

# Current reviews of allergy and clinical immunology

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## Health economics of asthma and rhinitis. II. Assessing the value of interventions

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Health care providers and payers are being asked to weigh data on the economic impact of new interventions along with clinical evidence when making decisions about the care of patients. The notion of incorporating formal health economic assessments into clinical and resource decisions is a difficult concept for many in the health care sector. However, it is the reality in today's environment. To effectively participate in these ongoing discussions, clinicians and other decision makers must be able to understand and critically assess the evidence on economic impact of medical interventions. This second of 2 articles describes the elements of comparative economic evaluations, reviewing the published literature on asthma and rhinitis in an attempt to critically appraise the studies from the perspective of one who might use data for decision making. Unfortunately, the quality of the economic evidence in these two disease states is not extensive. Until better economic analyses are conducted and made available, the allocation of resources for asthma and allergic rhinitis will continue to primarily rely on expert opinion rather than evidence-based literature. (*J Allergy Clin Immunol* 2001;107:203-10.)

**Key words:** *Asthma, allergic rhinitis, economics, cost-effectiveness analysis, costs*

Evidence-based medicine is concerned with the conscientious, explicit, and judicious use of the current best evidence in making decisions about the care of individual patients.<sup>1</sup> Increasingly, health care providers are being asked to weigh economic evidence alongside clinical evidence when making decisions about the care of their patients.<sup>2</sup> This review takes the position that today's health care environment makes some consideration of economics for determining resource use inevitable. If one accepts the notion that economic considerations are unavoidable in clinical decision making, it seems reason-

### Abbreviations used

BA: Bronchodilator alone  
CEA: Cost-effectiveness analysis  
ICS: Inhaled corticosteroid  
MDI: Metered-dose inhaler  
SFC: Salmeterol/fluticasone combination

able to then take a position that only high-quality economic evidence should be used. The purpose of this 2-part review is to provide decision makers with the tools to evaluate economic evidence for treatments for asthma and allergic rhinitis.

The first part of this review characterized the economic burden of asthma and rhinitis.<sup>3</sup> This second portion of the review focuses on the critical elements of comparative economic analyses that are useful for decision makers. Part II is specifically written for clinicians and decision makers who are not well versed in the purposes and methods of cost-effectiveness analysis (CEA). It argues that cost-effectiveness studies have much in common with the clinical literature that most clinicians are comfortable reading and critically appraising. Thus it will highlight important similarities and differences between sound economic and sound clinical evaluations. Some of the more subtle aspects of CEA (eg, discounting of future costs and benefits, comparative measures of benefit) are not emphasized here. The interested reader can find greatly expanded discussions of these issues, along with the major themes discussed below, in several excellent reference texts.<sup>4-6</sup>

Before discussing the major issues that should be addressed when evaluating economic evidence, this review first outlines the important similarities and differences between clinical evidence and economic evidence. CEAs take a "population" viewpoint for decision making. This viewpoint involves basing decisions on evidence gathered from studies of populations rather than on evidence gathered on a case-by-case basis. So, for example, the clinician who is deciding whether a particular controller treatment is appropriate for his or her asthma patient would look to the literature reporting results from clinical trials rather than considering how this treatment worked on his or her last patient (or even a colleague's patients). Similarly, CEA is designed to help

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health care providers and payers make informed resource allocation decisions based on evidence gathered from studies of populations, including the study types that are familiar to clinical readers (eg, randomized controlled trials, case-control studies, cohort studies).

Although clinical and economic impact studies have much in common, there are important differences between the two methodologies. First, the perspective is generally different. Clinical decisions are usually made from the perspective of what is best for the patient. Economic analyses are generally conducted from the broader societal perspective, that is, including all costs and benefits that are attributable to the intervention, even if they do not necessarily involve the patient directly. Taking a societal perspective is important in CEA because costs and benefits from medical treatments often “spill over” to others beyond the person receiving treatment. For example, when a child is vaccinated against chicken pox, he or she benefits from the vaccine, but so do other children who would have been exposed to the virus if the child had not been vaccinated and had contracted the disease. Sometimes, taking the societal perspective leads to different conclusions than taking the perspective of the patient.

Second, although clinical effectiveness is necessary for a therapy to be cost-effective, a treatment can have clinical effectiveness and still not be cost-effective. Thus the clinical information provided from randomized trials may not necessarily help with economic decisions. This fact has not been lost on the proponents of evidence-based medicine, who note that practicing evidence-based health care is at least as likely to increase medical care costs as it is to decrease costs.<sup>1</sup>

Third, economic analyses are conducted under a framework in which the decision maker operates within a limited resource environment. Decisions to spend more on one program will necessarily mean spending less on other programs. As a result, economic analyses almost always involve a comparison between alternative therapies to ascertain which therapy offers the best health value per dollar expended. Clinical evidence more commonly compares a new therapy with placebo care, even when placebo care (ie, no care) is not the standard of practice in the community.

## BASIC PRINCIPLES OF CEA

CEA can be defined as a set of related methods to assess and quantify the costs and clinical consequences of medical care treatments to estimate the “economic value” of the intervention in relation to alternative treatments. These methods were described briefly in the first part of this review.<sup>3</sup> A CEA of competing medical treatments should incorporate evidence on the clinical consequences (efficacy and safety) and the costs and relative cost-effectiveness of treatment alternatives.<sup>7,8</sup> Guidelines for designing and reporting CEAs—including methods for incorporating evidence on costs and effects—are now available and should be read by those who are interested in conducting or critically appraising these types of studies.

The results presented in CEA papers are derived from a simple equation that integrates estimates of total costs and clinical outcomes. This simple equation has been described as depicting an intervention’s value for money; that is, the cost-effectiveness of a new intervention in a defined population of patients represents the added total costs required to achieve an incremental improvement in outcome when compared with a currently accepted treatment. If the added cost-to-clinical benefit ratio is acceptable to decision makers, it is said to have value. The cost-effectiveness equation is as follows:

$$\text{Incremental cost-effectiveness ratio} = \frac{\text{Cost}_A - \text{Cost}_B}{\text{Effectiveness}_A - \text{Effectiveness}_B}$$

Here, 2 therapies are compared: *A* (usually the new technology) and *B* (the established or usual therapy). The incremental cost-effectiveness of *A* versus *B* is thus the attributable benefit per incremental level of expenditure for the new technology. The most common result of a cost-effectiveness evaluation for new medical interventions is one in which health benefits improve compared with standard care, but at an additional expense to the health care system. It is important to note that interventions that marginally increase costs and provide better health outcomes for patients are necessarily useful and worth paying for. In a health care system with a fixed budget, these additional expenditures on new treatments for asthma or allergic rhinitis must be weighed in relation to alternative uses of these funds in other disease states.

## ASSESSMENT OF VALUE IN THE CARE OF PERSONS WITH ASTHMA AND RHINITIS

Following is a concise review of studies of both asthma and allergic rhinitis that highlight the utility of economic evaluations for clinical and resource decision making. Only a few of these studies have met recommended standards for economic evaluation.<sup>9-11</sup> The review emphasizes studies that conform to appropriate scientific rigor but also points out notable studies that fail to meet guidelines. Also identified are important or contemporary interventions that lack even basic published evidence of economic benefit. These areas would be fruitful for research. The methodology used for the literature search was described in part I of this series.<sup>3</sup>

### Economic evaluations in asthma

**Diagnostic testing.** Asthma is principally diagnosed and managed with objective measures of lung function. For persons already diagnosed, national guidelines recommend periodic monitoring of pulmonary function by either spirometry or peak flow measurements.<sup>12</sup> To date, there have been no health economic evaluations to assess this recommendation. There has been one report of the economic consequences of use of pulmonary function tests to screen for asthma.<sup>13</sup> This study of an adult population in The Netherlands examined both asthma and chronic obstructive pulmonary disease collectively, making it impossible to single out the value of diagnostic

**TABLE I.** Summary of randomized health economic studies of pharmacotherapy for persistent asthma

Reference	Study method used	Sample size	Perspective	Treatments studied	Length of study	Costs measured	Health outcomes measured	Economic outcomes
Connett et al <sup>34</sup> (1993)	RCT	40 children	Societal	2 groups: budesonide vs placebo	26 wk	Direct and indirect	Lung function (FEV <sub>1</sub> ), symptoms, symptom-free days	Budesonide is dominant therapy; saved \$9.43 for each symptom-free day gained
Rutten-van Mólken et al <sup>35</sup> (1993)	RCT	116 children	Societal	2 groups: budesonide and salbutamol vs salbutamol alone	3 y*	Direct and indirect	Lung function (FEV <sub>1</sub> ), symptom-free days, school absences	Budesonide is cost-effective; \$83 per 10% improvement in FEV <sub>1</sub> , \$4.75 per symptom-free day gained
Rutten-van Mólken et al <sup>36</sup> (1995)	RCT	274 adults	Societal	3 groups: beclomethasone and terbutaline vs ipratropium and terbutaline vs terbutaline alone	2.5 y	Direct and indirect	Lung function (FEV <sub>1</sub> , PC <sub>20</sub> ), symptom-free days	Beclomethasone is cost-effective; \$201 per 10% improvement in FEV <sub>1</sub> , \$5 per symptom-free day gained; ipratropium is not cost-effective
O'Byrne et al <sup>33</sup> (1996)	RCT	57 adults	Societal	3 groups: budesonide 400 µg vs budesonide 800 µg and bronchodilator vs BA	16 wk	Direct	Lung function (PEFR), symptom scores, exacerbations, ED visits, and willingness to pay	Budesonide is cost-beneficial at 400 µg/d but not at 800 µg/d vs BA
Rutten-van Mólken et al <sup>38</sup> (1998)	RCT (open label)	482 adults	Societal	2 groups: dry powder formoterol 12 µg vs salmeterol 50 µg	28 wk	Direct	Daytime and nighttime symptom scores, episode-free days, quality of life	No clinical difference noted in clinical outcomes, no cost-effectiveness ratio calculated
Lundback et al <sup>39</sup> (2000)	RCT	353 adults and adolescents	Societal	2 groups: salmeterol/fluticasone propionate 50/250 µg combination product BID vs budesonide 800 µg BID	24 wk	Direct	Lung function (PEFR), successfully treated weeks, episode-free days, symptom-free days	Incremental cost-effectiveness ratio of \$1.12 per symptom-free day for salmeterol/fluticasone propionate to budesonide

Adapted from Sullivan SD, Weiss KB. Pharmacoeconomics of asthma treatments. In: Barnes PJ, et al, editors. Asthma: basic mechanisms and clinical management. 3rd ed. San Diego: Academic Press; 1998. p. 909.

RCT, Randomized controlled trial; BID, twice daily; PEFr, peak expiratory flow rate; ED, emergency department.

\*Study had a planned 3-year follow-up but only 39 patients reached a follow-up period of 22 months.

testing for asthma alone. There appear to be no health economic evaluations of the use of other types of diagnostic tests such as x-ray films, serologic tests, or skin tests for asthma.

**Management.** Pharmacotherapy represents the foundation for clinical management of asthma. Not surprisingly, there are a number of studies that present findings on the economic impact of drug treatments. Many of these studies did not meet 2 of the basic criteria for cost analysis. This was because they either failed to include all costs<sup>14-16</sup>

or they were of too short a duration to assess outcome and economic impact on a chronic condition such as asthma.<sup>14,17-22</sup> Table I provides an overview of selected studies that meet many of the economic-evaluation standards.

**Inhaled corticosteroids.** The National Guidelines for the Diagnosis and Management of Asthma<sup>12</sup> recommend inhaled corticosteroids (ICSs) in addition to as-needed bronchodilator therapy as treatment for persons with persistent asthma. There is substantial evidence to support this recommendation.<sup>23,24</sup> However, addition of ICS medica-

tions to an existing regimen of inhaled or oral bronchodilator therapy contributes significantly to the overall cost of treating these patients. An important research question is whether ICSs along with as-needed bronchodilators are cost-effective compared with as-needed bronchodilators alone (BA) for treating persons with mild-to-moderate or moderate-to-severe asthma. Although several observational studies have attempted to examine this issue,<sup>25-30</sup> this review focuses on randomized trials because of the strength of the study design.<sup>31,32</sup>

One of these studies was a 16-week randomized trial of budesonide, 400 µg/d and 800 µg/d, and placebo in 57 adults with mild asthma.<sup>33</sup> Low-dose budesonide demonstrated better control of morning and nocturnal symptoms, improved peak flow measurements, and was judged to be cost-beneficial compared with placebo. High-dose budesonide did not improve lung function or symptom scores relative to low-dose budesonide. In another study Connert et al<sup>34</sup> examined the cost-effectiveness of inhaled budesonide compared with placebo in a 6-month randomized trial of 40 children aged 1 to 3 years with persistent asthma. The results indicated that budesonide produced a favorable clinical response, increasing symptom-free days when compared with placebo. The results also suggested that compared with placebo, budesonide increased overall effectiveness and reduced overall costs by about \$9.45 per symptom-free day gained.

Rutten-van Mólken et al<sup>35</sup> reported on the cost-effectiveness of adding ICSs to an as-needed bronchodilator regimen (ICS + BA) compared with as-needed BA in a 12-month randomized trial of 116 children with asthma aged 7 to 16 years. The investigators evaluated FEV<sub>1</sub> as the primary outcome and frequency of symptom-free days and school absences as secondary outcome measures. ICS + BA was estimated to cost about \$4.75 per symptom-free day gained relative to use of BA.

One of the most comprehensive trials to date investigated the costs and effects of adding inhaled anti-inflammatory therapy to inhaled β<sub>2</sub>-agonist. This study was based on 274 adult participants aged 18 to 60 years with moderately severe asthma or chronic obstructive pulmonary disease as defined by pulmonary function criteria.<sup>36</sup> Each patient was randomly assigned to either inhaled fixed-dose terbutaline plus inhaled placebo, inhaled terbutaline plus 800 µg of inhaled beclomethasone per day, or inhaled terbutaline plus inhaled ipratropium bromide 160 µg per day. Patients were followed up for as much as 2.5 years. The economic objective of this study was to determine the relative cost per unit of benefit for the 3 therapeutic arms. The clinical results indicated that addition of the ICS to fixed-dose terbutaline led to a significant improvement in pulmonary function and symptom-free days, whereas addition of inhaled ipratropium bromide to fixed-dose terbutaline produced no significant clinical benefits over placebo. The incremental cost-effectiveness for ICS was approximately \$5 per symptom-free day gained. The incremental cost-effectiveness of ipratropium bromide was not evaluated because of the lack of clinical benefit relative to placebo. The results from these studies do sug-

gest a favorable economic profile for adding ICSs to short-acting β-agonists.

Data are beginning to appear that compare different anti-inflammatory therapies, but as yet, these studies do not meet many of the criteria for a well-designed CEA.<sup>37</sup> However, it is precisely these types of head-to-head studies that most decision makers want to see.

*Long-acting β<sub>2</sub>-agonists.* One study examined the relative economic consequences of treating persons with asthma with twice daily powder formoterol 12 µg as compared with salmeterol 50 µg.<sup>38</sup> However, the authors concluded that there were no statistically significant differences in symptom-free days between the two treatment groups, and because of this, no incremental cost-effectiveness ratio was calculated.

Of current interest in the United States is the potential economic impact of combination bronchodilator and corticosteroid products. Investigators examined the costs and effects of use of the salmeterol/fluticasone propionate fixed-dose combination product (SFC) 50/250 µg twice daily versus budesonide 800 µg twice daily.<sup>39</sup> This study involved 353 adult and adolescent participants (≥12 years) who were symptomatic while receiving current doses of ICSs. The patients were followed up for 24 weeks. The results indicated that patients taking SFC had significant improvements in several outcomes. The incremental cost-effectiveness for SFC was \$1.12 per symptom-free day gained. This study suggests that this combination therapy may have a favorable economic profile for patients with asthma whose symptoms are otherwise poorly controlled with moderate doses of inhaled steroids.

*Inhaled cromolyn sodium and nedocromil.* There appear to be no randomized controlled economic evaluations of inhaled cromolyn sodium or nedocromil. However, 2 published studies attempt to estimate the economic value of these compounds. One study is based on retrospective analysis of 53 patients categorized into 2 groups: those who received cromolyn sodium for at least 1 year and those who did not receive cromolyn sodium as part of their treatment regimen.<sup>40</sup> Another, more recent study of nedocromil sodium was conducted that used a retrospective pre-post design to examine this therapy for 553 adults with asthma.<sup>41</sup> These 2 studies suffer from selection and other biases common to retrospective analyses and therefore provide little information about the health economic value of these compounds.

*Leukotriene antagonists.* One health economic study of the use of zafirlukast for children and adults with mild-to-moderate asthma was reported; however, the study did not report on the cost of the study drug, thereby making this an incomplete assessment of economic impact.<sup>14</sup> There are presently no other published studies that meet current standards to provide an understanding of the economic value of these agents.

*Other pharmacotherapy.* There have been a few studies of various other pharmacotherapeutic strategies. One suggested that inhaled anticholinergics might be of benefit in treating children with asthma.<sup>42</sup> There also appears to be only 1 health economic evaluation of asthma phar-

macotherapy conducted within a developing country. This cost-minimization study, conducted in India, found the use of oral  $\beta$ -agonists provided no additional clinical benefit and increased costs for persons using as-needed inhaled  $\beta$ -agonists.<sup>43</sup>

Other literature has explored the cost consequences of nebulizers versus metered-dose inhalers (MDIs) with or without spacers in the acute care setting.<sup>44-49</sup> Although most of these studies have design limitations, collectively they suggest that there is no significant difference in clinical outcomes between nebulizers and MDIs.<sup>44,50</sup> These studies also suggest that MDIs offer modest cost savings. Although there are published studies of various other types of medication-delivery devices,<sup>51-53</sup> they do not meet many of the standards for health economic evaluations.

**Economic studies of asthma patient education, self-management programs, and specialty consultation.**

Several publications document the clinical and economic impact of patient-oriented asthma education programs. These educational interventions vary from formal classroom-based medication compliance programs to asthma self-management programs for adults and children/parents. Overall, the economic evaluations of these programs are quite favorable, especially when the programs are aimed at high-risk patients or those with high-end health care utilization (such as a prior hospitalization).<sup>54-65</sup> These studies nearly all take the form of cost-benefit analyses, with costs attributed to program costs and benefits related to changes in emergency department and hospital utilization. One particularly well-designed randomized controlled trial of an inner-city population was able to demonstrate cost savings from a program of five 1-hour asthma education sessions targeted to children who had been hospitalized during the previous year.<sup>64</sup>

True cost-effectiveness studies in the field of asthma education and training for self-management are infrequent. Two separate cost-effectiveness studies of asthma self-management programs in Finland arrived at conflicting conclusions. One study resulted in a cost-effectiveness ratio of 118 Finish Marks per health day gained.<sup>66</sup> Another similar study in Finland found no significant health economic value at either 1 or 3 years.<sup>67</sup> Another study of asthma self-management in India met a number of the standards for economic evaluation but fell short of calculating a cost-effectiveness ratio.<sup>68</sup> This study suggested that there were health improvements in terms of peak flow measurements and productive days lost, as well as average marginal cost savings of 22%.

There have also been studies examining the economic impact of referrals to specialists for persons with moderate-to-severe asthma.<sup>69,70</sup> Retrospective chart reviews found significant reductions in sick office visits, emergency department visits, hospital days, and costs of care. However, the results must be interpreted with caution in light of limitations imposed by the choice of study design and evaluation methods.

**Economic evaluation of innovations in health care delivery.** The health economic literature exploring new strategies in asthma care delivery addresses 2 general

issues: (1) acute care delivered in emergency departments and hospitals, and (2) managed care disease-management programs.

*Studies of asthma care in emergency departments and hospitals.* A number of studies have examined ways in which emergency departments or hospitals might achieve optimal asthma care outcomes at lower costs. Several studies have characterized the use of short-stay observation units in the emergency department.<sup>71-73</sup> Collectively, these studies suggest that there are cost benefits to the use of such units.

Several other studies have examined the economics of asthma clinical pathways designed to improve and streamline hospital care.<sup>74-78</sup> These studies, all nonrandomized and mostly retrospective in design, uniformly focused on length of stay without clearly defining the costs associated with the intervention. While a majority of these studies reported decreased length of stay, the actual cost benefit of the pathway intervention remains unclear. For example, one well-designed trial resulted in no significant cost benefit.<sup>78</sup>

*Studies of disease-management programs.* Disease management has become popular during the past decade.<sup>79-81</sup> Although there is currently no standard definition for this term, most program descriptions focus on population management and include some type of multifaceted team approach to improving the delivery of care. There are now a number of health economic studies evaluating asthma-specific disease-management programs.<sup>82-90</sup> Each of these studies has notable design limitations, particularly in relation to sample selection, controls, and economic analyses. However, together they suggest that a comprehensive approach to asthma management—beyond pharmacotherapy—may have some merit. Further research in the form of prospective randomized clinical trials will help to better elucidate the economic value of this approach to improving asthma outcomes.

*Other miscellaneous asthma-related health economic studies.* There are a number of other health economic studies related to asthma care that span the spectrum from examining the value of diagnosis and treatment of gastroesophageal reflux for asthma<sup>91</sup> to psychosomatic therapy<sup>92</sup> to use of pharmacists in guiding therapy<sup>93,94</sup> and use of physician audit with feedback.<sup>95</sup> The methods used in these studies do not meet many of the established standards for health economic studies, making the results difficult to interpret.

**Economic evaluations in allergic rhinitis**

The economic-evaluation literature in asthma is limited but growing and becoming increasingly relevant and rigorous. This is not the case for the economic-evaluation literature in allergic rhinitis. The paucity of literature is compounded by the lack of a standardized approach to undertaking CEA for this condition. Most notable is the lack of standard outcome measure to use in the denominator of the cost-effectiveness equation.

This review describes 4 studies of pharmacotherapy and 1 study of immunotherapy for treatment of allergic rhinitis. There are no existing reports on the economic

impact of the myriad of avoidance strategies and medical and disease-management interventions in this disease.

In a randomized controlled clinical trial of the use of intranasal fluticasone propionate (200 µg once daily) versus terfenadine tablets (60 µg twice daily) versus placebo, the authors reported cost-efficacy ratios for fluticasone to be more favorable than those of terfenadine or placebo in reducing nasal symptoms.<sup>96</sup> Unfortunately, the study reported only drug costs and focused exclusively on adults with allergies to mountain cedar. The utility of these data are questionable.

Another retrospective analysis of budesonide aqueous nasal spray and intranasal fluticasone propionate for treatment of perennial allergic rhinitis reported budesonide to be more cost-effective.<sup>97</sup> However, the economic analysis was distilled into a simple cost comparison because of lack of statistically significant differences in clinical endpoints. More troubling was the fact that the results of this 6-week study were extrapolated to predict 12-month costs, which could be seen to adversely affect the face validity of the analysis.

Another study explored the "willingness-to-pay" approach to valuing the benefits of 2 types of intranasal budesonide compounds for treatment of seasonal allergic rhinitis.<sup>98</sup> The authors of this study found no difference in willingness to pay for aqueous versus dry-powder intranasal inhalers.

There appears to be only 1 study modeling the long-term economic consequences of specific immunotherapy in the treatment of allergic rhinitis.<sup>99</sup> This model suggests that for a small subset of patients with 3 years of continuous symptoms, there may be an economic advantage to treatment with immunotherapy. Although this study is interesting, the next step would be to challenge the results in the form of an experimental clinical trial.

One other comparative study of rhinitis attempted to examine the economic impact of a disease-treatment program.<sup>100</sup> However, this study did not clearly define the actual disease-intervention program, thereby limiting interpretation of the results.

## CONCLUSION

The health economic literature for asthma and rhinitis has evolved considerably during the past decade. CEA is now recognized as a standardized methodology for assisting decision makers in selecting and reimbursing health care interventions that maximize the health of populations, given the conflicts generated by constrained health budgets and the rising demand for medical care. Unfortunately, much of the literature in asthma and rhinitis, while evolving, does not currently meet accepted standards. Thus very few definitive conclusions can be drawn from the evidence.

The literature is relatively conclusive that the use of ICSs for moderate persistent asthma is cost-effective when compared with the use of β-agonist alone. There is no information on the cost-effectiveness of early intervention with controller therapy in patients with mild

asthma. There also appears to be a favorable economic benefit to targeted and sustained asthma education directed at self-management for selected subgroups of patients. Disease-management programs may, with further study, provide a comprehensive intervention strategy that adds value to current clinical care of persons with asthma. Beyond these modest conclusions, there remain significant questions about the value of other treatments.

A number of problems need to be addressed before studies of this type can be effectively used to determine optimal clinical strategies. First is the lack of standardized outcomes for use in health economic analysis of both asthma and rhinitis. For asthma, the symptom-free day is beginning to emerge as a standard measure. Researchers in the field of rhinitis have not, as yet, benefited from national or international discussions aimed at standardizing outcome measures for this condition. Second, investigators need to more carefully apply appropriate research designs, with sufficient time horizons, relevant comparators, and accurate measures of resource use and cost, before these data will be taken seriously by decision makers.

Finally, clinicians should be a part of the process of critically evaluating economic evidence for new medical interventions, in the same way they now evaluate clinical evidence. The task of becoming an effective evaluator of CEAs is not as daunting as it may first seem because these studies have more similarities than differences with the clinical literature. The knowledgeable clinician can play a role in ensuring that only high-quality cost-effectiveness studies are used for decision making in their organizations. In addition, enlarging the audience of critical readers of CEAs will likely improve the quality of studies that are published in the medical literature. As economic evidence becomes more important in medical decision making, it is essential that clinicians participate in the process of translating this evidence into practice.

Until better economic analyses are conducted and made available, the allocation of resources for asthma and allergic rhinitis will continue to rely primarily on expert opinion rather than evidence-based literature.

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