migraine.

Objective

- To assess the impact of headache frequency on healthcare utilization, medication use, productivity loss and total costs.

Methods

AMPP Study

- The American Migraine Prevalence and Prevention (AMPP) study is a 5-year, national, longitudinal survey of headache in the U.S. with three phases:
  1. First phase (2004): a screening survey was developed by a panel of headache and healthcare experts and was mailed to a stratified random sample of 120,000 U.S. households included in the Taylor Nelson Sofres (TNS; formerly National Family Opinion) Consumer Survey Panel - > 600,000 households throughout the U.S., representative of the population in terms of geographic residence, age and head of household, household size, and income.
     - Screener questionnaire: 21 questions to identify headache sufferers, completed by head of household, answering for up to 3 household members. Screener data collected on 162,576 respondents from 120,000 households (age ≥ 12 years), of whom 30,721 respondents identified as headache sufferers.
  2. Second phase (2005): baseline survey mailed to random sub-sample of screener respondents with severe headache (n=24,000).
     - Baseline survey: 60 detailed questions on headache features, frequency, impairment, resource use and productivity loss. A total of 16,577 surveys were returned (69% response rate).
  3. Follow-up phase: consisting of three additional annual questionnaires to survey changes in headache features, frequency, impairment, resource utilization, and productivity loss.

Study Sample

- Identified all screener or baseline survey respondents (age ≥ 18 years) with migraine as defined by the International Classification of Headache Disorders, 2nd Edition (ICHD-2).
- The population of migraineurs was divided into quartiles (1-2, 3-6, 7-16, and 17-365 headache days) based on self-reported headache frequency in the past year.

Survey Data Analysis

- For all migraine cases, evaluated headache-related outcomes reported in the baseline survey: primary care, urgent care, ER, neurologist, and pain clinic visits; hospital nights; medication utilization; and productivity loss (Work and Health Questionnaire).
- Statistical significance of difference across the headache frequency quartiles in terms of participant age, gender, income, geographic region, population density, and insurance status (insured versus uninsured) was assessed using general linear models (GLM) analysis with a multinomial distribution and a cumulative logit link.

Table 1: Demographic Features of Study Sample

	Overall sample (n = 12829)	Headache frequency quartiles (migraines/year) 1 (1-2) (n = 3884)	2 (3-6) (n = 3644)	3 (7-16) (n = 3115)	4 (17-365) (n = 2186)	p-value
	N (%)	N (%)	N (%)	N (%)	N (%)	
Age, years						
18-24	845 (5%)	163 (4%)	141 (5%)	155 (5%)	181 (8%)	<0.01
25-34	2074 (16%)	539 (14%)	417 (16%)	539 (17%)	579 (19%)	
35-44	3063 (24%)	864 (22%)	616 (23%)	809 (26%)	771 (34%)	
45-54	3710 (29%)	1124 (29%)	793 (28%)	889 (29%)	844 (39%)	
55-64	2213 (17%)	773 (20%)	466 (18%)	490 (16%)	485 (15%)	
65-74	802 (6%)	301 (8%)	178 (7%)	158 (5%)	165 (5%)	
75+	327 (3%)	120 (3%)	71 (3%)	75 (2%)	61 (3%)	
Sex						
Male	2744 (21%)	1015 (26%)	527 (20%)	564 (18%)	638 (29%)	<0.01
Female	10085 (79%)	2869 (74%)	2117 (80%)	2551 (82%)	2548 (80%)	
Population density						
<100,000	2166 (17%)	663 (17%)	434 (16%)	533 (17%)	576 (19%)	0.05
100,000-499,999	2360 (18%)	633 (16%)	486 (18%)	554 (18%)	587 (19%)	
500,000-1,999,999	3117 (24%)	992 (26%)	608 (23%)	772 (25%)	745 (23%)	
2,000,000+	5204 (41%)	1606 (41%)	1116 (42%)	1256 (40%)	1276 (40%)	
Household income						
<$22,000	3071 (24%)	927 (24%)	603 (23%)	703 (23%)	838 (26%)	<0.01
$22,500-$39,999	2554 (20%)	726 (19%)	515 (19%)	643 (21%)	670 (21%)	
$40,000-$59,999	2433 (19%)	779 (20%)	499 (18%)	655 (19%)	580 (18%)	
$60,000-$89,999	2406 (19%)	759 (20%)	534 (20%)	577 (19%)	576 (18%)	
$90,000+	2335 (18%)	693 (18%)	533 (20%)	587 (19%)	522 (16%)	
Insurance status						
Insured	10249 (80%)	3171 (82%)	2115 (80%)	2445 (78%)	2518 (79%)	0.01
Uninsured	2580 (20%)	713 (18%)	528 (20%)	670 (22%)	668 (21%)	

Figure 1: Healthcare Utilization

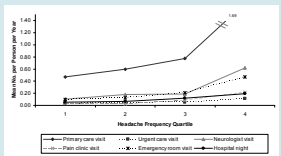
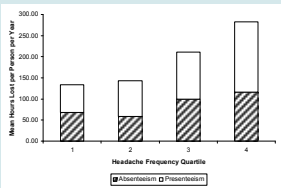


Table 2: Total Costs

	Unit cost	Headache frequency quartiles (headaches / year) 1 (1-2) (n = 3884)	2 (3-6) (n = 3644)	3 (7-16) (n = 3115)	4 (17-365) (n = 2186)
Primary care visit	70.00[a]	32.83	41.33	54.18	118.30
Neurologist visit	115.00[a]	12.08	20.13	21.74	71.65
Pain clinic visit	70.00[a]	2.10	1.75	5.88	14.98
Urgent care visit	70.00[a]	1.96	3.36	3.85	7.98
Emergency room visit	528.00[a]	51.74	68.11	109.30	246.58
Hospital night	1655.00[a]	81.10	110.89	200.26	319.42
Prevention medications	Variable[b]	48.14	52.85	73.11	148.35
Acute non-prescription medications	Variable[b]	38.77	43.69	48.37	74.07
Acute prescription medications	Variable[b]	137.52	208.71	229.19	551.25
Lost productive time	15.78[c]	2122.05	2249.30	3331.66	4462.17
Total mean cost / person / year		**2528.29**	**2800.72**	**4077.54**	**6014.75**

[a] Allowed amounts, PharMetrics analysis
[b] WAC, Redbook
[c] Hourly wage, US Bureau of Labor Statistics

Figure 2: Work Productivity



- Statistical significance of difference across the headache frequency quartiles in terms of the measures of health care resource use, medication use, and productivity loss (controlling for the demographic variables listed above) was assessed using GLM with a negative binomial distribution for resource and medication use and a gamma distribution for productivity loss, each with an inverse log link.

Cost Calculations

- Healthcare resource use unit-cost assumptions were derived from a separate analysis of the PharMetrics Patient-Centric database of U.S. managed care claims, including 866,060 patients with at least one inpatient or outpatient service claim for which migraine or headache was the primary diagnosis from June 2005 to June 2006.
- Medication costs were estimated using wholesale acquisition costs, assumed to be equal to published average wholesale drug prices, discounted by 20%.
- Labor costs were estimated by multiplying hours of lost productive time by the national hourly wage for women aged 25 and older from the U.S. Bureau of Labor Statistics.

Results

Study Sample

- 14,544 screening and baseline study respondents met the ICHD-2 definition of migraine. Of those cases, 12,829 completed the 2005 survey and were included in this analysis.

Demographic Features

- Table 1 outlines the demographic characteristics for the overall migraine population and by self-reported headache frequency quartile.

Healthcare and Medication Utilization

- Higher headache frequency quartile was associated with more nights in hospital and increased visits to primary care, urgent care, pain clinic, emergency room, and neurologists or headache specialists (Figure 1).
- The most commonly cited medications used for headache relief in all 4 quartiles were non-prescription analgesics and NSAIDs, and the most commonly cited prescription medications in all quartiles were the triptans.

Work Productivity

- Lost productive time (but not absenteeism) generally increased progressively in the higher quartiles (Figure 2).

Total Costs

- Average per-person annual total costs, including direct and indirect costs, ranged from $2,528 (lowest quartile) to $6,014 (highest quartile).
- Table 2 presents the cost detail across healthcare resource types, medications, and lost productive time for all four quartiles.

Limitations

- A potential limitation of this study was the possibility of bias associated with the TNS study population. Household panels tend to under-represent the very wealthy and very poor segments of the population and do not include military or institutionalized individuals.
- Although comorbidities may influence migraineurs' health care resource utilization and workplace productivity, the current study was not able to quantify the effect of other health conditions.

Conclusions

- Decreasing headache frequency is associated with positive economic benefits of reduced resource use and productivity loss.
- These benefits should be considered by stakeholders interested in improving migraine outcomes in a cost-effective fashion.

References

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