

Original Article

Asthma Cost-Effectiveness Analyses: Are We Using the Recommended Outcomes in Estimating Value?

Chong H. Kim, MPH^a, Piyameth Dilokthornsakul, PharmD, PhD^{a,b}, Jonathan D. Campbell, PhD^a, and Job F.M. van Boven, PharmD, PhD^{a,c} Denver, Colo; Phitsanulok, Thailand; and Groningen, The Netherlands

What is already known about this topic? In 2012, the National Institutes of Health convened a panel of experts to propose standardized measurement, collection, analysis, and reporting of health care utilization and cost outcomes in future asthma studies.

What does this article add to our knowledge? This article provides information regarding the use of National Institutes of Health–recommended outcomes and issues that prevent robust cross-study comparison in asthma cost-effectiveness analyses.

How does this study impact current management guidelines? This study provides recommendation to improve the quality of asthma cost-effectiveness analyses that will lead to better estimates of the cost-effectiveness of interventions, allowing for practitioners to be confident in prescribing cost-effective medications/therapies.

BACKGROUND: Asthma medication cost-effectiveness analyses (CEAs) lack the qualitative assessment regarding whether they capture the National Institutes for Health (NIH) 2012 recommended outcomes necessary to allow robust cross-study comparisons.

OBJECTIVE: We aimed to assess the current asthma outcomes used in CEAs and recommend a direction for improvement.

METHODS: We performed a systematic search using electronic databases including PubMed, EMBASE, Tufts CEA registry, Cochrane, and NHSEED from January 2010 through December 2015. Key words included (1) cost-effectiveness, cost-utility, economic evaluation, health economics, or cost-benefit AND (2) asthma. All CEA studies evaluating 1 or more asthma medication were included. Authors assessed each CEA study with respect to

asthma-specific NIH outcome recommendations including core (hospitalizations, emergency department visits, outpatient visits, medication, interventions costs), supplemental (visit categories and work/school absence), and emerging (academic/job-related) asthma outcomes. Besides outcomes of each CEA, issues that could prevent robust cross-study comparison were identified and thematically summarized.

RESULTS: A total of 12 pre-NIH and 14 post-NIH recommendation CEAs were included. Eleven (91.7%) and 14 (100%) of the pre-/post-NIH studies included at least 1 core outcome, respectively. Of the 26 total studies, 7 (26.9%) included asthma-specific outpatient visit categories, 6 (23.1%) included asthma school or work absences, 5 (19.2%) included respiratory health care use, and none of the studies included emerging outcomes. Other issues that hamper cross-study comparison include lack of standardized cost data, time frames, quality-of-life measures, and incorporation of adherence.

CONCLUSIONS: Although the use of NIH-recommended asthma core outcomes has improved, there is still room for improvement in using supplemental and emerging outcomes. To allow robust cross-study comparisons, future work should focus on further standardizing of data sources and methods. © 2017 American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2017; ■:■-■)

Key words: Asthma; Cost; Effectiveness; Cost-effectiveness; Cost-benefit; Review

^aCenter for Pharmaceutical Outcomes Research, Skaggs School of Pharmacy and Pharmaceutical Sciences, University of Colorado, Denver, Colo

^bCenter of Pharmaceutical Outcomes Research, Department of Pharmacy Practice, Faculty of Pharmaceutical Sciences, Naresuan University, Phitsanulok, Thailand

^cDepartment of General Practice, Groningen Research Institute for Asthma and COPD, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands

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Corresponding author: Job F.M. van Boven, PharmD, PhD, University of Groningen, University Medical Center Groningen, Groningen, Research Institute for Asthma and COPD (GRIAC), Department of General Practice, Antonius Deusinglaan 1 (Rm 3217-423), 9713 AV, Groningen, The Netherlands. E-mail: j.f.m.van.boven@rug.nl.

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Abbreviations used

CEA- Cost-effectiveness analysis

ED- Emergency department

GDP- Gross domestic product

HRQOL- Health-related quality of life

NIH- National Institutes for Health

WTP- Willingness to pay

new asthma treatments becomes increasingly important. Cost-effectiveness analyses (CEAs) help to assist decision makers in how to spend their limited budgets in the most efficient way, that is, with maximized health gains (Table I).

Systematic reviews may aid to provide a helpful overview of the cost-effectiveness of all existing treatments. Indeed, previous reviews have systematically assessed and summarized the existing economic evaluations of pharmacological and nonpharmacological asthma treatments.^{4,7} In general, the quality of the studies seems to be evolving,^{8,9} but even in the latest reviews several shortcomings were identified.^{4,5} To align future asthma cost-effectiveness studies, in 2012 the National Institute of Health (NIH) commissioned a position paper specifying which outcomes had to be included for optimal informative decision making and comparisons, with the goal of standardizing measurement, collection, analysis, and reporting of health care utilization, and cost outcomes in future asthma studies.¹⁰ Ultimately, this standardization will lead to enhanced cross-study comparisons and systematic interpretation of asthma treatment cost-effectiveness data.

In the upcoming years, several innovative, but also highly priced, biological asthma treatments are expected to enter the health care markets for which CEAs are yet to be performed.¹¹ Therefore, it is timely to systematically assess the current state-of-the-art of recent economic evaluations of pharmacologic asthma treatments. In recent years, several new CEAs of asthma medications have been reported.¹²⁻¹⁴ In particular, we were interested in knowing whether recommendations from the asthma NIH workshop¹⁰ have been implemented. The primary objective of this study was to evaluate the literature regarding the use of (NIH workshop—recommended) asthma-specific outcome measures through cross-study comparison of asthma CEAs. The secondary objective was to identify other issues (besides the inclusion of NIH-recommended outcomes) within asthma medication CEAs that prevent robust cross-study

comparison through a thematic analysis and to provide recommendations for future economic analyses.

METHODS**Study design and search strategy**

We performed a systematic search of multiple databases including PubMed, EMBASE, Tufts CEA Registry, Cochrane CENTRAL, and NHSEED from January 2010 through December 2015 using the MeSH terms “asthma” AND “cost-effectiveness analysis,” “cost utility,” “economic evaluation,” “health economics,” or “cost benefit.”

Inclusion and exclusion criteria

We limited the search to articles that were published in English. Only those studies comparing medications for asthma were included. All full CEAs that incorporated decision analytic models were included; models including transition probabilities, simulations, and/or a decision tree were included. Review articles, editorials, study protocols, and letters were excluded. Duplicate studies were identified and removed. A full CEA study was defined as a study that reported both cost and clinical outcomes with at least 1 comparison group.

Outcome assessment strategy. We evaluated the outcomes used in asthma health economic studies in a systematic and transparent way by using the asthma-specific health outcomes recommendations adopted from the “Recommendations for classifying outcome measures for asthma health care utilization and costs for NIH-initiated clinical research: Adult and children populations” set forth by an expert group convened by the NIH and other federal agencies.¹⁰ Among the studies meeting our inclusion criteria, 3 health economists (P.D., C.H.K., and J.F.M.B.) evaluated whether each study was considered to be of sufficient quality using the asthma-specific health outcomes recommendations. A study was considered to be of sufficient quality in terms of health care utilization and cost if at least 1 NIH-recommended core outcome was reported and all 3 evaluators were in agreement regarding the satisfaction of the core outcome reporting. The assessment also included supplemental and emerging outcomes that were used to highlight potential areas that may provide useful insight and future direction for asthma CEAs. Below, we further describe the various categories of outcomes (ie, core, supplemental, and emerging) to focus the discussion surrounding the level of quality regarding asthma CEAs.

Core outcomes. The core outcomes¹⁰ include asthma-specific hospital admissions, emergency department (ED) visits, outpatient visits, medications, and intervention-specific resources. Inclusion of at least 1 of these core outcomes indicates the study to have sufficient quality in terms of using NIH-recommended core outcomes relevant to health care utilization and cost.

Asthma-specific hospital admissions as a core outcome was included if the length of stay, intensive care unit days, and/or alternatively, the average length of stay was reported.¹⁰ ED visits as a core outcome was considered to be included if the ED visit costs are reported. Outpatient visits as a core outcome was included if the count of scheduled, unscheduled, subspecialty, and/or remote visits was reported. Medications were considered to be included if the medication name, dose duration, and utilization by class of medication per person per year were reported. Last, intervention-specific resources as a core outcome were included if supplies (purchase cost), patient costs (time invested for treatment and travel), and/or

TABLE I. Cost-effectiveness analysis basics and definitions

Cost-effectiveness analysis is a formal method for comparing the benefits and costs of clinical intervention to its next best alternative to determine whether it is of sufficient value to adopt or reimburse.³ The main output from a cost-effectiveness study is the incremental cost-effectiveness ratio (ICER), which compares 2 alternative interventions' average cost and effects, which is used to inform decision makers with regard to the intervention's cost-effectiveness relative to the comparator. Typically, cost-effectiveness analysis expresses the denominator (effectiveness) of the ICER as a gain in health from measures such as “years of life,” “death averted,” and “quality-adjusted life-years (QALYs) gained” while the numerator of the ICER may be expressed in terms of the cost associated with the health gain. A special case of cost-effectiveness analysis is cost-utility analysis, in which the effects are measured in terms of years full of health lived (ie, utility), which is expressed using measures such as QALY or “disability-adjusted life-years.”

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