

Allergic rhinitis: Direct and indirect costs

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ABSTRACT

Allergic rhinitis is one of the most common conditions affecting both children and adults. Along with the burden of the disease and decrease in quality of life associated with allergic rhinitis, there are high costs related to the disorder. Costs due to allergic rhinitis can be divided into two categories: direct costs that are related to monies spent on the course of managing the disease and indirect costs that are due to missing work and decreased productivity due to the illness. There are also the costs associated with the comorbidities of allergic rhinitis, such as sinusitis and asthma, which are classified as "hidden" direct costs. Management of allergic rhinitis involves allergen avoidance, proper pharmacologic therapies, and allergen immunotherapy. These treatments add to the direct cost of the condition and need to be evaluated to determine their cost-effectiveness in the control of the patient's nasal allergies. This article reviews the latest data on cost issues in allergic rhinitis and information of cost-effectiveness of treatments for this condition.

(Allergy Asthma Proc 31:375–380, 2010; doi: 10.2500/aap.2010.31.3329)

Key words: Absenteeism, allergic rhinitis, cost-effectiveness, costs, direct costs, immunotherapy, indirect costs, presenteeism, productivity, quality-adjusted life years

Allergic rhinitis is one of the most common chronic conditions observed in the pediatric and adult population. Patients with this malady suffer with repetitive sneezing, nasal itching, rhinorrhea, and nasal congestion. Allergic rhinitis affects 35–50 million people in the United States with its frequency continuing to increase especially in the younger population. Although there is no mortality associated with allergic rhinitis, there is significant morbidity. This condition has a major effect on the patient's quality of life, leads to sleep impairment, and is associated with comorbidities such as conjunctivitis, asthma, and sinusitis.^{1,2} Work by Marple *et al.* showed 59% of patients consider their allergic rhinitis symptoms to be moderate or severe and 20% of patients believe their health care provider does not take symptoms seriously enough.³

An important issue associated with allergic rhinitis is cost of the disease. Because of the large number of people burdened with this disorder, it should not be surprising that it is a high-cost medical condition.⁴ This article will address the latest data on the economic

impact of allergic rhinitis examining both direct and indirect costs in the population.

DIRECT COSTS IN ALLERGIC RHINITIS

Costs in health care can be divided into two major categories, direct and indirect. In allergic rhinitis, direct health care costs encompass the monies spent on the course of managing the disease. This would include medical services, such as physician fees, any laboratory procedures, and allergen skin testing. Other direct costs would include the monies spent on pharmaceutical agents and allergen immunotherapy. Some direct costs can be nonmedical, including transportation for medical services and monies for research and teaching.

The Household Component of the Medical Expenditure Panel Survey (MEPS-HC) is a nationally representative longitudinal survey that collects detailed information on health care utilization and expenditures, health insurance, and health status, as well as a wide variety of social, demographic, and economic characteristics for the civilian noninstitutionalized population. It is cosponsored by the Agency for Health Care Research and Quality and the National Center for Health Statistics. In May 2008 it published the use of and expenditures for ambulatory care and prescribed medications to treat allergic rhinitis among the U.S. civilian noninstitutionalized population in 2000 and 2005.⁵ This survey analyzed individuals with allergic rhinitis reported as a condition bothering the patient

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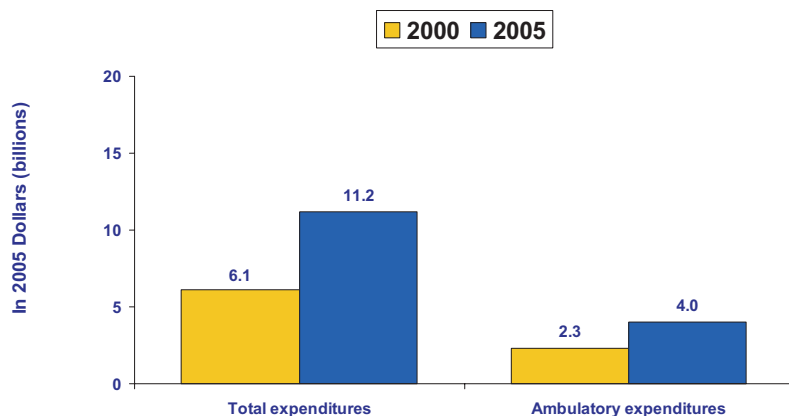
Presented at the preconference symposium of the Eastern Allergy Conference, Palm Beach, Florida, May 6, 2010

Supported by an unrestricted educational grant from Sanofi-Aventis and UCB Pharma. The author has nothing to disclose pertaining to this article.

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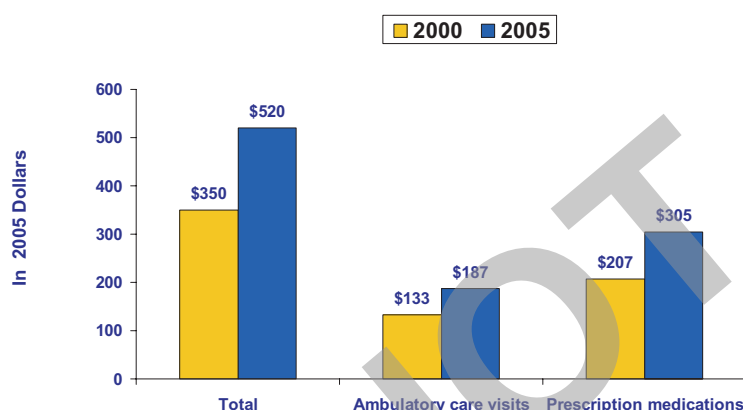
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Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2000 and 2005

Figure 1. Total and ambulatory expenditures on allergic rhinitis, 2000 and 2005. Adjusted for the 2005 value of the dollar. (Source: Ref. 5.)



Source: Center for Financing, Access, and Cost Trends, AHRQ, Household Component of the Medical Expenditure Panel Survey, 2000 and 2005

Figure 2. Mean expenditures on allergic rhinitis per person with expense, by type of service, 2000 and 2005. Adjusted for the 2005 value of the dollar. (Source: Ref. 5.)

and allergic rhinitis reported in connection with reported health care utilization (e.g., a person who reported purchasing a drug was asked what condition the drug was intended to treat) or reported disability days. The conditions reported by the respondent were recorded by the interviewer as verbatim text, which was then coded by professional coders to fully specified ICD-9-CM codes. Conditions with an ICD-9 code of 477 were classified as allergic rhinitis. It is important to note that costs associated with over-the-counter (OTC) allergic rhinitis medications were not included in this analysis. Expenditure data for 2000 was adjusted to 2005 dollars using the Personal Health Care Expenditure Price Index (Centers for Medicare and Medicaid Services, Office of the Actuary).

Some of the highlights associated with costs of allergic rhinitis found by this agency included

In 2005, ~22 million persons or 7.3% of the U.S. population reported experiencing related symptoms, visiting a physician, or obtaining a prescription drug

to treat allergic rhinitis. The prevalence here is lower than seen in other prevalence studies because of this study's restricted definition.

Medical spending to treat allergic rhinitis almost doubled from \$6.1 billion in 2000 (in 2005 dollars) to \$11.2 billion in 2005 (Fig. 1). Medical spending in the MEPS are defined as payments from all sources for hospital inpatient care, ambulatory care provided in offices and hospital outpatient departments, and care provided in emergency departments, as well as prescribed medicine purchases reported by respondents in the MEPS-HC. Sources include direct payments from individuals, private insurance, Medicare, Medicaid, Workers' Compensation, and miscellaneous other sources.

Ambulatory expenditures for care and treatment of allergic rhinitis increased 73% from 2000 to 2005.

Mean annual expenditures for those with an out-of-pocket expense related to allergic rhinitis increased from \$350/person in 2000 (in 2005 dollars) to \$520/person in 2005.

In 2000 and 2005, more than one-half of the total allergic rhinitis expenses were spent on prescription medications (Fig. 2).

A very important aspect in direct costs of allergic rhinitis is the money spent on OTC allergy medications in the United States. Data from two health care industry sources, Euromonitor and Nicholas Hall, estimated a range of \$1.175–1.5 billion spent in 2008 on OTC allergy medications (Wael Safi, Pharm.D., personal communication, February 17, 2010).

“HIDDEN” DIRECT COSTS IN ALLERGIC RHINITIS

Very important in allergic rhinitis is the role of “hidden” direct costs associated with this disorder. These costs are monies spent directly for other medical conditions that may have been brought about by the condition being evaluated.⁶ In allergic rhinitis this would include:

- Costs for antibiotics, x ray for treatment, and emergency department visits for complicating sinusitis.
- Surgical costs for nasal polyposis and sinusitis.
- Antibiotic costs for treatment of sinusitis.
- Medical and surgical costs for otitis media with effusion.
- Costs of worsening asthma and frequent upper respiratory infections.
- Orthodontic costs.
- Evaluation and treatment of ocular symptoms.

Schoenwetter *et al.* estimated that 67.5% of patients with chronic sinusitis, 21.3% of patients with asthma, 20.8% of patients with otitis media with effusion, and 2.2% with recurrent nasal polyps have allergic rhinitis.⁷ These “hidden” direct costs add billions of dollars to the economic burden of allergic rhinitis each year in the United States.

Halpern *et al.* did a retrospective cost of illness study evaluating the impact of allergic rhinitis on asthma medical care resource use rates and costs for patients with asthma plus allergic rhinitis versus patients with asthma alone.⁸ The subjects came from a medical claims database from a large, northeastern U.S. health insurance plan (1992–1994). Patients with both conditions were also more likely to receive care from medical specialists and less likely to be in managed care. Controlling for these factors, allergic rhinitis was still associated with an increase ($p < 0.0001$) in annual costs of >\$350/year. Allergic rhinitis in patients with asthma nearly doubled annual medical resource use and costs and was associated with increased use of asthma-related medications.

Table 1 Burden of allergic rhinitis on patient productivity and quality of life from the Allergies in America survey

Effect on Work and Productivity	%
Missed work because of allergies (patients)	
No	70
Yes	30
Level of interference with work (patients)	
Moderate	35
Some	28
A lot	20
Little	16
None	1
Reduction in productivity (mean)	
No symptoms	5
Symptoms at worst	28
Effect on daily life, patients	
Moderate	25
Some	26
Little	19
A lot	15
Did not really impact	14
Not sure	1

Source: Ref. 19.

INDIRECT COSTS IN ALLERGIC RHINITIS

A major part of the costs associated with allergic rhinitis are indirect costs.⁹ These encompass all of the nonhealth care costs associated with the illness:

- Monies lost due to missing work and decreased productivity due to the illness.
- Other indirect costs to measure include the monetary value of missing school and unpaid caregivers’ time to care for the sick child.

Allergies in America was a comprehensive national survey conducted in 2006 that included 2500 adults diagnosed with allergic rhinitis and 400 health care practitioners who treat the condition.¹⁰ This survey questioned the full-time workers on work interference from nasal allergies in the past year (Table 1). It was found that 10% had missed work in the last year, 22% stated that allergies interfered with their ability to work, and 20% both missed work and the condition interfered with their ability to work. Using a visual analog scale, the workers were asked to rate their productivity at work when they were asymptomatic and when their allergy symptoms were worse on 1–100 scale with 1 being the poorest productivity and 100 causing no effect on productivity. With no symptoms, productivity was rated 95 and with symptoms worse, 72. That is about a 23% reduction in work productivity with allergic rhinitis. Goetzel *et al.*¹¹ assessed total costs

for 10 different diseases in almost 375,000 employees in 6 large corporations in the United States in the late 1990s. Allergic rhinitis was the fifth most costly disease due to the high indirect costs. In fact, over 75% of the costs were caused by decrease productivity. Lamb *et al.*¹² assessed total productivity (absenteeism and presenteeism) in a 2002 self-reported survey of 8267 U.S. employee volunteers of 27 companies in 47 locations. Presenteeism is the effect on productivity at work hampered by the medical condition. The authors found that the total productivity in allergic rhinitis was about US\$600/employee per year, higher than any other condition assessed including asthma, diabetes, and coronary heart disease.

In 2002, Lockheed Martin commissioned a pilot study to assess the impact of 28 medical conditions on worker productivity. "Allergies or sinus trouble" was responsible for substantial costs to the company in total lost productivity with an estimate of aggregate annual loss of \$1.8 million calculated on the average Lockheed salary (~\$45,000).¹³ In a study of 634 service representatives at a Bank One call center in Elgin, IL, allergy-related presenteeism was measured by the amount of time workers spent on each call.¹⁴ During the peak ragweed pollen seasons, the allergy sufferers' productivity fell 7% below the productivity of coworkers without allergies. When ragweed was not posing a problem, however, the two groups' productivity levels were about the same.

COST-EFFECTIVE MANAGEMENT OF ALLERGIC RHINITIS

Management of allergic rhinitis can be divided into three major categories: allergen avoidance, pharmacotherapy, and allergen immunotherapy. Each adds to the direct cost associated with allergic rhinitis. The question is how cost-effective is each measure in each category, which would lead to a decrease in total costs in allergic rhinitis.

Allergen avoidance, such as removing pets from the house and dust-mite proofing the bedroom, are recognized important measures in good allergy management. Unfortunately, it can be very difficult to do, and it is unclear which patients benefit and how much.¹⁵ Most importantly, we do not know which interventions are truly cost-effective without further economic studies. Unlike allergic rhinitis, studies in asthma have shown the cost-effectiveness of environmental control. The Inner City Asthma study of children suffering with moderate to severe asthma showed that intervention, which cost US\$1469/family, led to statistically significant reductions in symptom days, unscheduled clinic visits, and use of β -agonist inhalers.¹⁶

Determining the cost-effectiveness of different agents used in the treatment of allergic rhinitis can also

be very difficult. Studies show that intranasal corticosteroids are the most effective agents in the treatment of symptoms associated with allergic rhinitis.¹⁷ Even though they are the most effective, are they truly the most cost-effective? The problem in running cost-effective models of medications is that each individual, depending on their prescription insurance coverage, is paying different costs for the same agent. In general, the least expensive medications in allergy management are the OTC second-generation antihistamines, but, again, depending on insurance coverage, generic second-generation antihistamines and/or generic intranasal corticosteroids may be less costly. Recently, a cost-effective analysis was performed between montelukast, a leukotriene receptor antagonist, and second-generation oral antihistamines in patients newly diagnosed with allergic rhinitis without asthma over a 1-year period.¹⁸ After confounder adjustment, patients on montelukast experienced higher total medical costs (\$1542 versus \$989), drug costs (\$714 versus \$477), allergic rhinitis drug costs (\$474 versus \$298), and outpatient visit costs (\$480 versus \$277) than second-generation oral antihistamine patients (all values of $p < 0.025$). Montelukast patients experienced higher total visits, allergic rhinitis outpatient visits, and comorbidity visits than second-generation oral antihistamine patients (all values of $p < 0.01$).

Another important aspect is use of the medications. In evaluating cost-effectiveness of a medication for a chronic condition, such as allergic rhinitis, one calculates cost-effectiveness on daily use; however, we know that a substantial number of allergic rhinitis sufferers only use their medication as needed and this will lessen the burden of cost. What is clear is that in the Allergies in America survey only 55% of patients felt they are getting their money's worth from their medications.¹⁹

Is rhinitis therapy cost-effective in patients with allergic rhinitis and asthma? Corren *et al.* conducted a case control study to determine whether treatment with intranasal corticosteroids and/or second-generation antihistamines is associated with changes in rates of asthma exacerbations resulting in emergency department visits and/or hospitalizations in patients with asthma and allergic rhinitis.²⁰ There were 361 patients treated in emergency departments or hospitalized with asthma compared with 1444 controls in a large managed-care organization. The authors found that patients treated with intranasal corticosteroids alone or in combination with second-generation antihistamines had a statistically significant decrease in odds ratio for both emergency department visits and hospitalizations for asthma.

Allergen immunotherapy is the only disease-modifying treatment for allergic rhinitis and therefore should play a role in cost-effective management. Hankin *et al.* performed a retrospective Florida Medic-

aid claims data (1997–2004) analysis of children (<18 years of age) given new diagnoses of allergic rhinitis.²¹ They examined characteristics associated with receiving allergen immunotherapy, patterns of allergen immunotherapy care, and health care use and costs incurred in the 6 months before versus after allergen immunotherapy. Of 102,390 patients with new diagnoses of allergic rhinitis, 3048 (3.0%) received subcutaneous allergen immunotherapy. Approximately 53% completed <1 year and 84% completed <3 years of allergen immunotherapy. When they examined the costs associated with allergic rhinitis 6 months before immunotherapy versus 6 months after immunotherapy was discontinued, they found that total costs including pharmacy, outpatient costs, and inpatient costs statistically decreased ($p < 0.001$) in the 6 months after allergen immunotherapy. The average 6-month savings in health care costs (\$401/patient) was sufficient to offset the average total cost of immunotherapy across the course of therapy (\$424/patient). The authors do point out that this study had several limitations. First, results based on Medicaid enrollees may not apply to privately insured or higher-income patients. Second, study results were limited to children <18 years of age and might not apply to adults. Third, the nature of available claims data did not allow us to examine the contribution of potentially important variables, such as the number and specific types of allergic rhinitis diagnoses, the types of settings in which patients received their immunotherapy, reasons for discontinuing treatment, and responses to previous treatments.

Another recent study from Germany investigated the cost-effectiveness of subcutaneous allergen immunotherapy in patients with allergic rhinitis and asthma.²² Patients had 3 years of immunotherapy and were followed for a total of 15 years. It was found that the total costs per patient after 15 years of disease were approximately €26,100 for symptomatically treated patients and approximately €24,000 for patients receiving additional subcutaneous allergen immunotherapy. The group on symptomatic treatment and immunotherapy was associated with annual cost savings of €140/patient. The incremental cost-effectiveness ratio was assessed in this study for quality-adjusted life-years (QALY). In Europe, the accepted ratio for cost-effectiveness of treatment is up to €50,000/QALY. Patients on immunotherapy in this study had an incremental cost-effectiveness ratio of €19,787/QALY showing the cost-effectiveness of this treatment.

Although not approved by the Food and Drug Administration in the United States at this time, sublingual allergen immunotherapy is an important treatment modality in much of the rest of the world. The cost-effectiveness of a sublingual allergen immunotherapy tablet consisting of timothy grass pollen was

assessed prospectively in allergic rhinitis with coexisting asthma.²³ Patients received the sublingual allergen tablet and/or standard therapy for 3 years and were followed for a total of 9 years. The authors calculated the QALYs and found that over a 9-year period, the sublingual allergen tablet was calculated to improve QALYs by 0.197 (equal to 72 extra days of perfect health). The cost per QALY gained was £4319 with any cost below £20,000 for QALY being cost-effective by the National Institute for Health and Clinical Excellence. National Institute for Health and Clinical Excellence is an independent organization responsible for providing national guidance in the United Kingdom on promoting good health and preventing and treating ill health.

CONCLUSIONS

It is clear that allergic rhinitis is a costly condition. With the numbers of Americans that suffer with this disorder, it is not surprising that direct costs are high. Unfortunately, the costs may be higher than what the recent literature suggests because few studies evaluate monies spent on OTC and alternative therapies. With the numerous comorbidities, such as asthma and sinusitis, seen in patients with allergic rhinitis, there are very high hidden direct costs in the patient population. There is no mortality associated with allergic rhinitis, but very significant morbidity, which leads to the high indirect costs. Not only is absenteeism high with allergic rhinitis, but presenteeism adds to the indirect costs of this condition. In fact, some studies suggest that indirect costs may be higher than direct costs of nasal allergies. Presently, data are sparse on the true cost-effectiveness of allergen avoidance procedures, pharmacotherapy, and allergen immunotherapy in allergic rhinitis management.

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