## Functional limitations and workdays lost associated with chronic rhinosinusitis and allergic rhinitis

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ABSTRACT

Background: Chronic rhinosinusitis (CRS) and allergic rhinitis are associated with functional limitations, but these impacts are not known on a population basis. Our objective was to epidemiologically determine functional limitations and workdays lost that are associated with CRS and allergic rhinitis in adults.

Methods: The Medical Expenditure Panel Survey for calendar year 2007 was examined to identify cases of CRS and allergic rhinitis. Functional limitation variables for activity limitation, work limitation, social limitation, and cognitive limitation determined by the survey also were extracted. Using multivariate models adjusting for age, gender, race, ethnicity, education level, insurance status, geographic region, as well as the Charlson comorbidity index, incremental differences in workdays lost and these functional limitations were determined for patients with and without CRS and allergic rhinitis.

Results: Among 225.1 million adults, the prevalences of CRS and allergic rhinitis were 4.9 ± 0.2% and 7.9 ± 0.3%, respectively. Patients with CRS demonstrated an incremental 1.04 ± 0.3 workdays lost per year along with significant increased adjusted odds ratios for activity limitation (odds ratio, 1.54), work limitation (1.50), and social limitation (1.49, all p < .005) but not cognitive limitation (1.05, p = .213). Patients with allergic rhinitis demonstrated an incremental 0.60 ± 0.45 workdays lost along with significant increased adjusted odds ratios for activity limitation (1.42), work limitation (1.43), social limitation (1.47), and cognitive limitation (1.32, all p < .019).

Conclusions: Both CRS and allergic rhinitis impart significantly increased odds ratios for activity, work, and social limitations. Allergic rhinitis also carries with it statistically significant odds of functional cognitive limitation. The total aggregate workdays missed in the United States may be estimated at 11.5 million workdays and 10.7 million workdays for CRS and allergic rhinitis, respectively.

Neil Bhattacharyya, M.D., F.A.C.S.

METHODS

The data source for this study consisted of the Medical Expenditure Panel Survey (MEPS) for 2007 as administered by the Agency for Healthcare Research and Quality under the U.S. Department of Health and Human Services. The MEPS is an overlapping panel design survey following a nationally representative sample of the U.S. civilian, noninstitutionalized population over the course of 2 years.10 The MEPS household component contains detailed self-reported information on demographic and socioeconomic characteristics as well as health conditions, insurance status, use of health care services employment, and missed workdays. Data are obtained at the household level and completed by one household member, who may be a proxy. Upon completion of the household MEPS component, a sample of medical providers are contacted by telephone to obtain supplemental information regarding dates of provider visits, diagnoses and procedure codes, charges and payments. These data are contained in the medical provider component of the MEPS.

This study was reviewed by our hospital’s committee on clinical investigations and designated as exempt from review. In accordance with data access agreements, precautions were taken to avoid individual patient identification. The 2007 household component of the MEPS was merged with the 2007 medical provider component according to the appropriate linkage variables in SPSS 17.0 (Chicago, IL). Because patients may report more than one medical condition, up to 34 medical condition variables were allowed per patient after the data files were merged.

Next, patients were identified as suffering from CRS or AR by examining the ICD9CODX data field for each listed medical condition. This field consists of the three-digit International Classification of Diseases version 9 code for a given medical condition based on an assessment of medical conditions recorded as verbatim text and then coded by a professional coder. Patients for whom any one of the 34 medical condition codes corresponded to 473.x and 477.x were considered as having CRS or AR, respectively; the remaining patients were considered as not reporting either of these two conditions.

Standard demographic information including age and gender distribution was compiled for those patients reporting and not reporting AR. The additional demographic information extracted and compared included race, ethnicity, level of education, insurance status, geographic region, and marital status (Table 1). In addition, the adaptation by D’Hoore et al11 of the Charlson comorbidity index was calculated based on comorbid medical conditions for each subject. This index adjusts for comorbidities that include myocardial infarction, congestive heart failure, peripheral vascular disease, dementia, cerebral vascular disease, asthma, chronic obstructive pulmonary disease, peptic ulcer disease, and liver disease, among others. It allows patients to be compared with “like” patients with similar comorbidities.

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The author has no conflicts of interest to declare pertaining to this article

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The functional limitations categorized herein as activity limitation, work limitation, social limitation, and cognitive limitation are specific queries within the MEPS construct. Although these are dichotomous, self-reported assessments, they have been shown to have good reliability and validity in several disease processes. Furthermore, by using the incremental approach, adjusting for medical comorbidity (with the Charlson comorbidity index) and demographic parameters, we are better able to distill the individual impacts of CRS or AR on these limitations. For example, it is well known that asthma may accompany CRS and/or AR and influence the disease burden. However, the multivariate analysis controls for the presence of asthma (and its potential impact on these limitations, etc.) through the Charlson comorbidity index as a covariate.

It is not surprising that both CRS and AR are associated with significant activity and work limitations. Previous publications have identified a substantial increase in workdays missed due to CRS, which is often remediated after endoscopic sinus surgery. The social limitations associated with CRS and AR may be more complex in nature. Patients often report social embarrassment related to constant rhinorrhea, sneezing, purulent discharge, or vocal congestion in the setting of CRS or AR. In addition, smell disturbances associated with these conditions may further compound social limitations.

One interesting variance between CRS and AR was that AR was associated with a statistically significant odds of cognitive limitation, whereas CRS was not. Anecdotally, patients have often reported in the outpatient clinic various symptoms that resemble cognitive limitations, such as their “head being in the clouds,” difficulty concentrating, and early fatigue of mental capabilities in the settings of both CRS and AR. The objective nature of these symptoms is yet to be discerned. We have found previously that even the nonsedating antihistamines have an increased rate of patient-reported fatigue when used regularly. This is likely a topic for future study.
Table 2  Functional limitations for patients with CRS

<table>
<thead>
<tr>
<th>% Non-CRS patients</th>
<th>SE</th>
<th>% of CRS patients</th>
<th>SE</th>
<th>p</th>
<th>Adjusted odds ratio*</th>
<th>95% CI</th>
</tr>
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<tr>
<td>Activity limitation</td>
<td>11.7</td>
<td>0.3</td>
<td>13.3</td>
<td>1.4</td>
<td>.001</td>
<td>1.54</td>
</tr>
<tr>
<td>Work limitation</td>
<td>10.6</td>
<td>0.3</td>
<td>12.0</td>
<td>1.3</td>
<td>.005</td>
<td>1.50</td>
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<tr>
<td>Social limitation</td>
<td>7.2</td>
<td>0.2</td>
<td>9.0</td>
<td>1.0</td>
<td>.004</td>
<td>1.49</td>
</tr>
<tr>
<td>Cognitive limitation</td>
<td>6.2</td>
<td>0.2</td>
<td>6.0</td>
<td>0.8</td>
<td>.213</td>
<td>1.22</td>
</tr>
</tbody>
</table>

*Odds ratio adjusted for age, Charlson comorbidity index, gender, insurance, degree, region, marital status, and race and ethnicity.

Table 3  Functional limitations for patients with AR

<table>
<thead>
<tr>
<th>% Non-AR patients</th>
<th>SE</th>
<th>% AR patients</th>
<th>SE</th>
<th>p</th>
<th>Adjusted odds ratio*</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity limitation</td>
<td>11.4</td>
<td>0.3</td>
<td>15.3</td>
<td>1.1</td>
<td>&lt;.001</td>
<td>1.42</td>
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<tr>
<td>Work limitation</td>
<td>10.4</td>
<td>0.3</td>
<td>13.9</td>
<td>1.0</td>
<td>&lt;.001</td>
<td>1.43</td>
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<tr>
<td>Social limitation</td>
<td>7.0</td>
<td>0.2</td>
<td>10.4</td>
<td>0.9</td>
<td>&lt;.001</td>
<td>1.47</td>
</tr>
<tr>
<td>Cognitive limitation</td>
<td>6.1</td>
<td>0.2</td>
<td>7.7</td>
<td>0.7</td>
<td>.019</td>
<td>1.32</td>
</tr>
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</table>

AR = allergic rhinitis.

*Odds ratio adjusted for age, Charlson comorbidity index, gender, insurance, degree, region, marital status, and race and ethnicity.

Finally, the number of workdays missed at the population-based level associated with CRS or AR deserves some scrutiny. Although on average one or fewer days was missed in association with CRS or AR, when evaluated at the population level this is a substantial figure. Given the prevalence of CRS and AR, aggregate workdays missed in the United States would be estimated as 11.5 million workdays and 10.7 million workdays for CRS and AR, respectively. These figures further emphasize the substantial societal burden of these upper respiratory diseases.

The use of the MEPS database for the study of disease impact has been explored in several other conditions, including asthma, diabetes, and spine/back problems, and it is widely felt to be reliable. However, several limitations of this database for the current study merit mention. First, patients with CRS or AR were identified by a International Classification of Diseases version 9 diagnosis code. This methodology, in turn, depends on the accuracy of the diagnosis code relative to the actual presence of CRS or AR. It is possible that incorrect diagnosis codes were ascribed to patients not truly suffering from CRS or AR; this may artificially inflate the perceived limitations associated with these illnesses. A second limitation is that data for the household component of the MEPS are completed by one household member who may be a proxy, which may afford inaccuracies in reporting. Survey data are subjected to postcollection checks for consistency by survey administrators. Furthermore, the current method’s linking of the household component to the medical provider component (collected independently from the proxy household member) serves as a secondary check for accuracy of reporting and code.

CONCLUSION

Both CRS and AR impart significantly increased odds ratios for activity, work, and social limitations. CRS is associated with more workdays lost than is AR. However, AR carries with it a statistically significant odds ratio for functional cognitive limitation. Additional work on a population-based scale will be required to better understand the societal impact of these limitations in the setting of these commonly prevalent conditions.

REFERENCES


