

## Effect of Cost-Sharing on Use of Asthma Medication in Children

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### Abstract

**Objective**—To examine the effect of cost-sharing on the use of asthma medications in asthmatic children. According to asthma guidelines, children with asthma may require treatment with multiple medications, including controllers and relievers, to achieve optimal control. Although families may be enrolled in drug benefit plans, impediments to access persist in the form of cost-sharing.

**Design**—Population-based retrospective cohort study of children by analysis of administrative medication insurance claims data.

**Setting**—Ontario, Canada.

**Participants**—A cohort of 17 046 Ontario children with asthma enrolled in private drug plans.

**Main Exposure**—We used data on out-of-pocket expenses and reimbursement for medications to classify children as having zero, low (<20%), or high (≥20%) levels of cost-sharing.

**Main Outcome Measures**—We examined use of bronchodilators, inhaled corticosteroids, leukotriene receptor antagonists, oral corticosteroids, and combination agents. Multiple linear and logistic regressions compared medication use between cost-sharing groups, controlling for age and sex.

**Results**—The annual number of asthma medication claims per child was significantly lower in the high cost-sharing group (6.6) compared with the zero (7.0) and low (7.2) cost-sharing groups

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( $P < .001$ ). Children in the high cost-sharing group were less likely to purchase bronchodilators, inhaled corticosteroids, and leukotriene receptor antagonists compared with the low cost-sharing group (odds ratio, 0.76; 95% confidence interval, 0.67–0.86) and were less likely to purchase dual agents compared with the low cost-sharing group (odds ratio, 0.70; 95% confidence interval, 0.66–0.75).

**Conclusion**—The cost-sharing level affected the use of asthma medication, with the highest cost-sharing group exhibiting significantly lower use of maintenance medications and newer dual agents.

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The US National Asthma Education and Prevention Program Guidelines for the treatment of pediatric asthma advocate daily therapy with inhaled corticosteroids for the management of persistent asthma in children.<sup>1</sup> This is reiterated by Canadian and international guidelines.<sup>2,3</sup> Despite the availability of guidelines, a substantial proportion of children do not receive inhaled corticosteroids, and asthma morbidity continues to contribute to unnecessary hospitalizations and high costs.<sup>4–8</sup> Optimal use of prescribed medications depends in part on access to a medication insurance plan. Even among families with insurance, barriers to access may remain if needed drugs are not on the drug plan formulary or if cost-sharing in the form of deductibles, coinsurance, and/or fixed co-payments is required. There is movement toward tiered drug plans and greater cost-sharing in US managed care programs, but there is limited information regarding how such policies affect the health of children with chronic diseases. Our objective was to examine the effect of cost-sharing on the use of asthma medications in children.

## METHODS

### STUDY DESIGN

A retrospective cohort study was performed using population-based health administrative data. The study was approved by the Research Ethics Board of The Hospital for Sick Children.

### DATA SOURCES

Data were obtained from a private population-based drug insurance claims database.<sup>9</sup> The database contains claims data from privately insured direct-pay drug plans in the province of Ontario. Although all Ontario residents have publicly financed health insurance for hospital, physician, diagnostic, and laboratory services, public drug insurance is not available to children unless their parents are receiving social assistance or experience catastrophic drug costs. Thus, most Ontario children receive drug benefits through private insurers. Under direct payment plans, after an individual obtains a prescription drug from a pharmacy, the pharmacy submits a claim for patient reimbursement directly to the plan administrator. Each claim includes information about the age and sex of the claimant; the name, strength, and amount of the drug dispensed; the number of days of medication supplied; the dispensation date; the total amount paid; and the claimant's share of the amount paid. The diagnosis and indication are not captured. The study database did not include claims from public sector drug plans. Costs are given in 2003 Canadian dollars.

## STUDY DRUGS

A comprehensive list of all formulations of prescription asthma medications licensed in Canada was compiled. Medications were classified into the following 4 therapeutic classes: bronchodilators, anti-inflammatories, leukotriene receptor antagonists, and oral corticosteroids. Bronchodilators included short-acting  $\beta_2$ -agonists, long-acting  $\beta_2$ -agonists, anticholinergics, and xanthines. Anti-inflammatory medications were further classified into inhaled corticosteroids (including combination agents), mast cell stabilizers, and ketotifen fumarate. Ketotifen inhibits inflammatory mediators and, as a liquid formulation, is considered a useful marker drug for asthma in very young children and infants (Table 1).

## PATIENT SELECTION

Subjects were selected using a validated algorithm for identifying children with asthma in an administrative medication claims database.<sup>10,11</sup> The study cohort consisted of girls and boys aged 2 to 14 years at the time of their first (index) asthma medication claim who were Ontario residents. As an indication of continuous drug program enrollment, subjects had to have filled at least 1 prescription for any drug (including study drugs) in each of the two 6-month periods preceding the index claim and in each of the 3 consecutive 6-month periods after the index claim. Claimants who did not satisfy these conditions were excluded from the analysis (eg, claimants who changed plans or moved out of the province). Children who subscribed to multiple drug plans were excluded. Only claims for which the same carrier was the payer for all prescriptions were tracked.

Prevalent asthma cases were included. This was defined by a requirement for at least 1 claim for an asthma medication in the 12 months before the index medication use. Index asthma medication use was defined as at least 1 prescription for a long-acting  $\beta_2$ -agonist, an inhaled corticosteroid, nedocromil sodium, cromolyn sodium (sodium cromoglycate), ketotifen (inflammatory mediator inhibitor), or a leukotriene receptor antagonist. For those patients who did not have a claim for 1 of the drug classes above but who did have a claim for a short-acting  $\beta_2$ -agonist, anticholinergic, or xanthine, a second prescription for a long- or short-acting bronchodilator, an inhaled corticosteroid, nedocromil, cromolyn, ketotifen, a leukotriene receptor antagonist, or an oral corticosteroid within 1 year of the bronchodilator prescription was required. This was because a single claim for a short-acting bronchodilator may reflect acute bronchitis or other acute respiratory conditions other than asthma. To be eligible, index asthma medication claims had to have been made from January 1 to December 31, 2002. The earliest claims in that period qualified as index medication use. Each patient was followed up for 1 year after the index claim.

## DETERMINATION OF COST-SHARING

All prescription claims for each eligible patient that occurred during the 1-year follow-up were extracted. The out-of-pocket expense and the dollar amount reimbursed related to each claim were identified. Cost-sharing could occur in one of the following 3 forms: (1) as a copayment equal to a fixed dollar amount or the dispensing fee, (2) as a percentage of the prescription cost (coinsurance), or (3) as a deductible. Regardless of the actual mechanism of cost-sharing experienced by the claimant, an average statistical cost-sharing amount, in percentage terms, was computed from all claims recorded during the follow-up period as the

difference between the total dollar amount paid by the claimant during the study period and the total dollar amount reimbursed to the claimant during the study period, times 100, divided by the total dollar amount paid by the claimant during the study period.

The dispensing fee was considered part of the medication price. A cost-sharing percentage was established for each study participant, and participants were stratified into the following 3 groups according to the cost-sharing level: zero cost-sharing, less than 20% (low cost-sharing), and 20% or greater (high cost-sharing). Cost-sharing levels were categorized to facilitate analysis, interpretation, and comparison with existing drug plans. Although 20% or greater may not be a high level of cost-sharing in an absolute sense, this cutoff was used for the high category to be consistent with a common coinsurance level and because it would be important to know if an effect was present at a lower limit of high cost-sharing.

## ANALYSIS

Asthma phenotypes differ between younger and older children, and this difference may influence medication management strategies. In addition, sex-related differences in asthma morbidity are well known, with boys experiencing more hospitalizations.<sup>12</sup> Thus, all analyses were stratified by sex and by age group, where age was established at the time of index medication use.

The use of bronchodilators, anti-inflammatories, leukotriene receptor antagonists, oral corticosteroids, and combinations agents were examined. The distributions of claimants across the various therapeutic classes were analyzed and stratified by sex and age group. It was hypothesized that differences in medication use patterns between cost-sharing groups would be low for inexpensive drugs for which many generic equivalents are available, such as albuterol sulfate (salbutamol sulfate). It was similarly hypothesized that a cost-sharing effect would be manifest for more expensive name-brand drugs, such as the inhaled corticosteroids, resulting in fewer children using these drugs in the high cost-sharing category. Multiple linear and logistic regression models were constructed to compare medication use for each therapeutic class between cost-sharing groups controlling for age and sex.

## RESULTS

Ontario is the largest province in Canada, with a population of 2.26 million children and adolescents younger than 15 years.<sup>9</sup> The total number of Ontario pediatric claimants captured in the database during the study period was 484 013. Of these, 17 046 met the criteria for prevalent asthma (3.52%). The sample characteristics are summarized in Table 2. Of the total study sample, 32.47%, 49.34%, and 18.20% were classified in the zero, low, and high cost-sharing groups, respectively. A higher proportion of children in the high cost-sharing group were younger than 5 years, resulting in a slightly younger average age in this group. Distributions of boys and girls were similar. More than 60% of all participants were male, a finding consistent with those of the epidemiologic studies of asthma in children.<sup>13,14</sup> Almost half of the low cost-sharing group had a level of cost-sharing that was less than 5%. Most of the high cost-sharing group had a level of cost-sharing in the range of 20% to 25%.

Slightly less than one-fifth of the high cost-sharing group had average annual cost-sharing of 30% or more.

Overall, children belonging to a private drug benefits plan appeared to have good management of their asthma, with 82.58% receiving a controller medication (ie, an inhaled corticosteroid or a leukotriene receptor antagonist). Sixteen percent of the sample received prescriptions for a drug within each of the 3 asthma medication classes (bronchodilators, inhaled corticosteroids, and leukotriene receptor antagonists) during the study year. Despite the high rate of controller use, 15.84% of the cohort filled a prescription for an oral corticosteroid during the study year, suggesting the occurrence of a severe exacerbation.

Table 3 provides the mean annual number of claims for asthma medications per child by age group, examined by multiple linear regression. In the model, the main effect of the cost-sharing group was significant ( $P<.001$ ), with children in the highest cost-sharing group exhibiting significantly fewer claims than those in the low or zero cost-sharing groups. The effect was most pronounced in the oldest group. Boys in the high cost-sharing group had an average of 6.8 claims during the study year, compared with 8.1 claims in the low cost-sharing group.

The effect of cost-sharing on the acquisition of bronchodilators is presented in Table 3. In a multiple linear regression model of bronchodilator claims, age group had a significant effect ( $P<.001$ ), with older children demonstrating more claims than younger children. As hypothesized, differences in medication use between cost-sharing groups were small, although the effect was significant for this class of medications ( $P=.005$ ), which consisted mostly of inexpensive generic equivalents of albuterol.

Many children use multiple medications to control their asthma. Table 4 provides the proportions of children who received 1 or more bronchodilators, anti-inflammatory agents, and leukotriene antagonists during the study period by age group and cost-sharing level. There was a strong age effect, with more than 15% of the oldest children using this medication combination compared with less than 7% of the youngest children. Few anti-inflammatory agents and no leukotriene antagonists were available in generic form during the study period. Logistic regression demonstrated that, compared with the low cost-sharing group, the high cost-sharing group was significantly less likely to purchase 1 or more bronchodilators, an anti-inflammatory agent, and a leukotriene antagonist (odds ratio, 0.76; 95% confidence interval, 0.67–0.86).

Although costly, dual-agent inhalers that combine long-acting  $\beta_2$ -agonists and inhaled corticosteroids in a single inhaler can enhance treatment adherence by reducing the number of concomitant medications that must be administered. These drugs are not indicated for children younger than 5 years. As seen in Table 5, the percentage of total claims for these medications was greatest in the oldest group. In a logistic regression, there was a significant cost-sharing effect, with reduced medication use in the high cost-sharing group compared with the low cost-sharing group (odds ratio, 0.70; 95% confidence interval, 0.65–0.75).

The use of oral corticosteroids serves as a useful marker for acute exacerbations. In contrast to the dual agents, prednisone is an older agent with inexpensive generic formulations

available. It is usually prescribed for a short course of 5 to 10 days. As seen in Table 5, use of oral corticosteroids as a proportion of all asthma medication claims was highest in the youngest age group because children younger than 5 years experience the most asthma exacerbations. Overall, there were no significant effects by cost-sharing group.

## COMMENT

The findings indicated that, for inexpensive medication classes for which generic equivalents exist, such as bronchodilators and oral corticosteroids, cost-sharing had limited impact on medication use in children with asthma. For more expensive brand-name inhaled corticosteroids and combination agents, cost-sharing of 20% or higher significantly deterred use. In the high cost-sharing group, the average copayment was only 25%. In private plans in the United States, tiered copayments may reach 24% in 2-tier plans and 35% in 3-tier plans for patients with chronic disease.<sup>15</sup> These rates are consistent with cost-sharing rates found in Europe.<sup>16</sup> Thus, the deterrent effect observed in the present study may be considered a lower limit.

The results did not demonstrate a dose-response effect. Medication use in the low cost-sharing group was usually greater than in the high cost-sharing group but also greater than in the zero cost-sharing group. This was a result of using a statistical cost-sharing percentage rather than directly comparing different cost-sharing schemes involving diverse arrays of deductibles, fixed copayments, and coinsurance. The distributions of cost-sharing schemes differed across the cost-sharing groups. The low cost-sharing group included a mix of claimants with deductibles and no copayments and those with co-payments and no deductibles. Families with low deductibles and no copayment theoretically could display greater rates of medication use compared with the zero cost-sharing group because subscribers strive to clear the deductible. In contrast, the high cost-sharing group consisted mostly of claimants with deductibles and fixed copayments or with deductibles and coinsurance. Further research is required to dissect the disparate effects on medication acquisition of various combinations of deductibles, fixed copayments, and coinsurance.

The data did not allow for controlling for disease severity, an important determinant of medication use. There are some private drug plans that allow subscribers to choose lower copayment schemes at the price of higher premiums. If allowed a choice, it is possible that parents of children with more severe asthma may choose plans with higher premiums but lower copayments in anticipation of a high rate of expensive medication use. So far in Canada, multitier-based or preferred drug lists do not exist. Moreover, relative to many US plans, Canadian employer-sponsored drug plans tend to provide fewer options and less flexibility with respect to cost-sharing. In Ontario, the dispensing of a generic equivalent of a drug is common unless the prescriber expressly advises no substitution or the subscriber requests a brand-name drug. Although the distribution of the 3 age groups was the same for the zero and low cost-sharing groups, the high cost-sharing group had more younger children (aged 2 to <5 years) and fewer older children compared with the other groups. Because more severe asthma occurs in younger children, this suggests that parents of more severely ill children were generally not able to opt for low cost-sharing schemes. The presence of potential confounding by severity requires further study.



Clear age group differences in medication use were observed in the study. Children younger than 4 years can experience the most severe asthma and demonstrate the highest costs.<sup>8,12</sup> Asthma is difficult to diagnose in these children because of difficulties reporting symptoms or measuring lung function. The asthma of young children may therefore be inadequately controlled, resulting in high rates of emergency department use.<sup>12</sup> This was supported by the present finding that the youngest age group demonstrated the highest use of oral corticosteroids. Differences in medication use rates between age groups also reflect age-related differences in the ability to use inhalers, the approved age limits of particular products, the child's stage of physiological development, and the child's reliance on parents for assistance in drug administration. Children of different ages have different needs that must be recognized with respect to access and treatment.

It is known that patients will reduce consumption of health care resources when faced with cost-sharing.<sup>17</sup> There has been a movement in the United States toward multitier drug plans with varying levels of cost-sharing. Families who fail to meet the criteria for low deductibles or who have members requiring multiple medications, such as patients with asthma, will be more affected by cost-sharing. Different cost-sharing mechanisms create distinct incentives for reducing medication use or substituting other forms of health care for medication consumption, such as emergency department visits.

In a study evaluating the introduction of premiums and larger deductibles for senior citizens and social assistance recipients who purchased medications through a provincial public drug plan, the purchase of expensive medications was reduced by 34% to 37% compared with 27% to 32% for inexpensive medications.<sup>18</sup> Essential medication use declined by 12% to 17%, whereas less essential medication use declined by 20% to 29%. The greatest reduction was observed for persons with the highest annual deductible. The new policy was associated with a 47% increase in emergency department visits; a 66% increase in admissions, institutionalizations, and deaths outside a health care facility; and a 111% increase in out-patient physician visits in senior citizens receiving essential medications for asthma, epilepsy, heart disease, and diabetes mellitus.

The effect of cost-sharing on asthma medication use has been studied in adults. A 1992 study<sup>19</sup> found that a modest increase in fixed copayments from NZ\$5 to NZ\$15 did not affect the demand for prescribed asthma drugs in New Zealand. Similarly, a US study found that, although out-of-pocket payments for inhaled corticosteroids increased from 1995 to 2000, use of medications by patients did not change. That study recognized physician practice patterns as a key determinant of asthma medication use.<sup>20</sup> In contrast, a retrospective study of a large pharmacy claims database containing data from 52 US health care plans found that the number of days of supplied asthma medications decreased by 32% when co-payments doubled.<sup>21</sup> Compared with adults with private or public medication insurance, higher proportions of uninsured self-pay patients with asthma reported reduced drug administration and reported delaying or not filling asthma medication prescriptions.<sup>22</sup> In a large population-based study<sup>23</sup> of the effect of introducing cost-sharing to asthmatic social assistance recipients in Quebec, inhaled corticosteroid use decreased by 37%.

There have been few studies of the effect of drug plan characteristics on families and children.<sup>24</sup> A small number of studies examined the use of asthma medication in children enrolled in different types of managed care or health insurance plans.<sup>25–29</sup> Those studies found that access to prescription drugs frequently differed by the type of health plan or provider organization. Adequate family income was an important determinant of access to and receipt of prescriptions. In an analysis of inhaled corticosteroid use after a change in a provincial drug benefit policy from a fixed deductible and copayment system to an income-based deductible, it was found that children with severe asthma were less likely to receive prescriptions for inhaled corticosteroids after the policy change. Among those who received prescriptions, there was a reduction of more than 15% in the mean number of annual doses.<sup>10</sup> In an early comparison of pediatric medication use by cost-sharing level among children enrolled in 5 different drug benefit plans, higher out-of-pocket expenses were associated with greater use of generic drugs and lower plan expenditures.<sup>30</sup> A study examining the effect of 3-tier formularies on medication use in children with attention-deficit/hyperactivity disorder found that, among children who were moved from a 1-tier to a 3-tier plan, the probability of medication used dropped by 17%, with a 20% decrease in plan expenditures compared with a control group. The reduction in plan expenditures was associated with significant cost shifting to families.<sup>31</sup>

The clinical relevance of the observed differences in asthma medication use by level of cost-sharing remains unknown. Similarly, it is difficult to comment on whether there was true underuse in the high cost-sharing group. The fact that 80% of our study cohort received at least 1 prescription for a controller is encouraging. The high proportion of children using oral corticosteroids, particularly in the youngest children, suggests that control remains inadequate. There was no information available on adherence to medication regimens, only on claims filled. In addition, adherence and rates of refill were not measured, precluding comparisons with other studies. This remains a limitation. Using claims data based on filled prescriptions is superior to using physician prescribing data. The study did not examine the effects of very high cost-sharing levels. The high cost-sharing group in this study was associated with an average level of cost-sharing of 25%, and a statistically significant effect was observed. The results may thus represent a lower limit of cost-sharing effects on pediatric asthma medication use. Although there are important differences in health care systems between the United States and Canada, the provision of pharmaceutical benefits is not one of them. In most Canadian provinces, parents must obtain private health insurance to cover their children's medication costs or pay out-of-pocket. Treatment guidelines for pediatric asthma are very similar in the United States<sup>1</sup> and Canada,<sup>2</sup> and thus our results may be broadly generalizable with respect to cost-sharing effects in children with asthma. Socioeconomic status is a known confounder for health outcomes in children with asthma.<sup>30–34</sup> It was not possible to control for socioeconomic status. However, because the analysis was based on subscribers to large private drug plans for employed persons, extreme effects of poverty and/or unemployment were not expected. It would have been useful to examine the effect of cost-sharing on health services markers of asthma morbidity such as emergency department visits and hospital admissions for asthma. Unfortunately, it was not possible to link this private payer data set with the public payer data on health services use.



In conclusion, drug plan managers should consider the effects that medication cost-sharing levels may have on health outcomes in children with asthma, particularly with regard to the use of controller medications. Ideally, the provision of pharmaceutical benefits to children should be integrated with family asthma education and asthma disease management programs to promote optimal asthma control.

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Table 1

## Target Drug List

Therapeutic Class	Therapeutic Group	Generic Name
Anti-inflammatories <sup>a</sup>	Ketotifen fumarate	Ketotifen fumarate
	Inhaled corticosteroids	Beclomethasone dipropionate, flunisolide, fluticasone propionate, triamcinolone acetonide, combined budesonide and formoterol fumarate dihydrate (Symbicort), <sup>c</sup> combination of fluticasone and salmeterol xinafoate (Advair) <sup>c</sup>
	Mast cell stabilizers	Nedocromil sodium, cromolyn sodium (sodium cromoglycate)
Leukotriene antagonists <sup>a</sup>	Leukotriene antagonists	Montelukast sodium, zafirlukast
Bronchodilators <sup>a</sup>	Anticholinergics	Ipratropium bromide, tiotropium bromide monohydrate
	Long-acting $\beta_2$ -agonists	Formoterol, salmeterol
	Short-acting $\beta_2$ -agonists	Fenoterol hydrobromide, orciprenaline sulfate, albuterol sulfate (salbutamol sulfate), terbutaline sulfate, combination of fenoterol and ipratropium (Duovent), <sup>d</sup> combination of albuterol and ipratropium (Combivent) <sup>d</sup>
	Xanthines	Aminophylline, oxtriphylline, theophylline
Oral corticosteroids <sup>b</sup>	Oral corticosteroids	Dexamethasone, hydrocortisone sodium succinate, methylprednisolone sodium succinate, prednisone, prednisolone sodium phosphate

<sup>a</sup>Included on index target drug list.

<sup>b</sup>Because injectable corticosteroids are usually dispensed in the hospital, claims for these products were not included.

<sup>c</sup>Claims for Symbicort (AstraZeneca Canada Inc, Mississauga, Ontario, Canada) and Advair (GlaxoSmithKline, Mississauga) were treated as 2 claims, one for inhaled corticosteroids and the other for long-acting  $\beta_2$ -agonists.

<sup>d</sup>Claims for Duovent (Boehringer Ingelheim [Canada] Ltd, Burlington, Ontario, Canada) and Combivent (Boehringer Ingelheim [Canada] Ltd) were treated as 2 claims, one for short-acting  $\beta_2$ -agonists and the other for an anticholinergic.

**Table 2**Group Characteristics<sup>a</sup>

Characteristics	Cost-Sharing Group		
	Zero (n=5534)	Low (< 20%) (n=8410)	High ( 20%) (n=3102)
Age, y			
2 to < 5	23.00	22.22	27.47
5 to < 10	42.70	44.66	43.42
10 to 14	34.30	33.12	29.11
Mean (SD) age	7.7 (3.6)	7.7 (3.5)	7.3 (3.5)
Sex <sup>b</sup>			
Male	61.89	61.37	62.83
Female	37.42	37.91	36.17
Cost-sharing <sup>c</sup>			
< \$50	100.00	87.07	56.64
\$50 to < \$100	0.00	9.14	23.37
\$100	0.00	3.78	19.99
% of cost-sharing			
< 5	100.00	42.77	0.00
5 to < 10	0.00	18.51	0.00
10 to < 20	0.00	38.72	0.00
20 to < 25	0.00	0.00	67.31
25 to < 30	0.00	0.00	13.67
30	0.00	0.00	19.02
Mean % of cost-sharing	0.00	7.70	25.25

<sup>a</sup>Unless otherwise indicated, data are expressed as percentage of patients. Because of rounding, percentages may not total 100.

<sup>b</sup>The sex of 1% of the claimants was not recorded.

<sup>c</sup>Indicates dollar expenditures on asthma medications per claimant per year, expressed as 2003 Canadian dollars.

**Table 3**

All Asthma Medication Claims and Bronchodilator Claims per Child per Year, by Age Group and Cost-Sharing Level

Cost-Sharing Category	Mean (SD) No. of Claims per Child per Year	
	All Asthma Medication Claims	Bronchodilator Claims
All children		
Zero	7.3 (6.0)	2.9 (3.0)
Low (<20%)	7.5 (6.0)	3.0 (3.2)
High ( 20%)	6.9 (5.6)	2.7 (2.9)
Children aged 2 to <5 y		
Zero	6.6 (5.3)	2.5 (2.4)
Low (<20%)	6.8 (5.5)	2.6 (2.5)
High ( 20%)	6.2 (4.5)	2.4 (2.2)
Children aged 5 to <10 y		
Zero	7.1 (5.7)	2.7 (2.7)
Low (<20%)	7.3 (5.8)	2.7 (2.9)
High ( 20%)	6.9 (5.9)	2.6 (2.9)
Children aged 10 to 14 y		
Zero	7.9 (6.7)	3.5 (3.6)
Low (<20%)	8.2 (6.6)	3.7 (3.8)
High ( 20%)	7.4 (6.1)	3.2 (3.4)

**Table 4**

Children With Concomitant Prescriptions for Bronchodilators, Anti-inflammatories, and Antileukotrienes, by Age Group and Cost-sharing Level

Cost-sharing Category	% of Children
All children	
Zero	13.73
Low (<20%)	15.78
High ( 20%)	11.93
Children aged 2 to <5 years	
Zero	6.60
Low (<20%)	6.47
High ( 20%)	4.93
Children aged 5 to <10 years	
Zero	14.22
Low (<20%)	16.56
High ( 20%)	13.21
Children aged 10 to 14 years	
Zero	17.91
Low (<20%)	20.97
High ( 20%)	16.61



**Table 5**

Claims for Dual-Agent Long-Acting  $\beta_2$ -agonists and Inhaled Corticosteroids and for Oral Corticosteroids, by Age Group and Cost-Sharing Level

Cost-Sharing Category	% of Claims	
	Combination Long-Acting $\beta_2$ -agonists and Inhaled Corticosteroids	Oral Corticosteroids
All children		
Zero	6.45	3.28
Low (<20%)	7.00	3.72
High ( 20%)	4.66	3.64
Children aged 2 to <5 y		
Zero	0.88	5.43
Low (<20%)	1.01	6.68
High ( 20%)	0.38	5.58
Children aged 5 to <10 y		
Zero	5.49	3.23
Low (<20%)	5.84	3.51
High ( 20%)	3.98	3.38
Children aged 10 to 14 y		
Zero	11.03	2.01
Low (<20%)	12.17	2.16
High ( 20%)	9.36	2.36