

Economic Burden of Transformed Migraine (TM): Results From the American Migraine Prevalence and Prevention (AMPP) Study

Julie Munakata,¹ Elisabeth Hazard,¹ Daniel Serrano,² David Klingman,¹ Marcia F.T. Rupnow,³ Jonothan Tierce,¹ Michael Reed,² and Richard B. Lipton⁴

¹IMS Consulting, Falls Church, VA, USA; ²Vedanta Associates, Inc, Chapel Hill, NC, USA; ³Health Economics and Reimbursement, Ethicon, Inc., Summerville, NJ, USA; ⁴Department of Neurology and Department of Epidemiology and Population Health, Albert Einstein College of Medicine and The Montefiore Headache Center, The Bronx, NY, USA

BACKGROUND

- Emerging evidence suggests migraine sometimes progresses to transformed migraine (TM), the most common and challenging subtype of the chronic daily headache disorders^{1,2}
- TM is characterized by headache ≥ 15 days/month and has been associated with adverse health effects (eg, poor sleep, allodynia) and diminished health-related quality of life³⁻⁵
- Little is known about the economic impact of TM

OBJECTIVE

- To evaluate the impact of new-onset TM on healthcare resource utilization and productivity loss in a US population

METHODS

AMPP

- 5-year, national, longitudinal study of headache in the United States
- First phase (2004): screener questionnaire developed by panel of headache and healthcare experts and mailed to a random sample of 120,000 US households in the National Family Opinion (NFO) panel – >600,000 households throughout the United States, representative of population in terms of geographic residence, age of head of household, household size, and household 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
- Second phase (2005): baseline questionnaire mailed to random subsample of screener respondents with headache (n = 24,000)
 - Baseline survey: 60 detailed questions on headache features, frequency, impairment, resource use, and productivity loss. Total of 16,577 surveys returned (69% response rate)
- Third phase (2006): first follow-up questionnaire mailed to a random sample of baseline respondents (n = 20,639)
 - Follow-up survey: 71 detailed questions on headache features, frequency, impairment, resource use, and productivity loss. Total of 14,540 questionnaires returned (70% response rate)

Study Sample

- Identified all screener or baseline survey respondents (age ≥ 18 years) with migraine as defined by International Classification of Headache Disorders, 2nd Edition (ICHD-2)
- These migraine cases were divided into two groups: those who developed TM and those who did not develop TM (migraine) in the 1-year interval between baseline and follow-up surveys
 - TM defined as migraine plus 15 or more headache days per month using ICHD-2 criteria

Analysis

- For all migraine cases, evaluated outcomes reported in follow-up survey:
 - Migraine frequency
 - Headache-related primary care, urgent care, emergency room (ER), neurologist, and pain clinic visits
 - Headache-related hospital nights
 - Productivity loss (MIDAS)⁶
- Compared outcomes between those classified as TM and those classified as migraine:
 - Linear, Poisson, and negative binomial regression models were applied to compare reported outcomes of both groups
 - Item phrasing and examination of item distributions were used to determine proper statistical models for each variable of interest
 - In all analyses, control variables included age, gender, income, population density, geographic region, insurance, and insurance-with-drug-coverage status
- No adjustment for multiplicity was made

RESULTS

Study Sample

- 14,544 screening and baseline study respondents met ICHD-2 definition of migraine
- Of those cases, 7796 completed the follow-up survey and were included in this analysis
 - 359 (4.6%) cases developed TM
 - 7437 (95.4%) cases did not develop TM and thus remained classified as migraine

Demographic Features

- Demographic features of 7796 participants overall and by migraine status are shown in Table 1

Table 1. Demographic Features of Overall Sample and by Migraine Status

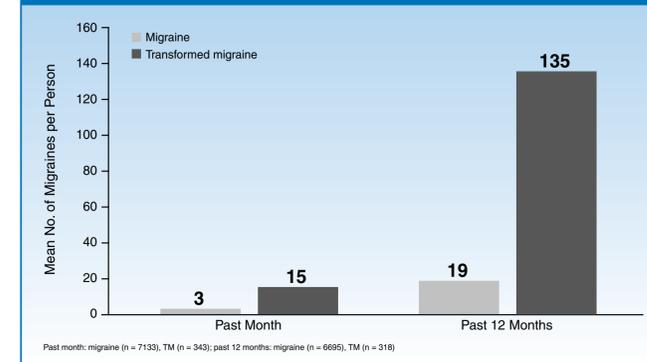
	Overall Sample (N = 7796)	Migraine (n = 7437)	Transformed Migraine (n = 359)	Migraine vs Transformed Migraine
	n (%)	n (%)	n (%)	P Value*
Age, y				
18-24	212 (3)	204 (3)	8 (2)	0.18
25-34	998 (13)	959 (13)	39 (11)	
35-44	1761 (23)	1687 (23)	74 (21)	
45-54	2489 (32)	2369 (32)	120 (33)	
55-64	1588 (20)	1497 (20)	91 (25)	
65-74	549 (7)	528 (7)	21 (6)	
75+	199 (3)	193 (3)	6 (2)	
Sex				
Male	1396 (18)	1321 (18)	75 (21)	0.13
Female	6400 (82)	6116 (82)	284 (79)	
Region				
New England	337 (4)	326 (4)	11 (3)	<0.01
Middle Atlantic	1043 (13)	1008 (14)	35 (10)	
South Atlantic	1534 (20)	1461 (20)	73 (20)	
East North Central	1289 (17)	1208 (16)	81 (23)	
West North Central	593 (8)	564 (8)	29 (8)	
East South Central	626 (8)	604 (8)	22 (6)	
West South Central	875 (11)	844 (11)	31 (9)	
Pacific	962 (12)	922 (12)	40 (11)	
Mountain	537 (7)	500 (7)	37 (10)	
Population density				
<100,000	1386 (18)	1325 (18)	61 (17)	0.20
100,000-499,999	1447 (19)	1365 (18)	82 (23)	
500,000-1,999,999	1824 (23)	1747 (24)	77 (21)	
2,000,000+	3139 (40)	3000 (40)	139 (39)	
Household income				
<\$30,000	2534 (33)	2386 (32)	148 (41)	<0.01
\$30,000-\$49,999	1650 (21)	1587 (21)	63 (18)	
\$50,000-\$74,999	1492 (19)	1416 (19)	76 (21)	
\$75,000+	2120 (27)	2048 (28)	72 (20)	
Insurance status				
Have	6419 (82)	6136 (83)	283 (79)	0.07
Do not have	1377 (18)	1301 (18)	76 (21)	

*P values are based on Pearson chi-square tests.

Migraine Frequency

- Participants with TM reported a significantly higher frequency of migraines in past month (RR = 4.93, 95% CI: 4.38-5.55) and in past 12 months (RR = 7.00, 95% CI: 6.03-8.13) compared with participants with migraine ($P < 0.01$) (Figure 1)

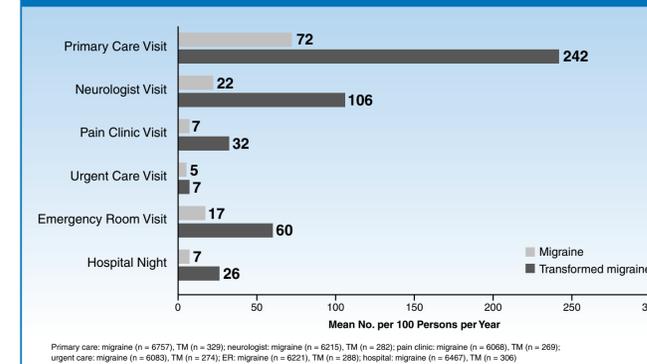
Figure 1. Reported Migraine Frequency by Migraine Status



Healthcare Utilization

- Participants with TM reported significantly more primary care visits (RR = 3.01, 95% CI: 2.36-3.84), neurologist visits (RR = 4.52, 95% CI: 2.66-7.69), pain clinic visits (RR = 4.52, 95% CI: 1.37-14.91), and ER visits (RR = 3.27, 95% CI: 2.78-3.84) ($P \leq 0.01$). Nights in hospital (RR = 3.05, 95% CI: 0.77-12.16) and urgent care visits (RR = 1.35, 95% CI: 0.53-3.43) did not reach statistical significance ($P > 0.05$) (Figure 2)

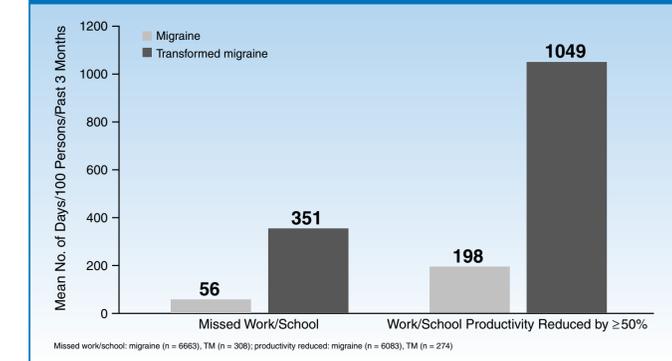
Figure 2. Healthcare Resource Use by Migraine Status



Productivity

- Participants with TM reported significantly more days missed at work or school in previous 3 months because of headaches (RR = 6.56, 95% CI: 4.60-9.35) and more days where work or school productivity was reduced by $\geq 50\%$ in previous 3 months because of headaches (RR = 5.23, 95% CI: 4.10-6.67) ($P < 0.01$) (Figure 3)

Figure 3. Productivity Loss (MIDAS) by Migraine Status



CONCLUSIONS

- Headache-related resource utilization and productivity loss were significantly higher in respondents with TM versus those with migraine
- These data underscore a need to (a) address traditional goals of migraine treatment of relieving pain and restoring patient function and (b) prevent migraine progression
- Further research on cost implications of these findings is needed

REFERENCES

- Lipton RB, Pan J. Is migraine a progressive brain disease? *JAMA*. 2004;291:493-494.
- Dodick DW. Clinical practice: Chronic daily headache. *N Engl J Med*. 2006;354:158-165.
- Cooke L, Eliasziw M, Becker WJ. Cutaneous allodynia in transformed migraine patients. *Headache*. 2007;47:531-539.
- Gathoun AH, Ford S, Finkel AG, Kahn KA, Mann JD. The prevalence and spectrum of sleep problems in women with transformed migraine. *Headache*. 2006;46:604-610.
- Meletiche DM, Lofland JH, Young WB. Quality of life differences between patients with episodic and transformed migraine. *Headache*. 2001;41:573-578.
- 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:S20-S28.

ACKNOWLEDGEMENT

This research was supported by grants from the National Headache Foundation and Ortho-McNeil Janssen Scientific Affairs, LLC, Titusville, New Jersey, USA.