Oral Corticosteroid Prescribing for Children With Asthma in a Medicaid Managed Care Program

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abstract

BACKGROUND AND OBJECTIVE: Short courses of oral corticosteroid (OCS) medication are recommended for treatment of moderate to severe asthma exacerbations. Concern has been raised about OCS overuse. Our objective is to describe rates of OCS dispensing among children with asthma and factors associated with variation in OCS dispensing.

METHODS: Claims data for children 1 to <18 years of age with an asthma diagnosis between January 2011 and January 2016 were extracted from the computerized databases of Texas Children’s Health Plan.

RESULTS: In the years 2011 to 2015, 17.1% to 21.8% of children had an asthma diagnosis. In each of these years 42.1% to 44.2% of these children had ≥1 OCS dispensing. OCS dispensing rates were higher for the children 1 to 4 years of age compared with older children. Repeated OCS dispensing was common, and was most common for children 1 to 4 years of age. Most children with an OCS dispensing (81%–83%) did not have other utilization suggesting poor asthma control (excessive β-agonist refills, emergency department visit, or hospitalization for asthma). OCSs were less commonly prescribed to patients whose primary care provider was a board-certified pediatrician compared with other types of primary care providers. There was large variation in OCS prescribing rates among pediatricians (15%–86%). There were minimal differences in asthma emergency department visits and no differences in hospitalization rates by the pediatrician’s OCS dispensing rate quartile.

CONCLUSIONS: The patterns of dispensing observed suggest substantial overprescribing of OCS for children with an asthma diagnosis.

WHAT’S KNOWN ON THIS SUBJECT: Oral corticosteroids are recommended for the treatment of moderate to severe asthma exacerbations. Overuse of oral corticosteroids can have important adverse effects.

WHAT THIS STUDY ADDS: In this Medicaid— and Children’s Health Insurance Program—insured population, oral corticosteroids appear to be substantially overprescribed for children with a health care provider’s diagnosis of asthma. The youngest children have the highest oral corticosteroid prescription rates.

Short-course oral corticosteroid (OCS) medication is recommended by current asthma guidelines for the treatment of moderate to severe asthma exacerbations. A recent meta-analysis on the efficacy of OCS in preschool wheezing found that, in the emergency department, OCS decreased the risk for hospital admission, whereas pooled data from outpatient studies suggested an increase in hospitalizations among those receiving OCS. A study in children 2 to 14 years of age found an increase in emergency department visits in the month concluding the data pull of members with asthma in 2012, 2013, 2014, and 2015 and February 14 of the next year for 2012. Patients with a diagnosis of cystic fibrosis were excluded. Primary care provider characteristics were determined from either health plan credentialing files or publically available Texas Medical Board records. We excluded subjects from analyses by provider type if the primary care provider was identified as a clinic, rather than a specific, provider (5.0% of members with asthma in 2012, 6.1% in 2013, 7.3% in 2014, and 8.8% in 2015).

OCS dispensing was determined as a pharmacy claim for the dispensing of an OCS medication, including prednisone, prednisolone, methylprednisolone, and dexamethasone. Inhaled corticosteroid dispensing events were determined from pharmacy dispensing claims for either a single-agent inhaled corticosteroid or a combination long-acting β-agonist/inhaled corticosteroid product. Hospitalizations and emergency department visits for asthma were determined from claims submitted with either a primary diagnosis of asthma or a secondary diagnosis of asthma if the primary diagnosis was a respiratory illness. A short acting β-agonist inhaler-equivalent was defined as a 200 puff, short-acting β-agonist inhaler or 50 unit doses of a short-acting β-agonist for inhalation via a nebulizer. Poor asthma control was defined as ≥4 short-acting β-agonist canister equivalents dispensed in the previous 12 months and/or a hospitalization or emergency department visit for asthma in the previous 12 months.

We used χ² tests for comparisons of categorical data. One-way analysis of variance was used to determine differences in hospitalization and emergency department visit rates by primary care pediatrician OCS dispensing rate quartile. The Scheffé test was used as a postanalysis of variance test to determine the significance of between-group differences. Statistical significance was accepted as two-tailed P < .05.

The study protocols were reviewed and approved by the Baylor College of Medicine Institutional Review Board.

RESULTS

We identified 69,056 children <18 years of age who had a health care provider’s diagnosis of asthma in the 2015 measurement year, representing 19.9% of the total
health plan membership in this age group. The proportion of the health plan pediatric membership with an asthma diagnosis was similar in the years 2011 to 2014 at 17.1% to 21.8%. In the 2015 measurement year, 29,076 children (42.1% of children with an asthma diagnosis) had ≥1 OCS dispensing, 6,849 (9.9%) had ≥2 OCS dispensings, and 2,265 (3.3%) had ≥3 OCS dispensings during that year. Similar rates of OCS dispensing were found in each of the preceding 4 years (Table 1).

When stratified by age group, OCS dispensing rates were highest for the children <5 years of age. In 2015, there were 22,553 children <5 years of age with a diagnosis of asthma, of whom 11,054 (49.0%) had ≥1 OCS dispensing event compared to 18,022 of 46,503 (38.8%) children ≥5 years of age with an asthma diagnosis (odds ratio, 1.5; 95% confidence interval, 1.47–1.57). Similar results were seen in each of the previous 4 years (Table 2).

When stratified by ethnicity, OCS dispensing rates were lowest for children identified as African American. In the years 2012 to 2015, 35% to 36% of African American children with an asthma diagnosis had ≥1 OCS dispensing event. In comparison, 40% to 44% of white children and 43% to 49% of Hispanic children had ≥1 OCS dispensing event (P < .001).

Among the 17,313 members with an asthma diagnosis who had an OCS dispensing in 2011, 14,458 (83.5%) had ≥36 months of health plan membership in the measurement years 2012 to 2015. Repeated OCS dispensing was common among these members: 8,014 (55.4%) had ≥1 additional OCS dispensing in the 2012–2015 measurement years, 4,212 (29.1%) had ≥1 OCS dispensing in ≥2 of the 2012–2015 measurement years, and 1,863 (12.9%) had ≥1 OCS dispensing in 3 or 4 of the years 2012 to 2015. Younger age groups had greater rates of repeated OCS dispensing than older age groups (Table 3).
The table shows OCS dispensing for health plan members who had (1) a diagnosis of asthma in 2011, (2) an OCS dispensing in 2011, (3) ≥58 months of health plan membership in the measurement years 2012–2015, and (4) health plan membership on the date of data pull for at least 5 of the 4 years from 2012 to 2015.

a The 1- to 4-year age group is different from age groups 9-12 and 13-17, P < .001.
b The 1- to 4-year age group is different from 5- to 8-year age group, P = .002.

Of the members who had an OCS dispensing in 2015, only 18.6% had ≥1 risk factors for poorly controlled asthma; 7.3% had an emergency department visit for asthma, 0.73% had an asthma hospitalization, and 14.3% had ≥4 short-acting β-agonist canister equivalents dispensed. These rates are greater than for those who did not have an OCS dispensing, (18.6% vs 12.8% for any risk factor, P < .001). Similar results were found for the years 2011 through 2014. The presence of an inhaled corticosteroid dispensing event ≥1 was low overall (20%–28%), but it was slightly more common among those with an OCS dispensing event. The difference was not statistically significant in 2015 (22.0% vs 21.4%, P = .06), but the small difference (2%–3.5% absolute difference) was statistically significant in the years 2011 to 2014 (P < .001) (Supplemental Table 7).

Analysis of utilization in the previous year among patients who had TCHP membership in both years demonstrated that the prevalence of a risk factor for poor asthma control in the previous year was similar (<1% difference) between the groups that had and those that did not have an OCS dispensing in the measurement year. The prevalence of an inhaled corticosteroid dispensing event in the previous year was slightly greater among those who did not have an OCS dispensing in the measurement year (1.7%–3.5% difference, P < .001) (Supplemental Table 8).

Rates of OCS dispensing for patients with asthma were lowest when the primary care provider was a board-certified pediatrician, compared with non–board-certified pediatricians (41%–42% vs 44%–51%, P < .001) and compared with those with an internal medicine, family practice, or general practitioner as their primary care provider (41%–42% vs 46%–47%, P < .001). When a nurse practitioner or physician was listed as the primary care provider, rates of OCS dispensing were similar to or slightly lower than that of board-certified pediatricians (40%–36%, P = .4 in 2015, P ≤ .01 in other years) (Supplemental Table 9).

There was large variation in rates of OCS dispensing by pediatrician primary care provider. With analyses restricted to pediatricians (regardless of board certification status) who served as primary care provider for ≥50 TCHP members with a current asthma diagnosis, we found rates of OCS dispensing ranging from 15% to 86% in 2015, with an interquartile range of 29% to 50%. Similar variation was observed in the years 2012 to 2014 (Table 4). We additionally looked to see if there was variation in hospitalization or emergency department visit rates by these pediatricians’ OCS dispensing rates. We found no statistically significant differences in asthma hospitalization rates by OCS dispensing rate quartile (Table 5). We found only inconsistent, small differences by OCS dispensing quartile for emergency department visits rates (Table 6).
DISCUSSION

In this population of Medicaid- and CHIP-insured children, we found both high rates of asthma diagnosis, high rates of OCS dispensing among children with an asthma diagnosis, and a large amount of variation in OCS prescribing rates. Taken together, these results suggest a substantial amount of OCS overprescribing among Medicaid-insured children with a health care provider’s diagnosis of asthma.

There is good evidence from randomized controlled clinical trials that systemic corticosteroids reduce risk of relapse and speed improvement in patients who present with a moderate to severe asthma exacerbation\textsuperscript{11–14} and for children with a history of moderate to severe, poorly controlled asthma.\textsuperscript{15,16} Given the large scale of OCS use in our population, one must assume that a substantial portion of the use is for children who present with mild wheezing and/or coughing. There is no evidence for benefit of systemic corticosteroid prescription for children <5 years of age who present with coughing or mild wheezing in the outpatient setting\textsuperscript{2} yet this is the population where the medication is most commonly prescribed.

Table 6: Asthma Emergency Department Visits by Provider’s OCS Prescribing Quartile

<table>
<thead>
<tr>
<th>Quartile 1 (lowest)</th>
<th>2015</th>
<th>2014</th>
<th>2013</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3 (2.5)</td>
<td>5.8 (2.9)</td>
<td>4.8 (2.8)</td>
<td>5.7 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Quartile 2</td>
<td>5.8 (3.1)</td>
<td>6.8 (4.3)</td>
<td>5.6 (3.2)</td>
<td>6.5 (3.8)</td>
</tr>
<tr>
<td>Quartile 3</td>
<td>5.5 (3.2)</td>
<td>5.9 (3.1)</td>
<td>5.4 (3.0)</td>
<td>6.5 (3.1)</td>
</tr>
<tr>
<td>Quartile 4 (highest)</td>
<td>4.8 (3.0)</td>
<td>4.6 (3.0)</td>
<td>4.4 (2.9)</td>
<td>4.6 (3.1)</td>
</tr>
</tbody>
</table>

P = .18 .005 .0953 .005

Data are presented as mean (SD) %, unless otherwise noted. Analysis restricted to pediatricians with ≥50 TCHP members with asthma in their practice.

Although the level of risk factors for poorly controlled asthma, such as excessive short-acting β-agonist medication dispensing, emergency department visits, or hospitalizations, were somewhat greater among those with an OCS dispensing event in the same year, there were only minimal differences (<1%) for these risk factors in the previous year. It is possible that some of the current-year risk events were associated with treatment of the exacerbation that led to the OCS dispensing event rather than preceded it. Most children with an OCS dispensing event did not have any of these risk factors, additionally supporting the assumption that most of the OCS prescribing was for children with mild respiratory symptoms.

Inhaled corticosteroid dispensing rates were low and minimally different for those with and those without an OCS dispensing. For those with an OCS dispensing in the current year, rates of inhaled corticosteroid dispensing were slightly greater in the current year (1%–4% absolute difference), but slightly lower in the previous year (1%–4% absolute difference). Although these differences were statistically significant, these small differences may not be clinically important.

We found large variation in rates of OCS dispensing to patients by primary care provider type. There was a lower rate of OCS dispensing to patients whose primary care provider was a board-certified pediatrician. Among the pediatricians, there was also large variation in rates of OCS dispensing. There were no differences in asthma hospitalization rate by OCS dispensing quartile, and the differences in emergency department visit rates were small and not consistent year to year. This substantial variation in practice without associated variation in outcomes supports the hypothesis that a large portion of the OCS dispensing is inappropriate.

These results additionally suggest that quality improvement and continuing education activities for pediatric health care providers need to address the appropriate use of OCS, neither too much nor too little, for children with asthma. Asthma guidelines need to provide clear guidance for providers on when the use of OCS for asthma is not supported by evidence and when its use is not indicated in clinical practice.

In our population, we found that OCS dispensing rates were substantially greater than reported elsewhere. In the Netherlands, a longitudinal follow-up study of 2272 children 4 to 12 years of age who were regular users of asthma medication found that 25.7% of their sample was prescribed an OCS.\textsuperscript{9} Pooled data from 85 US health plans from 1995 to 2008 found OCS dispensing in only 23% of children 6 to 18 years of age with nonsevere asthma.\textsuperscript{12} A study of primary care practices in Scotland found, among children 0 to 18 years of age who had an asthma medication dispensed, an escalation in the prevalence of OCS dispensing from 9% in 2001 to 2002 to 16% in 2005.
to 2006.\textsuperscript{18} Our rates were similar to the 48.7\% observed among infants with wheezing in the first year of life in the city of Belo Horizonte, Brazil.\textsuperscript{19}

We also found that the 17.1\% to 21.8\% prevalence of asthma diagnosis in our Medicaid- and CHIP-insured population was much greater than the 8.3\% to 9.5\% prevalence of current asthma reported in the 2011–2014 US National Health Interview Surveys. It is possible that our high asthma prevalence rates reflect health disparities in a low-income population, adverse impacts of air pollution in the greater Houston and Beaumont/Port Arthur area, adverse selection, with asthma patients selecting our health plan at greater rates than patients without asthma, and/or overdiagnosis of asthma among the providers in our health plan.

Our study was an analysis of health plan computerized claims data. Medical records were not reviewed. TCHP covers patients with Medicaid and CHIP health coverage. Eligibility for these programs defines a low-income population, and findings may not be applicable to more affluent communities. Our member-patient sample is from 1 portion of East Texas, and it is possible that practice patterns of providers in other geographic areas are different. Additional research is needed to replicate these findings in different health plans and different communities. OCS dispensing was assessed, and it is possible that all or part of a medication course dispensed to the patient was not taken by the patient. The specific indication for the OCS dispensing was not determined, and it is possible that some of the OCS was not dispensed for asthma. Given the large sample size, even small differences may be statistically significant even though the differences could be judged as clinically unimportant. For purposes of these analyses, we assigned all asthma medication dispensing to the patient to their primary care provider. It is possible that the primary care provider was not the prescribing provider. Although every effort is made to keep records up-to-date, it is possible that the primary care provider that the patient is assigned to in the health plan’s computerized databases is not the primary care provider that the patient uses.

CONCLUSIONS

Among Medicaid- and CHIP-insured children with a health care provider’s diagnosis of asthma, there is a high rate of OCS dispensing, with the highest rates in the youngest children. That there is substantial variation in prescribing rates by primary care provider type, substantial variation in prescribing rates among pediatrician providers, minimal to no significant differences in emergency department visits and hospitalizations associated with this variation, and that most of the OCS dispensing is for children who do not have other risk factors for poorly controlled or high-risk asthma suggests that there is substantial overprescribing of OCS in this population. Over the past 30 years, OCS prescribing for children with asthma has gone from underuse to what now appears to be substantial overprescribing. Like Goldilocks and the Three Bears, our challenge now is to get it just right.\textsuperscript{20}

ACKNOWLEDGMENTS

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ABBREVIATIONS

CHIP: Children’s Health Insurance Program
OCS: oral corticosteroid
TCHP: Texas Children’s Health Plan

REFERENCES


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