Quality of Life and Economic Burden of Respiratory Disease in Asia-Pacific—Asia-Pacific Burden of Respiratory Diseases Study

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A B S T R A C T

Objectives: Asia-Pacific Burden of Respiratory Diseases is a cross-sectional, observational study examining the burden of disease in adults with respiratory diseases across six countries. The aim of this study was to describe health care resource use (HCRU), work impairment, cost burden, and health-related quality of life (HRQOL) associated with respiratory disease in the Asia-Pacific. Methods: Consecutive participants aged 18 years or older with a primary diagnosis of asthma, allergic rhinitis, chronic obstructive pulmonary disease, or rhinosinusitis were enrolled. Participants completed a survey detailing respiratory symptoms, HCRU, work productivity and activity impairment, and HRQOL. Locally sourced unit costs for each country were used in the calculation of total costs. Results: The study enrolled 5250 patients. Overall, the mean annual cost for patients with a respiratory disease was US $4191 (SGD 8489) per patient. For patients who reported impairment at work, the mean annual cost was US $7315 (SGD 10,244), with productivity loss being the highest cost component for all four diseases (US $6310 [SGD 9100]). On average, patients were impaired for one-third of their time at work and 5% of their work time missed because of respiratory disease, which resulted in a 36% reduction in productivity. Patients with a primary diagnosis of chronic obstructive pulmonary disease had the greatest impact on HRQOL. Conclusions: In the Asia-Pacific, respiratory diseases have a significant impact on HCRU and associated costs, along with work productivity. Timely and effective management of these diseases has the potential to reduce disease burden and health care costs and improve work productivity and HRQOL.

Keywords: allergic rhinitis, asthma, COPD, cost of illness, health care costs, quality of life, respiratory disorders, rhinosinusitis.

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Introduction

Chronic respiratory diseases account for 4 million deaths annually and 4% of the global burden of chronic diseases [1]. Asthma, allergic rhinitis (AR), chronic obstructive pulmonary disease (COPD), and rhinosinusitis are among the respiratory diseases that have very high global morbidity and mortality [1]. These preventable chronic respiratory diseases have a major adverse impact on quality of life (QOL), disability, and productivity, and result in a substantial economic burden for both the individual and the community. To optimize the use of health care resources for respiratory diseases, an understanding of health care resource use (HCRU), associated costs, and health-related quality of life (HRQOL) related to the treatment of respiratory diseases is fundamental.

Previous research in predominantly US and European populations has demonstrated a high disease burden associated with respiratory diseases [2–6]. For AR, asthma, and rhinosinusitis, medication use was found to be a major driver of costs [2–4,6], whereas for COPD, hospitalizations have had a high impact on costs [5]. These respiratory diseases also impact costs outside the health care system, with lost work productivity among adult patients being a significant component of overall costs [2,5,7]. In addition, chronic respiratory diseases can negatively impact HRQOL, with inadequate control of symptoms and increased disease severity correlated with worsening HRQOL [8–10].

Conflicts of interest: The authors have indicated that they have no conflicts of interest with regard to the content of this article. Rab Faruqi was an employee of Merck & Co., Inc. when this study was conducted and has since retired.

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Despite the enormous socioeconomic impact of these diseases on HCRU, costs, and HRQOL, there are limited data examining the disease burden of common respiratory diseases using a standardized approach in the Asia-Pacific region. The Asia-Pacific Burden of Respiratory Diseases study was a cross-sectional, observational study that used a standard protocol to examine the disease and economic burden of AR, asthma, COPD, and rhinosinusitis across India, Korea, Malaysia, Singapore, Taiwan, and Thailand. Here, we describe the economic burden of respiratory disease, including HCRU, cost, work impairment, and HRQOL associated with asthma, AR, COPD, and rhinosinusitis.

Methods

Study Design

This was a cross-sectional, multicountry, observational study of adult patients with respiratory diseases. Subjects were recruited from a total of 22 sites between October 2012 and October 2013 during a routine visit to a health care provider which included primary and specialist care physicians, outpatient/polyclinics, or medical centers depending on the health care setting in each country. Possible reasons for patients’ medical visit related to their new or existing primary diagnosis of respiratory disease included physical, diagnostic, therapeutic, and/or nontherapeutic reasons. All study procedures took place during a single study visit. The study was approved by an appropriate ethics committee in each jurisdiction.

Patients

Consecutive adult patients receiving care for a respiratory disease during a routine consultation were screened for eligibility. Eligible patients were those aged 18 years and older, receiving care for a primary diagnosis of asthma, AR, COPD, or rhinosinusitis. Subjects were excluded if they had participated in any interventional clinical study within 12 weeks of entering the present study. Eligible patients were invited to participate in the study, and informed consent was obtained from each patient. A patient could participate in the study only once, and no follow-up visits were recorded.

Data Collection

During the study visit, physicians completed a physician survey relating to the patient’s respiratory diagnosis, referrals to other medical services, medication use 4 weeks before the study visit, and medication prescribed at the current visit. Consenting patients completed the patient survey, which included questions relating to general demographic characteristics, respiratory symptoms, HCRU, work productivity, and HRQOL. HCRU included the number of visits in the previous 4 weeks to a general practitioner (GP), medical specialist, alternative and traditional medicine practitioner, pharmacist, and emergency department and for hospital admissions.

Work productivity was assessed using the Work Productivity and Activity Impairment—Specific Health Problem (WPAI-SHP) questionnaire [11]. The WPAI-SHP questionnaire measures both the amount of absenteeism (work time lost), presenteeism (lost on-the-job productivity), and daily activity impairment attributable to a specific health problem. The WPAI outcomes were expressed as impairment percentages, with higher numbers indicating greater impairment and less productivity. The recall period in this questionnaire was 7 days.

Generic HRQOL was assessed by using the 12-item Short-Form Health Survey (SF-12) [12]. The physical and mental health component physical component summary [PCS] and mental component summary [MCS]) summary scores were presented on a scale of 0 (lowest) to 100 (highest), with scores better than 50 indicating better HRQOL than the general population and vice-versa. The recall period in this instrument was 4 weeks. According to their primary diagnosis, each patient completed one of the following disease-specific HRQOL instruments: the Mini Asthma Quality-of-Life Questionnaire (miniAQLQ) for asthma [13], COPD Assessment Test (CAT) for COPD [14], or Sino-Nasal Outcomes Test-20 (SNOT-20) for rhinosinusitis [15]. The miniAQLQ was scored from 1 to 7 for both an overall summary score and a score for each of the domains, with higher scores indicating less functional impairment due to asthma. The CAT was scored from 0 to 40, with higher scores indicating greater impact on a patient’s life due to COPD. The SNOT-20 score range was 0 to 5, with higher scores indicating greater health burden related to rhinosinusitis.

Costing

A broad societal perspective was adopted for the cost analysis and as such costs were collected on the basis of government, patient, and insurance provider contributions to total costs. Local unit costs were used for each of the six countries (see Appendix Table 3 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2015.11.004). Average costs were calculated using the unit cost of the HCRU item multiplied by HCRU reported in the previous 4 weeks, plus the current visit to the GP or specialist. To find the cost for each medication class, one medication, representative of the most commonly prescribed medication for the respiratory disease, was identified and costs were sourced from each country. Dosing and duration of medication use were according to therapeutic guidelines (see Appendix Table 4 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2015.11.004). Lost productivity costs were calculated by multiplying the overall productivity lost obtained from the WPAI-SHP questionnaire with the average monthly wage for each country [16] (see Appendix Table 5 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2015.11.004). Four-week costs were multiplied by 13 to estimate annual costs, and were presented in 2014 US dollars.

Statistical Analysis

Statistical analyses were performed using SAS version 9.3 (SAS Institute Inc., Cary, NC).

Results

A total of 13,902 patients were screened, of which 7,030 (50.6%) were diagnosed with diseases of interest—asthma, AR, COPD, or rhinosinusitis—and were eligible to enroll in the study. Of the eligible patients, 5250 (74.7%) consented and enrolled in the study. Of the enrolled patients, the percentage of patients visiting primary health care was 53.3%. The highest percentage of patients receiving care for a respiratory disorder had a primary diagnosis of AR (14.0%), followed by asthma (13.5%), rhinosinusitis (5.4%), and COPD (4.9%) (for more details, see Appendix Table 3 in Supplemental Materials). Twenty-one percent of the patients (n = 1087) were newly diagnosed with the primary diagnosis at the study visit, whereas 79% of the patients (n = 4163) had an existing diagnosis. The mean age of enrolled patients was 48.8 ± 17.55 years, with 53% being women. The highest proportion of patients (28%) was of Chinese ethnicity (see Appendix Table 2 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2015.11.004).
Enrolled patients reported their HCRU associated with their main respiratory symptom in the 4 weeks before the medical visit (Fig. 1). The percentage of patients and the mean number of visits to a GP (results not shown) were similar for all four diseases. Patients with a primary diagnosis of AR (31.7%) or rhinosinusitis (37.3%) were more likely to visit a specialist than were patients with a primary diagnosis of asthma (17.4%) or COPD (18.0%). A higher percentage of patients with a primary diagnosis of asthma (2.5%) or COPD (2.8%) visited an emergency department than did patients with AR (0.4%) or rhinosinusitis (1.9%). Patients with a primary diagnosis of COPD were the most likely to be admitted to the hospital (3.5%).

Medication use was high, with 79% of the patients prescribed medicines in the 4 weeks before the current visit (Fig. 2) and 97% prescribed medicines at the visit (see Appendix Figure 5 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2015.11.004). Patients with a primary diagnosis of COPD reported the highest previous medication use (91%), followed by asthma (87%), AR (71%), and rhinosinusitis (67%). The most frequently used medication for patients with asthma was beta agonists and for patients with COPD was methylxanthine. Patients with AR and rhinosinusitis most frequently used antihistamines.

Patients completed the WPAI-SHP questionnaire to assess the impact of AR, asthma, COPD, and rhinosinusitis on activity impairment and work productivity loss (Fig. 3). Percentage activity impairment was reported by most of the patients (n = 5248), with a mean score of 35.8% ± 27.56%. Presenteeism (percentage impairment at work), absenteeism (percentage work time missed), and overall work productivity loss were also reported by most of the patients who were enrolled (n = 2346 full-time; n = 313 part-time). Overall, mean percentage impairment at work was 33.9% ± 27.28% (range 0–100), work time missed was 5.1% ± 14.81% (range 0–100), and overall productivity loss was 36.0% ± 28.31% (range 0–100). Scores on average were similar across all conditions.

Total costs by primary diagnosis are summarized in Fig. 4 (further details of health care professional costs and medication costs are presented in Appendix Tables 6 and 7 in Supplemental Materials found at http://dx.doi.org/10.1016/j.vhri.2015.11.004). Overall, the mean annual cost for patients with a respiratory disease was US $4191 (SGD 8489) per patient. For patients who reported impairment at work as a result of the disease, the mean annual cost was US $7,315 (SGD 10,244), with productivity loss being the highest cost component for all four diseases (US $6310 (SGD 9100)). The biggest contributor to direct medical costs was medication use for patients with a primary diagnosis of COPD (60% of direct medical costs), asthma (53%), AR (37%), and rhinosinusitis (35%). The main driver of direct nonmedication costs was hospitalizations for patients with a primary diagnosis of rhinosinusitis (28%), asthma (24%), and COPD (23%), whereas specialist visits was the main driver for patients with a primary diagnosis of AR (28%). Patients with a primary diagnosis of COPD had the highest direct medical costs.

Disease-specific HRQOL is summarized in Table 1. For patients with a primary diagnosis of asthma, the mean miniAQLQ total score was 4.8 ± 1.2, indicating moderate to small asthma-related health impact. Environmental stimuli had the largest impact on QOL (4.2 ± 1.53). Among patients with a primary diagnosis of COPD, 43% were in the very high/high range (>20, meaning COPD stops them from doing anything or most things that they want to do), 34% were in the high range (10–20), and 23% were in the low range. Overall, mean CAT scores were in the medium range (10–20). For patients with a primary diagnosis of rhinosinusitis, the mean SNOT-20 score was 1.8 ± 1.02, indicating mild to very mild rhinosinusitis-related health impact.

The mean SF-12 PCS and MCS scores were below average (i.e., 50) for patients who presented with a primary diagnosis of AR,
Fig. 2 – History of medication use for respiratory disease in the 4 wk before the medical visit by primary diagnosis.

Fig. 3 – Mean ± SD WPAI scores by primary diagnosis. COPD, chronic obstructive pulmonary disease; WPAI, work productivity and impairment.

Fig. 4 – Annual direct and indirect costs for study population by primary diagnosis. Work productivity costs were calculated only for those patients who reported impairment at work as a result of the disease. COPD, chronic obstructive pulmonary disease; GP, general practitioner.
Table 1 – QOL scores for patients with a primary diagnosis of asthma (miniAQLQ), COPD (CAT), and rhinosinusitis (SNOT-20).

<table>
<thead>
<tr>
<th>Primary diagnosis, QOL instrument</th>
<th>Total, mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma, miniAQLQ (N = 1870)</td>
<td></td>
</tr>
<tr>
<td>Symptoms</td>
<td>4.8 ± 1.35</td>
</tr>
<tr>
<td>Activity limitations</td>
<td>5.2 ± 1.43</td>
</tr>
<tr>
<td>Emotional function</td>
<td>4.8 ± 1.58</td>
</tr>
<tr>
<td>Environmental stimuli</td>
<td>4.2 ± 1.53</td>
</tr>
<tr>
<td>Total score</td>
<td>4.8 ± 1.20</td>
</tr>
<tr>
<td>COPD, CAT* (N = 685)</td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>17.5 ± 8.76</td>
</tr>
<tr>
<td>Rhinosinusitis, SNOT-20† (N = 744)</td>
<td></td>
</tr>
<tr>
<td>Total score</td>
<td>1.8 ± 1.02</td>
</tr>
</tbody>
</table>

CAT, COPD Assessment Test; COPD, chronic obstructive pulmonary disease; miniAQLQ, Mini Asthma Quality-of-Life Questionnaire; QOL, quality of life; SNOT-20, Sino-Nasal Outcomes Test-20.

*Higher number indicates lower asthma-related health impact (range 1–7). Recall period of 2 wk.
†Higher number indicates higher COPD-related health impact (range 0–40). Score of 0–10 indicates that COPD stops them from doing one or two things that they want to do; score of 10–20 indicates that COPD is one of the most important problems in the patients’ lives; score of >20 indicates that COPD stops them from doing anything or most things that they want to do.
‡Higher number indicates higher rhinosinusitis-related health impact (range 0–5). Recall period of 2 wk.

Discussions

This study used a standard methodology to examine the economic burden of four highly prevalent respiratory diseases in the Asia-Pacific region. Results of the study showed that respiratory diseases have a substantial impact on costs associated with HCRU and work productivity and a moderate impact on HRQOL. The mean annual cost for patients with a respiratory disease was US $22 million for the entire study sample.

The biggest contributor to direct medical costs was medication use. Although an infrequent event, hospitalizations were also associated with a high level of costs, especially for patients with a primary diagnosis of asthma, COPD, and rhinosinusitis. Previous research has shown similar findings for asthma and COPD in the Asia-Pacific region [17–19]. A multicountry study of the economic burden of asthma in Asia-Pacific found maintenance costs (e.g., routine medication and GP/specialist visits) to be the main driver of asthma-related costs. Poor asthma management, however, was associated with higher urgent care costs [5]. In addition, countries with the highest level of symptom control and medication use had the lowest costs associated with hospitalizations [5]. This suggests that identifying the main underlying symptoms of disease and optimizing treatment are important in reducing downstream high-cost events such as hospitalizations.

When expressed as a percentage of average wages, the economic burden of direct health care costs was the greatest in countries with lower yearly wages (India 28% of average wage, Thailand 17%, Malaysia 16%, Taiwan 7%, Korea 4%, and Singapore 2%). Note that the economic burden calculated is based on average wage; patients on lower wages, however, would be disproportionately impacted. Interestingly, when societal costs were considered, there was less variation across countries (39–71% of average wage). This can be primarily attributed to lost work productivity rather than direct health care costs being the biggest contributor to overall costs for all four diseases.

The present study showed a much higher impact on societal costs than did previous studies in the Asia-Pacific region, which considered only lost productivity due to time off work [17]. The WPAI scores in the present study indicated that most of the patients still attended work with their illness but had severely impacted productivity at work. The WPAI scores were similar to those in previous studies in AR [20] and asthma [21]. Reilly et al. [20] reported that adult participants with AR from the United States reported low absenteeism (1.7%) but overall work impairment ranged from 35% to 40% of normal productivity. In a survey of European adult participants with asthma, overall productivity was reduced by 19.3% to 36.2%, depending on whether the asthma was well-controlled or not well-controlled [21]. Therefore, the effect of AR and asthma on work productivity in adults in the Asia-Pacific region is comparable to that on US and European populations. In contrast, a multicountry study of COPD [22] reported a lower impact on overall work productivity (15.0%) compared with the present study (34.5%). Notably, the participants were younger and had less severe COPD (only 22% of the patients rated as severe on the Medical Research Council dyspnoea scale compared with 43% reporting very high/high impact on QOL in the present study), which demonstrates the impact of disease severity on overall work productivity.

The SF-12 PCS and MCS scores and the disease-specific HRQOL scores indicated a moderate to small impact on patients’ HRQOL for patients with a primary diagnosis of AR, asthma, and rhinosinusitis, whereas the impact was greater for patients with a primary diagnosis of COPD. The findings were similar to those reported for patients with asthma in the European Community Respiratory Health Survey [23] as well as for patients with rhinosinusitis visiting specialist clinics in the United States [15]. Interestingly, previous research has shown that appropriate and careful management of cough significantly improves mental and physical aspects of HRQOL [24,25]. We previously reported that patients with respiratory disorders frequently report cough as their main reason for visiting a health care provider [26]. Taken together, this highlights the importance of appropriate disease management of cough in improving HRQOL in patients with respiratory diseases.

There were several limitations associated with this study. Only patients visiting primary and specialist care clinics were recruited in the study. It is likely that patients recruited from hospitals have more severe disease, lower HRQOL, and higher HCRU and costs. Hospitalizations were an infrequent event with high associated costs. As such, there may be considerable variability around the estimates provided. Work productivity loss, which was the highest contributor to the total cost, was patient-reported and therefore subject to recall bias. The calculation of costs also does not consider opportunity costs for HCRU. The dosing and duration of the medications were based on clinical information relevant to clinical guidance documents for each of the respiratory diseases; nevertheless, clinical and practice guidelines may have varied from country to country. Finally, disease-specific HRQOL for patients with a primary diagnosis of AR was not assessed because of the lack of current availability of a standardized instrument in the necessary languages.

The study showed that there is a high economic burden of respiratory diseases in the Asia-Pacific region. This is reflected not only in the direct cost to the health care system of HCRU and
medications, which is considerable, but also in the greater economic cost to the country in lost productivity. As such, medical interventions that prevent lost work productivity are likely to greatly reduce the economic impact of respiratory diseases. Timely identification of symptoms and effective disease management have the potential to reduce disease burden, health care costs, and loss of work productivity associated with respiratory diseases.

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Supplemental Materials

Supplemental material accompanying this article can be found in the online version as a hyperlink at http://dx.doi.org/10.1016/j.vhri.2015.11.004 or, if a hard copy of article, at www.valueinhealthjournal.com/issues (select volume, issue, and article).

REFERENCES