tional Asthma Education and Prevention Program (NAEPP) guidelines. The primary outcome evaluated at each injection visit was the number of symptomatic days in the previous 2 weeks. Numerous secondary outcomes were evaluated.

RESULTS. Compared with placebo, omalizumab treatment significantly reduced the mean number of symptomatic days per 2-week interval from 1.96 to 1.48, which is a 24.5% difference ($P < .001$). Significantly fewer exacerbations occurred during the treatment period in the omalizumab group; 30.3% of patients had an exacerbation compared with 48.8% of patients in the placebo group ($P < .001$). Similarly, the percentage of hospitalizations caused by asthma was 1.51% vs 6.3% in the placebo group ($P = .02$). Asthma control in the omalizumab group required significantly lower doses of inhaled glucocorticoids ($P < .001$) and long-acting β_2 agonists ($P = .003$). Finally, posthoc analysis revealed that omalizumab prevented the seasonal spikes in exacerbations seen in the placebo group. No differences in safety were seen.

CONCLUSIONS. Omalizumab improved asthma control in inner-city children, adolescents, and young adults when added to their previous guideline-based therapy.

REVIEWER COMMENTS. Omalizumab is an effective treatment option for patients with asthma and allergies whose conditions are not adequately controlled on guideline-based therapy. In this study, the effectiveness of omalizumab was shown at all levels of asthma severity. According to NAEPP guidelines, omalizumab is indicated for patients older than 11 years as a step 5 or 6 treatment option. Further data on the long-term safety of omalizumab in children is needed before we can fully advocate adjusting these current recommendations. Overall, this study provides us with further proof that the allergic component of asthma plays a key role in controlling this population's asthma. Further research to investigate the potential use of omalizumab for preventing seasonal peaks would also be beneficial at this time.

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Cost-effectiveness of Metered-Dose Inhalers for Asthma Exacerbations in the Pediatric Emergency Department

Doan Q, Shefrin A, Johnson D. *Pediatrics.* 2011;127(5). Available at: www.pediatrics.org/cgi/content/full/127/5/e1105

PURPOSE OF THE STUDY. To compare the incremental cost and effects (eg, averted admission to hospital) of using a metered-dose inhaler (MDI) against wet nebulization to deliver bronchodilators for the treatment of mildly to moderately severe asthma in pediatric emergency departments (EDs).

STUDY POPULATION. The population was obtained from a Cochrane systematic review in which the efficacy of using MDIs versus nebulizers for the delivery of albuterol to children who presented to the ED with asthma were compared.

METHODS. Cost data were obtained from hospitals and regional authorities involved in the Cochrane review studies. The incremental cost-effectiveness ratio was determined, and Monte Carlo simulations were used to perform probabilistic sensitivity analyses.

RESULTS. Using MDIs in the ED versus wet nebulization might result in a net savings of $154.95 (Canadian dollars [CAN$]) per patient. Models suggest that using MDIs is both more effective and less costly than wet nebulization. Sensitivity analyses revealed that MDIs would remain the better strategy even if the net cost of using an MDI was CAN$70 more expensive than using nebulized bronchodilators.

CONCLUSIONS. Using MDIs with spacers instead of wet nebulizers to deliver albuterol to treat children with mild-to-moderate asthma exacerbations in the ED could lead to significant cost savings.

REVIEWER COMMENTS. Although not statistically significant ($P = .062$), the MDI protocol was more likely to prevent hospital admission than using nebulized bronchodilators. Each hospitalization averted would save CAN$2499. At the same time, using albuterol MDI (CAN$262.73) versus albuterol via nebulizer (CAN$417.68) for acute asthma in the ED would also be less expensive (net cost savings: CAN$154.95). The authors noted that these results are only generalizable to single-payer health care models similar to those assessed in Canada.

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Cost-effectiveness Analysis of Fluticasone Versus Montelukast in Children With Mild-to-Moderate Persistent Asthma in the Pediatric Asthma Controller Trial

Wang L, Hollenbeak CS, Mauger DT, et al; Childhood Asthma Research and Education Network of the National Heart, Lung, and Blood Institute. *J Allergy Clin Immunol.* 2011;127(1):161–166

PURPOSE OF THE STUDY. To compare the cost-effectiveness of 2 commonly used asthma controllers, fluticasone and

montelukast, in a population of pediatric patients with mild-to-moderate persistent asthma.

STUDY POPULATION. A total of 154 patients (aged 6–14 years) who participated in the Pediatric Asthma Controller Trial (PACT) were included in the study.

METHODS. This study extracted data from the PACT study, a randomized controlled, double-blind, multicenter trial that studied treatment regimens in children with mild-to-moderate persistent asthma. Both effectiveness and cost measures were used to determine a cost-effectiveness analysis of the 2 controller medications: fluticasone (100 μg twice daily) and montelukast (5 mg daily), given for 48 weeks. Effectiveness measures included (1) asthma-control days (ACDs), (2) improvement in forced expiratory volume in 1 second (FEV_1), and (3) the number of exacerbations avoided. Cost measures were taken from (1) direct costs from a third-party payer's perspective, including the sum of costs from asthma-related medication, emergency department visits, and regular physician's office visits, and (2) societal costs, which were the direct costs plus productivity losses from asthma-related missed school or work. Cost-effectiveness analysis was then used to compare the effectiveness of the different treatments relative to their costs. Cost-effectiveness analysis was also performed for subgroups on the basis of the phenotypic factors of exhaled nitric oxide (eNO) and the provocative concentration that causes a 20% decrease (PC_{20}) in the forced expiratory volume in 1 second (FEV_1).

RESULTS. Of the 154 patients analyzed, 79 received fluticasone and 75 received montelukast. There were no statistical differences in demographics among the participants. When effectiveness measures were compared, fluticasone showed significantly higher effectiveness with respect to ACDs, improvement in FEV_1, and the number of asthma exacerbations ($P < .01$). Direct costs during the study period were \$759 for fluticasone and \$1189 for montelukast ($P < .001$). Societal costs were \$1075 for fluticasone and \$1673 for montelukast ($P < .001$). Thus, fluticasone was shown to be more cost-effective. In the subgroup analysis, fluticasone was more cost-effective compared with montelukast for the subgroups with high eNO levels (eNO $\geq$ 25 ppb) and more-responsive PC_{20} ($PC_{20} < 2$ mg/mL).

CONCLUSIONS. In children with mild-to-moderate persistent asthma, fluticasone had lower cost and higher effectiveness when compared with montelukast, especially in patients with more airway inflammation and more responsivity to methacholine.

REVIEWER COMMENTS. Few evaluations exist for the cost-effectiveness of asthma controller regimens for children. The results of the study were consistent with the National Asthma Education and Prevention Program guidelines, which recommend inhaled corticosteroid monotherapy as the preferred asthma controller option for mild-to-moderate persistent asthma in children.

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Relationship of Asthma Management, Socioeconomic Status, and Medication Insurance Characteristics to Exacerbation Frequency in Children With Asthma

Ungar WJ, Paterson JM, Gomes T, et al. *Ann Allergy Asthma Immunol.* 2011;106(1):17–23

PURPOSE OF THE STUDY. To identify factors associated with severe asthma exacerbations in children as measured by the number of emergency department (ED) visits and hospitalizations.

STUDY POPULATION. Asthmatic children aged 1 to 18 years were enrolled from specialty and family practice hospital-based outpatient clinics and 2 EDs in Ontario, Canada, from November, 1, 2000, through March 31, 2003.

METHODS. Data regarding demographics, socioeconomic status, drug plan characteristics, health status, health utilization, and symptom data were collected during this retrospective cohort study. These data were compared with data on asthma ED visits and hospitalizations in the full group and a subgroup with prescription drug coverage.

RESULTS. Complete data were available from 490 patients. Fewer exacerbations were associated with medium/high income, older children, recruitment from a physician's office or asthma clinic, and having an action plan. Previous ED visits, pet ownership, nebulizer use, asthma education, and younger age were associated with more exacerbations. A history of food, medication, and insect allergies were associated with 52% more exacerbations. In the drug-plan subgroup, girls had 26% fewer exacerbations, and the rate of asthma exacerbations increased by 14% for every 1% increase in the proportion of income spent on prescription medicines.

CONCLUSIONS. Exacerbations that required urgent care were associated with asthma history, disease-management factors, and socioeconomic status. Because families with drug plans paid a higher proportion of household income for asthma medicines, there was a significant association with more exacerbations.

REVIEWER COMMENTS. This study demonstrates what clinicians see in clinical practice: cost-shifting often leads to rationing and underuse of needed medicines by our patients. We need to assess medication use and educate

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Amaziah Coleman and Stacie M. Jones

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