**BACKGROUND**

- Migraine attacks with nausea, compared to those without, are associated with greater pain severity,
  poorer response to oral triptans,
  poor quality of life,
  and greater impairment in functional ability.

- Nausea also adversely affects patients' medication-taking behavior by causing delay or avoidance of oral medications.
  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 mild.

- A recent study of migraine-associated nausea utilized population data from the American Migraine Prevalence and Prevention (AMPP) Survey and compared persons with high-frequency, headache-related nausea vs. those with no/rare nausea.
  Nausea was associated with significantly (p<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:**
  

**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, 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.

**RESULTS**

- The sample included 11,792 severe headache sufferers; 6,448 met ICHD 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<0.05) 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.

**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.

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

<table>
<thead>
<tr>
<th>Sociodemographics</th>
<th>Nausea Frequency Group</th>
<th>Mean Cost Per Respondent Per Year, $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>27.4</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>28.6</td>
</tr>
<tr>
<td></td>
<td>N=1,887</td>
<td>22.2</td>
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<tr>
<td></td>
<td>2nd Time on &lt;35</td>
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<tr>
<td>Age Group</td>
<td>18-44 years</td>
<td>26.7</td>
</tr>
<tr>
<td></td>
<td>25-34 years</td>
<td>19.9</td>
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<tr>
<td></td>
<td>≥35 years</td>
<td>19.9</td>
</tr>
<tr>
<td></td>
<td>45-54 years</td>
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<tr>
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<td>19.9</td>
</tr>
<tr>
<td></td>
<td>≥65 years</td>
<td>19.9</td>
</tr>
</tbody>
</table>

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**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 (n=6,448)**

**Table 3: Headache-Related Healthcare Utilization by Nausea Frequency Group for Office-Related Services and for Hospital and Diagnostic Related Services (n=6,448)**

**Table 4: Office-based Costs per Respondent**

**Table 5: Hospital/Diagnostic Costs per Respondent**

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**Figure 1: Office-based Costs per Respondent**

**Figure 2: Hospital/Diagnostic Costs per Respondent**

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