Asthma-related healthcare services utilization by African–Americans enrolled in West Virginia Medicaid

Vivek Pawar*, Michael James Smith

Department of Pharmaceutical Systems and Policy, West Virginia University, PO BOX 9510, Morgantown, WV 26506, USA

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KEYWORDS
Asthma; African–Americans; Blacks; Health services utilization; Medicaid

Summary
Background: Over the past 25 years, African–Americans have experienced higher rates of emergency department (ED) visits, hospitalizations, and death due to asthma compared to other ethnic groups in the US. African–Americans of lower socioeconomic groups are particularly vulnerable to asthma morbidity and mortality. Few studies have investigated asthma-related healthcare services use by different age and gender groups within this sub-population.

Objectives: The objectives of this study are to: (1) report rates of asthma among African–Americans who receive healthcare through a state government Medicaid program that provides medical coverage to low-income citizens; (2) report rates of asthma-related medical services and prescription utilization for these recipients; and (3) report the costs to the Medicaid program for asthma-related care for these recipients.

Methods: This was a cross-sectional descriptive analysis. West Virginia (WV) Medicaid administrative fee-for-service claims data from calendar year 2002 were the data source. Medical services claims with a primary diagnosis of asthma for recipients who were African–American less than 65 years of age were extracted. Matching prescription claims for these recipients for medications to treat asthma were extracted. Dollars reimbursed for medical services and prescription medications were from the perspective of WV Medicaid.

Results: There were 635 African–American recipients who had a primary diagnosis of asthma. Children under 21 years of age comprised the majority of the sample. Males under 21 years of age, and females 21 years and older had the highest rates of asthma. Although males 21 years and older accounted for the lowest proportion of age–gender groups, these recipients had the highest rates of hospitalizations and ED visits for asthma. Less than one-third of the recipients had a prescription claim for an...
inhaled corticosteroid. There were more claims paid by Medicaid for quick-relief medications vs. controller pharmacotherapy for the sample. A majority of the dollars paid by Medicaid for asthma care were for prescriptions and hospitalizations.

Conclusion: Asthma prevalence and asthma-related medical services utilization rates among African–American recipients of Medicaid varied by age and gender groups. These recipients appeared to be underutilizing controller pharmacotherapy for asthma.

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Introduction

Asthma is a chronic disease of the airways that causes recurrent and distressing episodes of wheezing, breathlessness, chest tightness, and nighttime or early morning coughing. In the US, the disease affects approximately 20 million people, nearly 6 million of whom are under the age of 18 years. Asthma is often associated with substantial financial burdens and is a leading reason for utilization of health services. Asthma accounts for an estimated 14.5 million lost workdays for adults and 14 million lost school days for children in the US annually. Additionally, asthma has been shown to have a negative impact on a patient’s quality of life, and psychological distress is common in asthma.

Surveillance reports over the last 20 years in the US show that asthma has substantially impacted African–Americans. In 2000, asthma prevalence rates were higher among African–Americans (8.5%) compared to Whites (7.1%). Hospitalization and emergency department (ED) visit rates due to asthma have been higher among African–American children compared to White children. Disparities in mortality rates due to asthma among African–Americans also have been reported, especially those of lower socioeconomic groups. Furthermore, it has been shown that low-income individuals are more likely to miss or delay seeking healthcare services.

In 2003, the US Department of Health and Human Services launched an initiative titled, “Steps to a Healthier US”. One purpose of the initiative is to enhance access to health services by focusing on those populations with the greatest needs. Asthma was cited as a target disease because of its debilitating effects and its responsiveness to prevention measures. One method to identify and target those groups in need where care may be inadequate is to analyze the current prevalence of asthma and treatments for asthma among vulnerable or high-risk groups.

Methods

Data source

This study used computerized WV Medicaid paid claims records for medical services and prescription medications delivered through a fee-for-service system between January 1 and December 31, 2002. Medicaid is a jointly funded program by the US federal and state governments, and pays for medical assistance of individuals and families with low income and resources. The rules for counting the income and resources vary from state to state. For WV Medicaid, those individuals who receive Supplementary Security Income automatically qualify for benefits. The income of the applicant is counted and compared to a federal poverty level standard applicable to the size of the applicant’s family. Similarly, resources of the applicant are also counted to determine if the applicant meets the resource threshold to be subsidy eligible. The Department of Health and Human Resources (DHHR) determines Medicaid eligibility at its local administrative offices throughout the state.

The Medicaid data collected for this study included claims paid for medical services and prescription medications, as well as recipient enrollment information. Data were de-identified to prevent the investigators from identifying any recipients in compliance with the West Virginia University Institutional Review Board and Health...
Insurance Portability and Accountability Act (HIPAA) regulations that require the protection of patient health information. The purpose of HIPAA is to improve the efficiency and effectiveness of the healthcare system by encouraging the development of a health information system through the establishment of standards and requirements for the electronic transmission of protected health information.

Study sample

In 2002, there were 58,909 African–American residents in WV which accounted for 3.3% of the state’s entire population. A total of 17,890 (30.4%) received Medicaid benefits during the year. However, our target population consisted only of recipients who were 64 years of age or younger (n = 16,667). Persons who were older than 64 years of age were not included in the sample because the elderly population in the US is insured under the federal Medicare program. Medicare data were not available for this study. From our target population, those who had at least one medical services claim for a hospitalization, ED, or office visit with a primary diagnosis of asthma (using the International Classification of Diseases, 9th Edition, Clinical Modification [ICD-9-CM] code 493.XX) were selected for the study sample.

Study design

This study used a cross-sectional design to conduct a retrospective descriptive analysis of the prevalence of asthma, utilization of medical services and prescription drugs for asthma, and related costs incurred during 2002 among recipients of WV Medicaid who were African–American. Costs for healthcare services and prescription medications were from the perspective of WV Medicaid. Dollars reimbursed by Medicaid for hospitalizations were not recorded in the claims data set used in this study, so these particular costs were estimated using US average diagnosis-related group (DRG) reimbursement rates. The DRG is an inpatient or hospital classification system used to pay a hospital or other provider for services, and to categorize illness by diagnosis and treatment. Costs for ED visits, office visits, and prescription medications were based on dollar amounts recorded in the claims data set that equaled the actual amount reimbursed by Medicaid for these services.

Analysis

Medical services utilization

The frequency of visits for medical services for asthma was based on what appeared to be the visits associated with a particular episode of asthma or an exacerbation of asthma for each recipient. For example, if a recipient had claims for an ED visit and hospitalization on the same date of service, it was assumed that the recipient visited the ED and was subsequently admitted to the hospital for that particular episode of asthma. In such a circumstance, the event was counted only as a hospitalization, and the dollars paid by Medicaid for the hospitalization were calculated as the sum of dollars paid for both types of medical services.

Prescription utilization

Reviewing the utilization of prescription medications to treat asthma can serve as an indicator of care for patients with asthma. Specifically, the current prescription use patterns among the sample will be compared to the ideal management of the disease based on recommendations by the National Heart, Lung, and Blood Institute (NHLBI). Guidelines published by the NHLBI recommend the use of inhaled corticosteroids as the preferred controller pharmacotherapy for patients with persistent asthma.

To report the patterns of asthma treatment among the study sample, the proportion of recipients who were treated by various pharmacotherapy classes were calculated. Additionally, the proportion of prescription claims paid by WV Medicaid for the various pharmacotherapy classes was also reported. Claims for prescription drugs were categorized as either claims for quick-relief or maintenance drugs. Quick-relief medications included short-acting beta-agonists, anti-muscarinics, and oral corticosteroids. Maintenance drugs included long-acting beta-agonists, leukotriene inhibitors, methylxanthines, inhaled cromolyn, inhaled nedocromil, and inhaled corticosteroids.

Results

Study sample

Of the 16,667 African–Americans who comprised our target population, there were 635 recipients who had at least one medical services claim (whether for hospital, ED, or office visit) with a primary diagnosis of asthma paid by WV Medicaid. Of these recipients, 66% were children under 21
years of age. There was a greater proportion of females (53.7%) compared to males (45.8%). Males under 21 years of age comprised a majority of the total sample (38.6%), whereas males over 20 years of age accounted for the lowest proportion of the total sample (7.2%). There were similar proportions of females under 21 years of age (27.2%) and females over 20 years of age (26.5%).

The overall rate of asthma was 38.1 per 1000 African–American recipients of WV Medicaid. Recipients between 21 and 64 years of age had a higher rate of asthma (40.1 per 1000) compared to recipients less than 21 years of age (37.2 per 1000). Recipients who were male had a higher rate of asthma (40.5 per 1000) compared to recipients who were female (36.0 per 1000). The highest rates for asthma occurred among African–American recipients aged 21 and older who were female (43.2 per 1000), and African–American recipients less than 21 years of age who were male (43.1 per 1000). The total numbers, proportions, and rates of asthma among African–American recipients classified by age and gender groups are presented in Table 1.

**Medical services utilization**

There was a total of 47 hospitalizations, 275 ED visits, and 1075 office visits with a primary diagnosis of asthma made by the study sample. The overall rates for asthma-related medical services utilization among the population of African–American recipients of WV Medicaid benefits were as follows: 28.2 hospitalizations per 10,000 African–American recipients, 165.0 ED visits per 10,000 African–American recipients, and 64.5 office visits per 1000 African–American recipients. Adults between 21 and 64 years of age had higher medical services utilization rates compared to children and adolescents under 21 years of age. Rates of medical services utilization were higher among recipients who were male than rates among recipients who were female.

Recipients who were male between 21 and 64 years of age had the highest rate of hospitalizations compared to other age and gender groups. The rates of ED visits among males between 21 and 64 years of age were substantially higher compared to the rates among females between 21 and 64 years of age as well as the rates of ED visits among children. Recipients who were female between 21 and 64 years of age had the highest rate of office visits for asthma, followed by recipients who were male and under 21 years of age. The lowest rates of medical services utilization occurred among recipients who were female and under 21 years of age. The rates of healthcare services utilization by gender and age groups are shown in Table 2.

### Table 1  Numbers and rates of African–American recipients of West Virginia Medicaid with asthma classified by age and gender groups.

<table>
<thead>
<tr>
<th>Category</th>
<th>Recipients with asthma N (% in total)</th>
<th>Asthma rate per 1000*†</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children (0–20 years)</td>
<td>419 (66.0)</td>
<td>37.2</td>
</tr>
<tr>
<td>Adults (21–64 years)</td>
<td>216 (34.0)</td>
<td>40.1</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>291 (45.8)</td>
<td>40.5</td>
</tr>
<tr>
<td>Females</td>
<td>341 (53.7)</td>
<td>36.0</td>
</tr>
<tr>
<td>Unknown†</td>
<td>3 (0.5)</td>
<td>—</td>
</tr>
<tr>
<td><strong>Age and gender groups</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male children</td>
<td>245 (38.6)</td>
<td>43.1</td>
</tr>
<tr>
<td>Female children</td>
<td>173 (27.2)</td>
<td>30.9</td>
</tr>
<tr>
<td>Adult males</td>
<td>46 (7.2)</td>
<td>30.5</td>
</tr>
<tr>
<td>Adult females</td>
<td>168 (26.5)</td>
<td>43.2</td>
</tr>
<tr>
<td>Unknown†</td>
<td>3 (0.5)</td>
<td>—</td>
</tr>
<tr>
<td>Total</td>
<td>635 (100.0)</td>
<td>38.1</td>
</tr>
</tbody>
</table>

* Rates based on the total number of African–Americans less than 65 years of age in West Virginia who received Medicaid benefits in 2002 (total N = 16,667).
† Denominators used to calculate rates of asthma included recipients enrolled in managed care plans, although the analyses did not include managed care claims.
‡ Rates unable to be calculated due to lack of population denominators.
Prescription utilization

There was a total of 3637 prescription claims paid by WV Medicaid for asthma-related medications for the study sample. On average, there were nearly six prescription claims per recipient during the year, and the median number of prescription claims per recipient was equal to 4.0. The largest proportion of claims by pharmacotherapy category was for short-acting beta-agonists (43.3%). Claims for leukotriene inhibitors accounted for approximately one-fifth of the claims (19.5%), followed by claims for oral steroids (13.9%), and claims for inhaled corticosteroids (12.5%). Overall, there was a greater percentage of prescription claims for quick-relief medications (61.0%) than for maintenance drugs (39.0%) among the sample.

Among the 635 African-American recipients included in the study sample, a substantial majority had at least one prescription claim for a short-acting beta-agonist medication (78.6%). Approximately 40% of the sample had at least one claim for an oral steroid. Less than a third of the recipients had at least one claim for a leukotriene inhibitor (30.7%) or inhaled corticosteroid (31.3%) during the year. A greater percentage of children in our sample had at least one prescription claim for an inhaled corticosteroid (34.8%) compared to adults (24.5%).

Recipients who used short-acting beta-agonists had an average of 3.2 claims per recipient in 2002. Similarly, recipients who used leukotriene inhibitors had an average of 3.6 claims per recipient. In contrast, recipients who used inhaled steroids had an average of only 2.3 claims per recipient during the year. The utilization of prescription medications for asthma among the study sample is shown in Table 3.

Costs to Medicaid

Medical services

WV Medicaid paid on average $3409 per hospitalization for African-Americans who were admitted for asthma during 2002. Medicaid paid on average $149 per ED visit, and $84 per office visit for asthma for those in the study sample who used these services. Table 4 lists the estimated amounts reimbursed by WV Medicaid for asthma-related medical services.

Prescription medications

The total asthma-related prescription drug costs to WV Medicaid equaled approximately $179,124, at an average cost of $49 per prescription claim. On average, the highest costs per prescription claim for drugs to treat asthma were for inhaled corticosteroids ($111.30 per claim). Even though leukotriene inhibitors and inhaled corticosteroids accounted for only one-third of all prescription claims for asthma, these medications accounted...
for nearly 58% of the total dollars paid by WV Medicaid for prescriptions to treat asthma. Claims for short-acting beta-agonists accounted for nearly 27% of the total dollars paid by Medicaid for asthma-related prescriptions. Table 5 shows the distribution of dollars reimbursed by WV Medicaid for asthma-related prescription claims by drug class.

### Combined medical services and prescription medications

The dollars reimbursed by WV Medicaid for both asthma-related medical services and prescription medications totaled approximately $470,563. A majority of the dollars were for prescription drugs to treat asthma (38.1%), followed by hospitalizations (34.1%), and office visits (19.2%). ED visits accounted for the lowest proportion of total dollars (8.7%).

### Discussion

Asthma increasingly is a public health issue in the US especially among minority and low-income groups. During the past 20 years, African–Americans have had the highest prevalence rates, hospitalization rates, and ED visit rates for asthma compared to other ethnic groups. This study focuses on the recent prevalence rates of asthma and asthma-related medical services and prescription utilization for different age and gender groups of low-income African–Americans who received Medicaid benefits in WV.

A majority of the prior studies investigating asthma surveillance have compared overall prevalence rates among various ethnic groups. Few studies have reported asthma prevalence rates for different age and gender categories within each ethnic group, making it difficult to compare the results from the sample of African–Americans in our...
study to previous literature. One study conducted by Lozano et al.\textsuperscript{25} reported an asthma prevalence rate of 4% among children who were Black who received Medicaid benefits in the urban area of Seattle-Tacoma, which was similar to the rate of 3.7% among our sample of children who reside mainly in rural settings. There was no literature identified that reported asthma prevalence rates specifically for African–American adults that could be compared to our sample of adults.

When we estimated asthma prevalence by age and gender, we found that asthma was more prevalent among African–American children who were male and African–American females who were older than 20 years of age than other age and gender groups. This finding is consistent with other surveillance studies.\textsuperscript{26,27} However, we also found overall that adults 21 years of age and older had a slightly higher rate of asthma compared to children, and that adults utilized medical services for asthma at a greater rate compared to children. This observation differs from conventional knowledge in that asthma is more prevalent among children than adults. Our finding may be due to the fact that 28.5% of the adults in our sample had concomitant chronic obstructive pulmonary disease, making them more severe and in need of more frequent care compared to the children in the sample.

Another explanation for the high rate of medical services use for asthma among the adults in our sample may be attributed to a high prevalence of smoking in WV.\textsuperscript{28} This may be an important factor to consider, because cigarette smoke is a dangerous and important source of indoor pollution that may be an aggravating factor in asthma.\textsuperscript{29} Also, statistics have reported that African–American men tend to smoke at a higher rate than White men (31.4% vs. 27.6%), White women (24.4%), and African–American women (22.7%).\textsuperscript{30}

The observation that African–American adults had higher rates of hospitalizations and ED visits for asthma also suggests that these recipients were more likely to receive episodic care for their asthma compared to children. Although certain behavioral or cultural factors may be possibly related to this observation, further empirical investigation will be necessary to capture specific reasons for this finding.

Another finding in this study was that a low proportion of African–Americans were receiving inhaled corticosteroid therapy. Although the 1997 NHLBI Guidelines had been in print for 5 years at the time the prescriptions included in our study were written and filled, less than one-third of the African–American recipients in our sample had at least one prescription claim for an inhaled corticosteroid during 2002. Inadequate pharmacotherapy of African–Americans compared with Whites have been shown to exist in other studies and may contribute to racial disparities in asthma-related health outcomes. Krishnan et al.\textsuperscript{31} determined race and sex differences in the consistency of care with national asthma guidelines in managed care organizations. They found that fewer African–Americans than Whites reported care consistent with recommendations of daily inhaled corticosteroid use.

The results of this study also showed that recipients who used inhaled corticosteroids were utilizing the medications less frequently (2.3 mean claims per recipient) compared to those who were filling prescriptions for short-acting beta-agonists.

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**Table 5** Dollars reimbursed by West Virginia Medicaid for asthma-related prescription medications utilized by African–American recipients.

| Drug class                      | Number of claims (% in total)* | Total costs ($) (% in total)$^y|$ Average cost per claim ($)$^z| |
|---------------------------------|-------------------------------|---------------------------------|-------------------------------|
| Short-acting beta-agonists      | 1575 (43.3)                   | 47,594.52 (26.6)                | 30.22                         |
| Oral steroids                   | 505 (13.9)                    | 6002.76 (3.4)                   | 11.89                         |
| Anti-muscarinics                | 139 (3.8)                     | 10,664.73 (6.0)                 | 76.72                         |
| Methylxanthines                 | 124 (3.4)                     | 2105.77 (1.2)                   | 16.98                         |
| Long-acting beta-agonists       | 99 (2.7)                      | 7213.45 (4.0)                   | 72.86                         |
| Leukotriene inhibitors          | 710 (19.5)                    | 52,995.81 (29.6)                | 74.64                         |
| Inhaled cromolyn or nedocromil  | 32 (0.9)                      | 2146.64 (1.2)                   | 67.08                         |
| Inhaled corticosteroids         | 453 (12.5)                    | 50,400.44 (28.1)                | 111.30                        |
| Total                           | 3637 (100.0)                  | 179,124 (100.0)                 | 49.25                         |

$^*Number of prescription claims for medications by pharmacotherapy class.

$^yDollars reimbursed by West Virginia Medicaid for claims for asthma-related prescription medications by pharmacotherapy class.

$^zAverage equals the costs for medications divided by the number of claims within each pharmacotherapy class.
(3.2 mean claims per recipient). This finding can have important implications because our sample was relying more on quick-relief medications than controller drugs, which may lead to uncontrolled exacerbations of asthma.

It should be noted that an update to the NHLBI Guidelines was released in June 2002.23 The update lists inhaled corticosteroids as the preferred pharmacotherapy of all patients with persistent asthma. The update also lists leukotriene antagonists as an alternate therapy to inhaled corticosteroids in the treatment of patients with mild persistent asthma. In this study, the proportion of recipients who had at least one claim for a leukotriene inhibitor medication (30.7%) was approximately equal to the proportion of recipients who had at least one claim for an inhaled steroid (31.3%) during the year. This pattern may reflect the increasing role that leukotriene modifiers play in the pharmacotherapy of patients with asthma.

Interestingly, recipients who had used leukotriene inhibitors were utilizing the medications more frequently (3.6 mean claims per recipient) than when recipients were using inhaled steroids (2.3 mean claims per recipient). Perhaps this gives some indication that African-Americans prefer oral administration of medication to treat asthma rather than inhaled dosage forms. Overall, however, it appeared that African-American recipients were underutilizing controller pharmacotherapy for the treatment of their asthma. This issue is especially important with respect to outcomes that have been associated with the adequate use of controller medications, especially inhaled corticosteroids.

Previous research has shown that appropriate daily use of inhaled corticosteroids results in a reduction in ED visits and hospital admissions related to asthma. Despite their documented usefulness in asthma management, inhaled corticosteroids accounted for only about 13% of the prescription claims for asthma medications in this study. Inappropriate drug therapy and underutilization of inhaled corticosteroids has been identified as one factor of ineffective asthma management that can lead to increased hospitalizations, ED visits, and office visits for uncontrolled asthma.32,33 This may be reflected in the data in our study in which only 24.5% of the adults had at least one prescription claim for an inhaled corticosteroid. This could be another reason why the adults in our sample had high rates of ED visits and hospitalizations. Future research should investigate factors that are related to the inappropriate utilization of prescription medications for asthma such as physician prescribing behavior and patient medication-taking behavior.

Limitations

When interpreting the results of this study, some limitations should be considered. Claims data are subject to data entry and coding errors. Recipients who had been misdiagnosed with asthma during a medical visit would have been included in the study sample due to the data extraction criteria used in this study. Also, the ICD-9-CM coding recorded in the medical claims data did not enable the investigators to classify a recipient by disease severity. Thus, it is difficult to determine whether recipients in this sample were utilizing what would be considered appropriate vs. inappropriate pharmacotherapy to treat asthma at a given point in time.

The recipients included in this study were enrolled in a fee-for-service payment system in Medicaid. Data for recipients enrolled in managed care plans were not analyzed and therefore are not represented in the present sample. The rates of asthma and medical services utilization rates for asthma reported in this study may underestimate the true rate of disease among recipients of WV Medicaid who are African-American.

Conclusions

Patterns of asthma and asthma-related medical services utilization varied by age and gender groups among recipients of WV Medicaid who were African-American. Rates of asthma were greatest among children who were male and among adults who were female. Adult recipients who were male appeared to utilize medical services for episodic care (hospitalizations and emergency department visits) at a higher rate compared to other age and gender groups.

Recipients of WV Medicaid who were African-American appeared to be underutilizing controller pharmacotherapy for asthma. Only 31% of the recipients had at least one prescription claim for an inhaled corticosteroid during the year, and on average recipients were filling more prescriptions for short-acting beta-agonists than for inhaled steroids. With regard to controller pharmacotherapy utilization, recipients who used leukotriene modifiers had filled more prescriptions on average for these agents compared to recipients who used inhaled corticosteroids.
WV Medicaid reimbursed over $470,563 for medical services and prescription medications for asthma that were utilized by recipients who were African–American. A majority of these dollars were for prescription drugs and hospitalizations.

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