WORKING
PAPER

Estimating the Impact of Improving Asthma Treatment

A Review and Synthesis of the Literature

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WR-448-MCAN

November 2006

Prepared for the Merck Childhood Asthma Network (MCAN)

HEALTH

EXECUTIVE SUMMARY

Introduction and Background

In 2002, over 30 million Americans reported ever having been diagnosed with asthma; 106 per 1000 adults and 122 per 1000 children, making it the most common chronic disease among children (NCHS, 2006). In 2002, the estimated annual cost of treating asthma was around $ 14 billion, of which hospital care accounted for almost a third of direct costs, and the indirect cost of asthma care was $ 4.6 billion (NHLBI, 2002).

Recent advances in pharmacotherapy have made asthma a highly treatable disease. Current treatment guidelines define the appropriate uses for three categories of agents: 1) anti-inflammatory medications (inhaled corticosteroids [ICS] and leukotriene inhibitors), 2) bronchodilators (methylxanthines and long-acting beta-agonists [LABA]), and 3) rescue treatments (systemic steroids and short-acting beta-agonists (SABA). However, research suggests that treatment often falls short of recommended care. According to a 2001 study, 74 percent of children with moderate to severe asthma in a national sample did not receive adequate treatment. (Halterman et al., 2001) And, in spite of their higher prevalence of the disease, minority children are less likely than white children to receive adequate treatment (AAFA, 2005). Adults with asthma fare no better: A recent RAND study showed that only 43 percent of patients who used a rescue inhaler at least three times a day were put on maintenance treatment (McGlynn, 2003). Recognition of the discrepancy between recommended care and care that is actually received has led to initiatives to improve the quality of asthma care, such as the Healthy People 2010 Initiative.

Although the quality of asthma care, treatment options, and the effect of the disease have been addressed extensively by the research community, no attempt has been made to date to provide consensus estimates for the costs (that is, for medications and other medical care) and benefits (such as avoided hospitalizations and ER visits, reduction in lost school or work days, and improved workplace productivity) of quality asthma care.

We conducted a project aimed at bridging this gap by synthesizing the existing evidence from literature and non-literature sources to address the following questions:

1. What are the gaps in the quality of asthma care for children and adults?

2. What are the clinical and policy implications of those gaps (e.g., excess morbidity and mortality, avoidable hospitalizations, lost school/work days)?
3. What would it cost to close the quality gaps?
4. What would be the return on investment/cost-benefit ratio of better asthma care?

This report provides the results of our literature synthesis and attempts to answer the questions, with the hope of guiding policy directed at improving the quality of asthma care.

Approach and Methods

To answer the questions, we conducted a comprehensive review of the literature dating from 1995 to 2006 to identify relevant publications as well as unpublished material. To obtain articles published in peer-reviewed journals, we searched the traditional health literature databases, such as Medline, EMBASE, and Cinahl, as well as Psycinfo, Social Sciences Abstracts, and Econlit. Relevant articles were reference mined for additional articles to retrieve. We also searched the websites of relevant governmental professional and advocacy organizations as well as a number of databases for "grey" literature sources.

Two researchers independently reviewed the titles of identified items to assess whether the content of the article was likely to provide relevant information. If available, the abstracts were obtained for all items flagged by one of the two reviewers as potentially relevant. Two reviewers then independently reviewed the abstracts or, in some cases, the full publications to determine whether they contained relevant information. Differences in opinion were resolved by consensus. Reports were omitted from further consideration if they did not contain any relevant information, were not conducted in the United States, were review or opinion articles, or were duplicative publications of the same data.

A comprehensive coding tool (form) was developed to abstract the relevant data from each report, including study design, findings (such as quality gaps), outcomes resulting from quality gaps, and cost estimates. These data were entered into a database for further analysis. As a first step, we conducted a qualitative analysis, seeking common themes and findings across the sources.

In the second part of the analysis, we attempted to take differences in population characteristics into account and to recalculate the outcomes measured in the first part of the analysis using common metrics

in order to facilitate cross-study comparisons. Three outcome measures were chosen: use of inhaled corticosteroids, hospitalizations, and emergency room (ER) visits. For each outcome measure, all findings were re-estimated to express them in the same terms, and where possible study durations were extrapolated to one year. We tested four categories of explanatory variables to account for differences: disease severity, age, race/ethnicity, and data source.

Results

Of the 2,786 reports identified by the initial searches, all but 164 were omitted from further review because they were determined not to meet the inclusion criteria.

Initial Analysis

Findings on the Quality of Asthma Care. The majority of reports that addressed care quality focused on pharmacologic treatment. Reported utilization rates for all three categories of asthma medications exhibited considerable variability. Utilization rates for anti-inflammatory drugs ranged from 0 percent to 94 percent and for bronchodilators from 0 to 98 percent, but median rates for anti-inflammatory drugs (32 percent) were considerably higher than for bronchodilators (17 percent). Use of rescue treatment also ranged from 0 percent to almost 100 percent. The types of utilization measures varied widely among studies.

Nevertheless, three patterns of utilization emerged. First, use of anti-inflammatory medications was well below 100 percent. Second, bronchodilators were used less frequently than anti-inflammatory drugs, reflecting their decreasing role in asthma treatment. Third, utilization rates for rescue drugs varied substantially, but few studies expressly looked into the adequacy of treatment with rescue drugs.

Findings on the Outcomes of Care. Among the studies that examined care outcomes, most examined hospitalization rates and/or emergency room visit rates; a much smaller number measured lost school days, symptom days, symptom-free days, or complications associated with asthma, and only a few studies attempted to directly relate the outcomes to gaps in quality of care. Further complicating attempts to synthesize findings across multiple studies, the units used to measure and express a particular outcome (e.g., hospitalization rate) tended to vary considerably among studies. Nonetheless, comparing studies that used a similar metric revealed a wide range of estimates. For example, the incidence of at least one hospitalization in the preceding 3 to 12 months was generally below 10 percent, although 35 percent of patients

in a study conducted at an urban hospital were hospitalized during the month of the study. Too few studies assessed outcomes in terms of complications or symptom-free/symptom days to permit any comparisons.

Findings on the Cost of Closing Gaps in Care. We found insufficient evidence to estimate the cost of reducing the gaps in quality and the return on investment for interventions - such as disease management programs - that attempt to close the gap.

Secondary Analyses

Findings on ICS Utilization. ICS utilization ranged from 10 to 94 percent of a study sample. Greater use was associated with disease severity (that is, the stringency of the study's inclusion/exclusion criteria for participant enrollment, compared with, say, the HEDIS criteria), being white, and being an adult; also, self-reported use was greater than use rates obtained from other data sources. Thus, use rates are lower than they should be, and blacks and Hispanics are disproportionately affected.

Findings on ER Visits. The number of ER visits varied from zero to 80 per 100 patient years. ER visit rates mirrored the findings on ICS utilization. Thus, ER visits were associated with disease severity, the proportion of whites and adults in the population, and with self-report.

Findings on Hospitalization Rates. The rate of hospitalization also varied widely: from zero to 53 admissions per 100 patient years. Hospitalization also mirrored ICS utilization and ER visits.

Results of Two-way Tabulations and Multivariate Regression. When the results were tabulated by both disease severity and racial/ethnic composition of the sample, few combinations of disease severity and racial/ethnic composition contained more than one or two studies; nevertheless, the findings generally reflected those for the individual explanatory variables. However, multivariate regression found no statistically significant effect of any of the explanatory variables.

Discussion

This study showed that although the quality of asthma care is an area of active research, it is impossible to derive reasonably bounded consensus estimates for the cost and benefits of better asthma care. Two limitations accounted for this problem. First, most publications focused on only one aspect of the question, e.g., estimating ICS treatment rates or hospital admission rates; however, no study tried to relate variation in endpoints explicitly to gaps in care. For example, no study examined the potential association between higher hospital admission rates and lower use of ICS treatment (except in the context of a multifaceted

intervention, making it impossible to isolate the effect of ICS treatment). Second, and more importantly (*and* more *surprisingly*,) researchers used a staggering variety of criteria to recruit their study patients and a staggering number of study outcomes. Similarly, as the key determinant of both treatment intensity and patient outcomes, *disease severity* was often insufficiently defined, that is, not defined according to well-established criteria. This finding is somewhat surprising, considering the availability of well-established patient identification and risk stratification criteria that can be applied to utilization data (HEDIS criteria) or clinical data (NHBLI and ATS criteria).

While it was not possible to obtain reasonable estimates of the costs or benefits of care, some important findings did emerge. Consistent with previously published reports, disadvantaged populations appear to receive worse care. ICS treatment rates were lower in studies with a high proportion of minority patients (and/or Medicaid) beneficiaries, a finding previously reported by others.

Another important finding was that both ICS treatment rates and ER and hospital utilization rates were typically higher in studies that relied on self-reported data than in studies that used health insurance claims or medical records as their sources. This finding implies that study outcome findings that have been derived from different types of data sources cannot simply be pooled but that, instead, it is necessary to take the data source into account when interpreting results.

Our findings suggest the need for more economic evaluations of the impact of gaps in asthma care and of interventions to improve asthma control and that such research should use standard definitions to allow comparison across studies and aggregation of data. Public and private funding agencies should use their influence to move the asthma research community toward more standardization of definitions. Arriving at such definitions is no easy feat, as it requires forming consensus and achieving buy-in of multiple stakeholders. But MCAN, with its ties to both the federal and non-federal funding agencies, the advocacy community, and academic researchers, is in an excellent position to broker such a consensus.

Finally, the second important conclusion of our study is that, given the enormous variability of results, overly confident statements about the gaps in asthma care or their impact should be avoided, as any estimates will strongly depend on their context. Thus, for the present, policymakers and other stakeholders should carefully review the sources of - and methods used to generate - existing data, when relying on them as the basis for critical decisions.