

Assessing the economic burden of asthma

In this month's issue of the *Journal*, Cisternas et al¹ report on the costs related to adult asthma. This article presents a unique perspective in its ability to capture both direct and indirect costs related to asthma by using a randomly selected cohort population. When the societal burden of asthma is considered, assessment of both the direct costs (ie, costs attributed to medical care) and the indirect costs (ie, dollars expended or not accrued by the patient, family, employer, and society because of the illness) should be evaluated to understand the full economic effect of the disease. In simple objective terms these reports are a balance sheet documenting the expenses of treating the illness and the investment in wellness, with the potential return accounted for by prospective reductions in future costs of care, greater work productivity, and easing the burden of disease.

Economic analyses might be performed in different settings with distinct data sets. Each study environment has its own intrinsic strengths and limitations. One can use national health care databases, assess resource use from commercial or government insurance claims, model cost of care from randomized clinical trials, or study a cohort of patients longitudinally as the authors in this edition of the *Journal* have chosen. Information generated from these different resources have their own inherent value and, although frequently comparable in their trends, might differ in the magnitude of the costs or charges allocated to each cost center. It is important to assess these reports for regional and national differences. Some reports look primarily at the cost of the specific illness. Others include the comorbidities associated with the primary disease. Cisternas et al,¹ in their estimates of medication costs, factor in the pharmaceuticals dispensed to treat allergic rhinitis. Some analyses focus not only on the cost of asthma care but also include the direct costs related to total health care.² The inclusion of other costs assigned to different illnesses might prevent the shifting of expenses from one disease state to another. These differences are important to acknowledge when discussing the variations in results between studies with distinct methodologies.

Another variable that might differentiate the results are the terms used: costs and charges. In the study by Cisternas et al,¹ cost data are presented. Costs are the actual dollars that are paid, usually by the insurer or patient, for the ser-

vice or product. Charges are the fees generated for a service. Because most medical charges are highly discounted, these numbers frequently correlate with the costs but typically overestimate the expenditure. It is therefore important not to compare or combine these 2 types of debits on the balance sheet. Furthermore, it is important to acknowledge regional differences in the cost of care in the United States. Staff model managed care organizations and preferred provider organization-style health plans assign costs or charges differently. Pharmaceuticals are frequently reported by their average wholesale price or other standardized terms that might differ considerably from the contracted prices. Medication costs should also be adjusted to include the cost of the patient's copays. In some studies mean costs or charges are applied to hospitalizations or emergency department events to generalize the use of these resources. Again, this might distinguish the outcomes of studies. Health economics is a young science, and it is important to study a wide range of methodologies.

Use of data from the National Center for Health Statistics³ provides information that is collected from across the country. It is the most generalizable data source because of the inclusion of a diverse population, regional distribution, and the inclusion of multiple payer types. It can be used to record trends over time. It illustrates areas of high resource consumption and could be used as a benchmark for intervention programs. Its limitations are that it uses calculations of events times average or mean costs or charges for that occurrence, so that small errors in estimations might be magnified. Similar to the limitations of other commercial claims data sets, it is dependent on proper diagnostic coding and lacks measures of disease severity. Because of the large database, these limitations might be minimized. Pharmacy costs are calculated from average wholesale prices and might adjust this cost center upward. In addition, data are frequently recorded in one year and then adjusted to subsequent years, adding potential for discordance with other types of analyses.

Commercial insurance claims databases have strengths in that direct medical costs or charges can be assigned to specific illnesses, such as asthma identified on the basis of ICD-9 classification. Patients with these diagnoses can be tracked over a prolonged time interval (months to years). All patients within a health plan with a specific diagnostic code might be followed, with exclusions for overlapping illnesses.² One is reminded to distinguish plans that report charges (ie, the fees that were billed) and costs (ie, the dollars that were reimbursed). The values might vary 2-fold. Claims analyses might look at cost or charges of care over time and differences in health care outcomes between different therapeutic approaches. There are potential limitations on the generalizability of these analyses. Different rules between health plans might significantly affect

From the School of Medicine, University of Washington, Seattle.
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Reprint requests: David A. Stempel, MD, econmed@msn.com.

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whether a patient is seen in an urgent care unit or an emergency department. As with assessment of national databases, one is dependent on the accuracy of the diagnostic coding and lacks the ability to assess disease severity. Instead, these systems might describe use of resources and report low, medium, and high users as surrogates for mild, moderate, and severe disease or use other strategies to define severity. The lack of patient-specific information is a limitation, although some researchers have used these databases to identify and then survey patients.⁴

Cost-effectiveness studies can be performed on the basis of data in clinical trials.⁵ Patients in these studies are well defined and have multiple observations. Disease severity can be determined. These studies can be used to assess costs associated with symptom-free or rescue-free days and improvement in lung function. Exacerbations requiring hospitalization and emergency department visits are uncommon in clinical trials. These trials might not be generalizable because of the selection criteria of the investigation, but again, they provide important economic data given these limitations. Larger clinical trials, such as the Childhood Asthma Management Program⁶ or OPTIMA,⁷ might be used for cost-effectiveness analyses. Another important assessment from these larger treatments is the calculation of the number of patients needed to treat to prevent one exacerbation.

The article by Cisternas et al¹ uses a fourth type of data set. It studies a random sample of an asthmatic population derived from a well-distributed group of community physicians. This design allows for interview access of the patients to assess health care use, including use of traditionally tabulated resources, such as medications, hospital and emergency department visits, and also non-traditional direct expenses, including transportation to the physician. In addition, the dollars expended for environmental control and housekeeping are captured. Most importantly, lost productivity is accounted for both in days of work missed because of asthma, as well as reduced output at work. These studies might have limitations imposed by the patient selection criteria, are dependent on patient's recall, and are limited by the ability to generalize to other populations. These limitations might be mitigated by sensitivity analyses that the authors of this study have performed.

One might ask whether one of these techniques is preferable to another. Each of them addresses different aspects of the economics of health care, and therefore each has unique value. Economic analysis of asthma is important in determining the effect of this common illness on the individual, as well as the burden to society. The article in this edition of the *Journal* adds to the growing depth of this literature. When employers, insurers, and government agencies decide how to allocate resources, it is important to understand the financial consequences of the disease. Many studies take the perspective of cost of illness. Another approach might be the cost of wellness. The former is a traditional view of the commercial insurance industry and governmental health plans. The question is simply to determine

how much it costs to take care of one patient with asthma and then how much it costs annually to take care of 11 million asthmatic patients with active disease. The cost-of-wellness approach asks society what investment in time and resource it is willing to make to minimize the burden of the disease. In the health care balance sheet the investment is reported in direct costs for medications and preventative health care, with the potential of minimizing expenses caused by treatment failure incurred in the emergency department and hospital. Further indirect costs are expended for environmental control, lifestyle changes (including smoking cessation), and exercise programs to promote better asthma health. On balance, the debits might be compensated for by greater productivity at work (school) and home and improvement in the quality of life.

The upfront investment in wellness has potential returns both in terms of direct and indirect costs. Pharmaceuticals in the report by Cisternas et al¹ are the largest contributor to total health care costs. It is interesting to note that as disease severity increases from mild to severe, the percentage of total costs attributed to medications declines from 47% to 19%. Effective controller medications have been demonstrated to reduce other high-cost components of health care, including hospitalizations.⁸ The expenses of the treatment failures are magnified in indirect costs. This study also demonstrates that as disease severity increases, indirect costs increase from 22% to 46% of the total asthma costs, illustrating that investment in wellness might have its greatest effect in its reduction of indirect expenses measured on the basis of increased productivity and fewer days of school and work lost. In addition, there is an intrinsic value in feeling well that is difficult to quantitate with a monetary value. The economics of health care is an important science that continues to expand with research, such as the excellent contribution by Cisternas et al.¹

David A. Stempel, MD
Seattle, Wash

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