Comparing Asthma Care for Medicaid and Non-Medicaid Children in a Health Maintenance Organization

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Objective: To compare ambulatory visit patterns, rates of medication use, and emergency department and hospital utilization for children with asthma covered under Medicaid and commercial payers within the same health maintenance organization (HMO).

Design: Retrospective cohort study.

Setting: Eleven staff-model pediatric departments of an HMO.

Patients: A total of 1928 Medicaid and 11007 non-Medicaid children aged 2 to 18 years with at least 1 encounter with a diagnosis of asthma between October 1, 1991, and September 30, 1996.

Methods: We linked patient-level data from the HMO’s automated medical record system for ambulatory encounters, a claims system for emergency department and hospital care, and an automated pharmacy dispensing database. Medicaid and non-Medicaid patients were compared for all encounter types and for prescribing and dispensing of β-agonist and controller medications (inhaled corticosteroids and cromolyn sodium). Incidence rate ratios were calculated from Poisson regression models to control for age, sex, and, when appropriate, β-agonist dispensing rate. The number of refills authorized on each prescription and the fraction of medications dispensed as refills compared with new prescriptions were compared for Medicaid and non-Medicaid patients.

Results: Medicaid-insured children in the HMO were 1.4 times (95% confidence interval, 1.2-1.5) more likely to receive care in emergency departments and 1.3 times (95% confidence interval, 1.1-1.5) more likely to be hospitalized for their asthma compared with non-Medicaid members. Medicaid and non-Medicaid enrollees had similar yearly rates of nonurgent (1.32 vs 1.17) and urgent (0.38 vs 0.31) ambulatory visits. β-Agonists were dispensed roughly equally to Medicaid and non-Medicaid members. Although Medicaid patients were less likely to have controller medications dispensed (relative risk, 0.72; 95% confidence interval, 0.69-0.74), they were equally likely to have them prescribed.

Conclusions: Differences in ambulatory contact for Medicaid members do not explain the higher rates of emergency department visits and hospitalization in this population. Reasons for lower rates of dispensing of controller medications should continue to be investigated as one cause of increased morbidity for low-income children with asthma.


Asthma is the most common chronic illness among children and disproportionately affects low-income and minority populations. Poor children are also reported to have 40% higher rates of hospital care but 40% lower rates of preventive ambulatory services, raising questions of access to high-quality asthma care. Analyses of Medicaid claims data have confirmed high rates of hospitalization and infrequent prescribing of controller medications, which have been shown to decrease the number and severity of asthma exacerbations in children and the frequency of hospitalization. It remains unclear whether reported differences in care received by Medicaid and non-Medicaid patients reflect differences in care provided in practices caring primarily for low-income populations compared with private practice settings or whether differences by payment source exist within health care systems serving both groups.

State Medicaid programs, the primary providers of health insurance to low-income children, are increasingly turning to managed care programs in an effort to reduce costs and coordinate care. Studies directly comparing health maintenance organization (HMO) with fee-for-service care for pediatric Medicaid enrollees have shown mixed results. Be-
PATIENTS AND METHODS

POPULATION AND SETTING

We performed a retrospective cohort study of children enrolled in 11 staff-model pediatric departments (now Harvard Vanguard Medical Associates) of Harvard Pilgrim Health Care, a large managed care organization in New England. We included asthmatic children aged 2 to 18 years who were covered by the health plan between October 1, 1991, and September 30, 1996, for at least 365 days. Eligible observation time was calculated beginning on the date of the first asthma diagnosis at an ambulatory visit, ED encounter, or hospitalization, or the first dispensing of an asthma medication, and ending at each patient’s 18th birthday, the end of the study period, or at disenrollment from the plan. Enrollment files of the HMO were used to identify children covered under Medicaid at any time; these children were assigned to the Medicaid cohort for the entire study period. The total number of person-years contributed by the Medicaid and non-Medicaid groups serves as the denominator for all population-based rates.

Each pediatric department caring for these patients is located within a multispecialty health center with an on-site pharmacy. Evening and weekend urgent care is provided for all members at several health centers with extended hours, during which the pharmacies are also open. No copayments were required of Medicaid recipients for office visits or medications, and there were no formulary restrictions in effect for these patients. Emergency department visits and hospitalizations require referral or approval by a health plan clinician.

DATA SOURCES

Data about each patient were obtained from several databases, linked by a unique medical record number. Ambulatory clinical information was obtained from an automated medical record system used for all clinical encounters, described in detail elsewhere. Providers document encounters on a paper form that is subsequently input by medical records staff. The form allows selection of multiple diagnoses for each visit and entry of free text for history and physical examination findings. Diagnostic codes for asthma were used to identify routine and urgent ambulatory encounters. Emergency department and hospital claims were searched for International Classification of Diseases, Ninth Revision, diagnosis codes for asthma. Finally, asthma-related prescription medications, including bronchodilators (oral and inhaled), mast cell stabilizers (cromolyn sodium and nedocromil), and inhaled corticosteroids were identified from 2 independent sources. First, each prescription written by a clinician during in-person visits or telephone encounters is recorded in the automated medical record. Second, a separate system tracks medications dispensed by any of the health plan pharmacies, including initial filling of a prescription and filling of prescription refills. We analyzed separately the patterns of medication prescribing and dispensing. Inhaled corticosteroids and mast cell stabilizers were grouped to calculate rates of use of controller medications. Because of the infrequent use of theophylline as a first-line controller agent, we excluded it from our analysis.

ANALYSIS

Population-based rates of ambulatory visits (urgent and non-urgent), medications dispensed, and ED visits and hospitalizations represent the frequency of each event divided by the number of child-years contributed. We defined urgent visits to include those that occurred during evening or weekend hours at any of the health centers; nonurgent visits included those during regular hours that might have been for acute or nonacute asthma care. For each utilization and medication variable of interest, we first calculated unadjusted rates for Medicaid and non-Medicaid patients. Poisson regression was used to adjust for covariates including age and sex in each of the models. Age at the midpoint of observation time for each patient was entered as a continuous variable. The models for controller medication prescribing and dispensing outcomes also included the rate of β-agonist dispensing as an index of asthma control. Incidence rate ratios (IRRs) were calculated and are reported with 95% confidence intervals (CIs). Finally, patient race (for the 60% of patients for whom this information was available) was added to the final models to determine its impact on the parameter estimate for Medicaid status.

We examined the number of authorized refills on the first prescription of each medication type received by each patient. We also calculated the fraction of new prescriptions filled among all dispensings (the sum of new prescriptions filled and refills). Because these variables were not normally distributed, differences between Medicaid and non-Medicaid patients were assessed using the Wilcoxon rank sum test.

RESULTS

We identified 12935 children with asthma, 1928 of whom were covered under Medicaid at some time during the study period. On average, Medicaid members contrib-
Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Medicaid Patients (n = 1928)</th>
<th>Non-Medicaid Patients (n = 11007)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
<td>White</td>
<td>Nonwhite</td>
</tr>
<tr>
<td></td>
<td>5.9 ± 4.5</td>
<td>7.8 ± 4.9*</td>
</tr>
<tr>
<td>Sex</td>
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<td>1069 (55)</td>
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<tr>
<td></td>
<td>Female</td>
<td>859 (45)</td>
</tr>
<tr>
<td>Age, mean ± SD, y</td>
<td>2.61</td>
<td>3.01</td>
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</tbody>
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*R = .001. †For the 60% of the sample for whom data were available; P < .001.

Figure 1. Emergency department visits and hospitalizations for asthma. Incidence rate ratios (IRRs) (and 95% confidence intervals) compare Medicaid and non-Medicaid patients after adjustment for age and sex.

Figure 2. Asthma-related urgent and nonurgent visits for Medicaid vs non-Medicaid patients. Incidence rate ratios (IRRs) (and 95% confidence intervals) compare Medicaid and non-Medicaid patients after adjustment for age and sex.

Figure 3. Medication dispensing rates for Medicaid vs non-Medicaid patients. For β-agonists, incidence rate ratios (IRRs) (and 95% confidence intervals) compare Medicaid and non-Medicaid patients after adjustment for age and sex. For inhaled corticosteroids, cromolyn, and inhaled controllers, IRRs (and 95% confidence intervals) compare Medicaid and non-Medicaid patients after adjustment for age, sex, and β-agonist dispensing rate.

Rates of dispensing of reliever medications (β-agonists) and controller medications (inhaled corticosteroids and mast cell stabilizers) are shown in Figure 3. There was no difference in the dispensing rates of β-agonists, which averaged approximately 2 dispensings per year (age- and sex-adjusted IRR, 0.99; 95% CI, 0.97-1.0), or in the percentage of children who received 4 or more β-agonist dispensings per year, which was 13% in each group. However, Medicaid members were substantially less likely to receive cromolyn sodium (adjusted IRR, 0.65; 95% CI, 0.62-0.68) or inhaled corticosteroids (adjusted IRR, 0.81; 95% CI, 0.76-0.85). Taken together, inhaled controller medications were less frequently dispensed to the Medicaid population from health plan pharmacies (age- and sex-adjusted IRR, 0.72; 95% CI, 0.69-0.74). In contrast to dispensing rates, prescribing rates for the same asthma medications showed no deficit for the Medicaid population (Figure 4). Medicaid members had higher prescribing rates for β-agonists (adjusted IRR, 1.16; 95% CI, 1.13-1.19) and equal prescribing rates for controller medications (adjusted IRR, 0.99; CI, 0.95-1.04). Adding race, when available, to our mod-
els had no impact on the direction of effect of Medicaid status in all models for dispensing. The effect of Medicaid status on controller medication prescribing rates, which was not significant, became so after the addition of race, but the magnitude of these effects was small.

We examined whether the disparities between prescribing and dispensing were the result of the number of refills allowed on these prescriptions or of differing rates of refilling prescriptions. For β-agonists, 36% of prescriptions for Medicaid patients specified 0 refills and 42% specified 2 or more refills; 35% of prescriptions for non-Medicaid patients specified 0 refills and 44% specified 2 or more refills. Initial controller medication prescriptions (inhaled corticosteroids and cromolyn combined) specified 0 refills for 18% and 2 or more refills for 62% of Medicaid prescriptions compared with 22% with 0 refills and 59% with 2 or more refills for non-Medicaid patients. This suggests that differences in the prescribing of refills were not responsible for differential dispensing between these groups. However, Medicaid patients were significantly less likely to obtain refills of both β-agonists and controller medications from HMO pharmacies. Among Medicaid patients, 19% of β-agonist dispensings were refills compared with 23% for non-Medicaid patients (P < .001). For controller medications, 24% of Medicaid patients' dispensings were refills compared with 29% for non-Medicaid patients (P < .001).

The higher rates of ED visits and hospitalizations we observed among children insured through Medicaid are consistent with previously reported differences according to ethnic and socioeconomic factors. A study of adults in a prepaid health system showed that African Americans with asthma had more hospitalizations and fewer primary care asthma visits. Such findings are not surprising in light of the well-documented differences in general medical care between Medicaid recipients and those with other indicators of lower socioeconomic status compared with more advantaged patients. Unlike some of these studies, our results cannot be explained by differences in the health systems in which Medicaid recipients receive care. Furthermore, the differences we found cannot be attributed to overall rates of contact with primary care providers. Low-income children with asthma in this study had similar rates of contact with their primary care practice. In fact, Medicaid members with asthma had similar (or slightly higher) adjusted rates of daytime visits and similar rates of urgent care encounters at health centers compared with their non-Medicaid peers.

Appropriate pharmacotherapy is a critical component of effective asthma treatment and has been shown to significantly reduce rates of hospitalization. Our comparison showed equivalent age- and sex-adjusted rates of β-agonist dispensing among Medicaid and non-Medicaid patients with asthma, suggesting comparable access to prescription medications in the 2 groups. We found significant differences in dispensing rates of controller medications, although rates reported here for Medicaid patients were substantially higher than those reported in other low-income populations. However, we found no consistent differences in prescribing practices according to Medicaid insurance status.

One potential explanation for the different dispensing rates is that Medicaid patients did not fill prescriptions at health plan pharmacies because, unlike commercial insurers, the Medicaid program allowed them to use any pharmacy without penalty. Although differential use of non-HMO pharmacies might have caused relative underascertainment of dispensing among Medicaid members, we believe that this is unlikely to account for the observed pattern of dispensing compared with prescribing. Direct comparison of the HMO's dispensing records for child Medicaid members with asthma to Medicaid claims records showed that only 9% of dispensings occurred in pharmacies outside the HMO. We have no comparable independent measure of non-HMO pharmacy use by non-Medicaid members, but even if our records are assumed to be complete for non-Medicaid members, the difference in controller medication dispensing rates between Medicaid (0.69 per person-year) and non-Medicaid (0.91 per person-year) members is substantially larger than 8%. In addition, among Medicaid patients, the relative disparity between dispensing and prescribing of controller medications is greater than that for β-agonists. Both observations support the hypothesis that Medicaid members were somewhat less likely to fill or refill prescriptions for controller medications.

Our data show no substantial difference in the number of refills authorized by clinicians at the time prescriptions were written for controller medications but that a smaller fraction of available refills are actually used by patients in the Medicaid group. Although we have no direct information on why Medicaid patients did not refill prescriptions, this finding might reflect difficulties in adhering to chronic medication regimens among low-income children. Leickly et al, in a study of inner-city children with asthma, reported parental doubts regarding the usefulness of medications and concerns about adverse effects as common barriers to adherence.

In this study we assigned children insured through Medicaid at any time to the Medicaid group for the entire

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**Figure 4.** Medication prescribing rates for Medicaid vs non-Medicaid patients. For β-agonists, incidence rate ratios (IRRs) and (95% confidence intervals) compare Medicaid and non-Medicaid patients after adjustment for age and sex. For inhaled corticosteroids, cromolyn, and inhaled controllers, IRRs (and 95% confidence intervals) compare Medicaid and non-Medicaid patients after adjustment for age, sex, and β-agonist dispensing rate.
study period. This may have resulted in some misclassification that biased our results toward findings of no difference. We are further limited by not having data on the reasons that patients sought asthma care from their primary care practice or the content and quality of these visits. We have no independent measure of asthma severity beyond the rate of β-agonist dispensing, which serves as one measure of symptom burden. Finally, we lack information on many of the important covariates that might further elucidate mechanisms for the differences we report. Information on patient race was not recorded in a standardized way and was not present for 40% of those in our sample; although we examined the impact of race on our findings by Medicaid status, we cannot confidently report the precise contribution of race itself to these outcomes. We also have no data on the income of Medicaid or non-Medicaid enrollees. Despite the lack of other sociodemographic data, the findings of differences in medication use among Medicaid members is important for health plans and policy makers who can target these patients for outreach and coordinated asthma programs.

We believe that it is unlikely that the differences in dispensing rates for controller medications alone are responsible for the substantial differences in ED use and hospitalization. Unmeasured differences in housing, exposure to tobacco smoke and indoor allergens, and other factors are likely to make important contributions to asthma symptoms and rates of hospitalization. There may be barriers to obtaining high-quality asthma care and other sociocultural determinants of seeking care in EDs that cannot be assessed through these data.

The rates of routine and nonroutine care we report are lower than those found by Lozano et al in their study of asthma care in an HMO during a single year. We studied all children with at least 1 encounter for asthma, thereby including some children with less severe disease than did Lozano et al. Another factor contributing to lower rates is the longer observation period for most patients in the present study. When patients enter a cohort on the date of an asthma-related event, the event rate is naturally skewed toward higher values during the first few months. We would therefore expect rates to be lower in studies with longer observation periods; in addition, the clinical condition of some patients improves over time. Longer follow-up might give physicians, health plans, and Medicaid policy makers better estimates of the long-term costs of caring for childhood asthma.

During the study period, asthma outreach activities were undertaken that might have affected the patterns of care. Outreach by trained asthma nurses began in 1990 for children who were seen in the ED or hospitalized with asthma, and it was extended to the entire population by 1994. Medicaid patients received special attention in these outreach efforts, which are continuing. It will be important to assess the impact of these programs over time, which are similar to those being undertaken by a number of managed care organizations.

Differences in morbidity for low-income children with asthma have often been attributed to inadequate access to care. Insurance under Medicaid eliminates many of the direct costs to families of medical care for eligible children. While other barriers documented in recent studies (including child care, transportation, and office waits) are important, they did not prevent our low-income patients from using primary care services as often as higher-income children. The differences in rates of obtaining medications, and of ED and hospital care, therefore, must result from more complex causes, including medical and nonmedical factors. Understanding the reasons that these differences persist will be an important step in improving outcomes for these children.

Accepted for publication December 7, 1999.

This study was supported by a research grant from Merck & Co Inc, West Point, Pa, and by institutional support from the Harvard Pilgrim Health Care Foundation, Boston, Mass.

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REFERENCES


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