Factors Associated With Children Diagnosed With Attention-Deficit/Hyperactivity Disorder and 30-Day Follow-up Care With Practitioners Among Medicaid Recipients in Georgia

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Background and Objectives: It is important that children prescribed attention-deficit/hyperactivity disorder (ADHD) medication get timely follow-up care. In 2018, only 44% of US Medicaid recipients attended a follow-up visit within 30 days of their first ADHD prescription. The objective of this study was to identify the member and practitioner-related predictors that were associated with children who were diagnosed with ADHD and had a follow-up visit within 30 days (initiation phase) of their first prescription of ADHD medication (Index Prescription Start Date, or IPSD).

Methods: A cross-sectional study was conducted to identify the independent predictors of a follow-up visit within 30 days and 2 follow-up visits within 270 days after the initiation phase (continuation and maintenance phase, or C&M phase) for Medicaid recipients. Predictive factors examined included race, school age group, gender, geography of residence, Medicaid service region, newly diagnosed ADHD, hospital admission, emergency department (ED) visit, types of ADHD medication, other psychosocial or behavioral diagnoses, psychosocial or behavioral therapy, prescriber specialty, and school season.

Results: There were 2369 members eligible for the initiation phase measure, of whom 330 members were eligible for the C&M phase measure. Multiple regression analysis found that unmet 30-day follow-up was significantly associated with African American children with an existing diagnosis of ADHD (adjusted odds ratio [AOR] = 2.13; 95% confidence interval [CI], 1.64-2.76), middle school-aged children (AOR = 1.27; 95% CI, 1.05-1.55), no ED visit (AOR = 1.57; 95% CI, 1.16-2.12), no psychosocial or behavioral therapy prior to the IPSD (AOR = 2.30; 95% CI, 1.65-3.21), and primary care practitioners (AOR = 1.88; 95% CI, 1.45-2.44).

Conclusion: Pediatrics was the most common specialty prescribing ADHD medications. Managed care organizations can focus intervention efforts to improve compliance with 30-day follow-up among Medicaid children by targeting the high-risk categories identified above. They can also focus on facilitating communication between behavioral health practitioners and pediatricians about several key points: (1) the importance of using behavioral health therapy prior to prescribing medication; (2) the importance of timely follow-up care; and (3) the importance of medication management in combination with behavioral health therapy.

Key words: attention-deficit/hyperactivity disorder, follow-up care, Medicaid, population health
found initiation and C&M phase compliance rates were higher for behavioral health providers than for nonbehavioral health providers, and for elementary school children than for older children. Patel and colleagues found that ADHD patients diagnosed by a primary care physician had a lower rate of follow-up care than those diagnosed by a psychiatrist. Hooven and colleagues found ADHD patients of Hispanic ethnicity, with public insurance, or who lived further from the physician’s office had a lower rate of follow-up care.

The purpose of this study was to identify the member and practitioner-related factors associated with children who were diagnosed with ADHD but who did not receive the required follow-up care with a practitioner after the IPSD as defined by the NCQA HEDIS specifications.

**METHODS**

**Study design**

This is a cross-sectional study that used administrative claims data from October 1, 2017, to August 31, 2019, among a sample of Medicaid managed care recipients who reside in Georgia. All members in the sample were enrolled in the health plan at least 120 days before the IPSD and at least 300 days after the IPSD. This measurement interval allowed for the identification of predictive factors prior to and during the treatment interval.

**Participants**

The analyzed sample was selected based on the HEDIS 2019 specifications and restricted to children of 6 to 12 years old. Factors included in the analysis were retrieved from the managed care claims database.

**Outcome variables and independent variables**

The main outcomes studied were compliance with the initiation phase and C&M phase HEDIS quality measures. Based on findings in the literature, age, the specialty of practitioners, and geography of residence (urban vs rural) were included as independent variables. The following independent variables were also selected for analysis: gender, race, Medicaid service region, newly diagnosed ADHD, types of ADHD medication, other psychosocial or behavioral diagnoses, psychosocial or behavioral therapy, hospital admission, emergency department (ED) visit, and school season based on recommendations from behavioral health subject matter experts. Age was categorized as elementary- and middle-school-aged groups. Given that specific information about Hispanic ethnicity was not available from the data, race was categorized into African American, Caucasian, and other races. Medicaid service regions included Atlanta, Central, East, North, Southeast, and Southwest, as defined by the Georgia Department of Community Health. Urban or rural county residence was defined based on the county where a patient lived on the IPSD following the definition of the Georgia Department of Public Health.

A member was defined as newly diagnosed for ADHD if the diagnosis was initially documented on or within 10 days prior to the IPSD. If the diagnosis of ADHD was documented prior to the 10 days before the IPSD, the member was considered to have an existing ADHD diagnosis. Types of ADHD medication were categorized as stimulants or nonstimulants. The category for both stimulants and nonstimulants was excluded given that only 11 members fell into the category. Other psychosocial or behavioral diagnoses include disorders other than ADHD diagnosed during the 90 days prior to and on the IPSD. Prescriber specialty was categorized as behavioral health practitioners (psychiatrists, mental health practitioners, and neurologists), primary care practitioners (pediatricians, general medicine physicians, family physicians, nurse practitioners, and physician assistants), and others (case management agencies, social workers, legal medicine, community or behavioral health agencies, diagnostic radiology, etc). The number of hospital admissions and emergency department visits for all causes was captured for the 90 days prior to and on the IPSD. Due to the low number of members (N = 18) with a hospital admission before the IPSD, that variable was excluded from the statistical analyses. To examine the effect of school season on initiation phase compliance, IPSDs between July 20 and May 10 were denoted as in the school season. This resulted in the need for the initial follow-up visit during the school season. Other IPSD dates would be considered as off school season.

**Statistical analysis**

In the analysis, we focused on noncompliance with the outcome variables to identify high-risk subgroups. The bivariate association between the outcome variables and the independent variables was examined using the $\chi^2$ test. Multiple logistic regression was conducted to identify the significant predictive variables that were associated with noncompliance. The correlations between all covariates were assessed using the $\chi^2$ test, given that the covariates are categorical. Covariates with a Cramer’s V coefficient greater than 0.5 were identified as highly correlated. The Akaike Information Criterion (AIC) was used to decide which correlated independent variables should be included in the final model. The AIC considers both the fitness and the parsimony (ie, use fewer predictors to explain more variance) of the model. Generally, a smaller AIC value indicates a better model.

The following interactions were tested: school age and type of ADHD medication; school age and psychosocial or behavioral therapy; gender and psychosocial or behavioral therapy; race and psychosocial or behavioral therapy; school age group and whether ADHD was newly diagnosed; gender and whether ADHD was newly diagnosed; race and whether ADHD...
was newly diagnosed; type of ADHD medication and prescriber specialty; and whether psychosocial or behavioral therapy was given prior to IPSD and prescriber specialty, based on the researchers’ hypotheses. Only 1 interaction term was included in the model each time to simplify the interpretation of the results. Analyses were conducted using SAS Enterprise Guide. A P value ≤ .05 was considered significant.

RESULTS
Sample characteristics
There was a sample size of 2369 members eligible for follow-up during the initiation phase in the study period, of whom 1306 (55.1%) did not have a follow-up visit within 30 days. Out of those same 2369 members in the sample, 330 were eligible for follow-up visits in the C&M phase, and 127 (38.5%) did not have the required visits.

Among the sample studied, slightly more than half were Caucasians (52.0%), 42.4% were African Americans, and 3.4% were another race. About half of members were at elementary school age (49.9%). The majority were male (65.6%), newly diagnosed with ADHD (60.7%), prescribed stimulant ADHD medication (78.3%), given behavioral intervention (88.2%), and treated by a primary care practitioner (62.5%).

Bivariate association between the independent variables and the outcome variable
Table 1 shows the bivariate analyses between the follow-up during the initiation phase outcome variable and the independent variables. The association of each of the following variables with the initiation phase follow-up visit was statistically significant: race, school age group, Medicaid service region, newly diagnosed ADHD, ED visit prior to IPSD, other psychosocial or behavioral diagnoses prior to IPSD, psychosocial or behavioral therapy prior to IPSD, and specialty of the prescriber of ADHD medication (Table 1). Due to the small sample size for the C&M phase follow-up visits compliance, the results are not shown.

Factors associated with initiation phase follow-up identified in the multiple regression
The following pairs of independent variables were highly correlated based on Cramer’s V statistics: Medicaid service region and geography of residence (Cramer’s V = 0.76); and specialty of the prescriber and types of ADHD medications (Cramer’s V = 0.71). After considering the correlations found and applying the AIC, Medicaid service region, type of ADHD medication, other psychosocial or behavioral diagnoses prior to IPSD, and specialty of the prescriber of ADHD medication (Table 1). Due to the small sample size for the C&M phase follow-up visits compliance, the results are not shown.

Table 1. Bivariate Association Between Covariates and the Initiation Phase Measure Among Children With ADHD, Georgia, 2017 to 2019

| Measure            | Unmet n (%) | Met n (%) | χ² |
|--------------------|-------------|-----------|----|
| Race               |             |           |    |
| Caucasians         | 626 (50.8)  | 606 (49.2)| 25.27 a |
| African Americans  | 615 (61.4)  | 386 (38.6)|    |
| Other Races        | 44 (55.0)   | 36 (45.0) |    |
| School age group   |             |           |    |
| Elementary school  | 591 (50.0)  | 590 (50.0)| 24.63 a |
| Middle school      | 715 (60.2)  | 473 (39.8)|    |
| Gender             |             |           |    |
| Male               | 872 (56.2)  | 681 (43.8)| 1.90   |
| Female             | 434 (53.3)  | 382 (46.6)|    |
| Geography of residence |       |           |    |
| Urban              | 779 (53.5)  | 676 (46.5)| 4.57   |
| Rural              | 526 (57.7)  | 385 (43.3)|    |
| Medicaid service region |       |           |    |
| North              | 199 (43.5)  | 259 (56.5)| 51.38 a |
| Atlanta            | 329 (51.8)  | 306 (48.2)|    |
| Central            | 288 (61.2)  | 183 (38.8)|    |
| East               | 141 (66.8)  | 70 (33.2) |    |
| Southeast          | 202 (57.4)  | 150 (42.6)|    |
| Southwest          | 146 (61.1)  | 93 (38.9) |    |
| Newly diagnosed ADHD |          |           |    |
| No                 | 486 (52.3)  | 444 (47.7)| 5.10 a |
| Yes                | 820 (57.0)  | 619 (43.0)|    |
| ED visits prior to IPSD |        |           |    |
| 0 visit            | 1180 (56.6)| 906 (43.4)| 14.61 a |
| ≥1 visits          | 126 (44.5)  | 157 (55.5)|    |
| Types of ADHD medications |    |           |    |
| Stimulants         | 1041 (56.1)| 814 (43.9)| 4.01   |
| Nonstimulants      | 37 (56.1)   | 29 (43.9) |    |
| Other psychosocial or behavioral diagnoses prior to IPSD | | | |
| Yes                | 29 (41.4)   | 41 (58.6)| 5.47 a |
| No                 | 1277 (55.6)| 1022 (44.4)|    |
| Psychosocial or behavioral therapy prior to IPSD | | | |
| Yes                | 1102 (52.8)| 987 (47.2)| 40.34 a |
| No                 | 204 (72.9)  | 76 (27.1)|    |
| Specialty of the prescriber of ADHD medication | | | |
| Behavioral health practitioners | 146 (76.0)| 48 (24.0)| 30.64 a |
| Primary care practitioners | 876 (59.2)| 604 (40.8)|    |
| Others             | 56 (51.4)   | 53 (48.6)|    |
| School season      |             |           |    |
| Yes                | 1218 (54.9)| 1002 (45.1)| 0.99 |
| No                 | 88 (59.1)   | 61 (40.9)|    |

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; ED, emergency department; IPSD, Index Prescription Start Date.  
aP < .05.  
bPsychiatrists, behavioral health practitioners, neurologists.  
cPediatricians, general medicine physicians, family physicians, nurse practitioners, or physician assistants.
Table 2. Regression Analysis to Identify the Independent Predictors of Unmet Initiation Phase Follow-up Among Children (6 to 12 Year-Old Medicaid Recipients) With ADHD, Georgia, 2017 to 2019

|                                      | Crude Odds Ratio (95% CI) | Adjusted Odds Ratio (95% CI) |
|--------------------------------------|---------------------------|------------------------------|
| **Race**                             |                           |                              |
| Caucasians Reference Reference       |                           |                              |
| African Americans 1.57 (1.30-1.89)   | 2.13 (1.64-2.76)          |
| Other races 1.25 (0.75-2.10)         | 1.33 (0.68-2.61)          |
| **School age group**                 |                           |                              |
| Elementary Reference Reference       |                           |                              |
| Middle school 1.52 (1.26-1.83)       | 1.49 (1.23-1.80)          |
| **Geography of member residence**    |                           |                              |
| Urban Reference Reference Reference  |                           |                              |
| Rural 1.19 (0.98-1.43)               | 1.27 (1.05-1.55)          |
| **ED visits prior to IPSD**          |                           |                              |
| ≥1 visits Reference Reference        |                           |                              |
| 0 visit 1.61 (1.20-2.17)             | 1.57 (1.16-2.12)          |
| **Psychosocial or behavioral therapy prior to IPSD** | | |
| Yes Reference Reference Reference    |                           |                              |
| No 2.22 (1.61-3.03)                  | 2.30 (1.65-3.21)          |
| **Specialty of the prescriber of ADHD medication** | | |
| Behavioral health practitioners Reference Reference | | |
| Primary care practitioners 1.84 (1.44-2.34) | 1.88 (1.45-2.44)          |
| Others 1.32 (0.85-2.05)              | 1.40 (0.88-2.21)          |
| **Newly diagnosed ADHD**             |                           |                              |
| No Reference Reference Reference     |                           |                              |
| Yes 1.36 (1.13-1.64)                 | 1.47 (0.48-4.54)          |
| **Interaction terms**                |                           |                              |
| Newly diagnosed ADHD among African Americans N/A 0.59 (0.40-0.87) | |
| Newly diagnosed ADHD among other races N/A 1.16 (0.39-3.43) | |

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; CI, confidence interval; ED, emergency department; IPSD, Index Prescription Start Date; N/A, not available.

a Adjusted odds ratios comparing specific racial groups were calculated based on the interaction term and shown in Table 3.

DISCUSSION

By using administrative data, this study found that managed care organizations had a significantly higher noncompliance rate for the initiation phase HEDIS measure for African American children than Caucasian children among those with an existing ADHD diagnosis. Literature suggested that financial limitation, cultural and social norms may contribute to racial differences in receiving treatment for ADHD.10 For example, Paidipati and colleagues found that Caucasian parents were more likely to seek medication treatment for children with ADHD than were parents of other racial or ethnic groups.11

Our finding that the middle school age group had a higher noncompliance rate than the elementary school age group was somewhat consistent with the findings by Bussing et al of a higher noncompliance rate for older children than for younger children. This difference may be due to the fact that middle school age children are more likely to have a negative attitude toward medication, stigma, concerns regarding treatment dependence, and experience of social withdrawal caused by medication.12 Older children may also have a busier schedule than younger children, which could affect their follow-up care.

Table 3. Difference in Noncompliance (Adjusted Odds Ratio) among Racial Groups Depends on Whether ADHD Was Newly Diagnosed

|                                      | Adjusted Odds Ratio (95% CI) |
|--------------------------------------|-----------------------------|
|                                      | African Americans vs Caucasians | Other races vs Caucasians (Reference) |
| Not newly diagnosed ADHD             | 2.13 (1.64-2.76)             | 1.33 (0.68-2.61) |
| Newly diagnosed ADHD                 | 1.25 (0.65-2.40)             | 1.54 (0.27-8.87) |

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; CI, confidence interval.

a Calculation was based on the interaction terms from Table 2.

P < .05.
The current study found children with a rural residence had a higher unmet follow-up rate than those with an urban residence. A previous study by Hooven et al found ADHD patients who lived further from the physician's office had a lower rate of follow-up care, which may help explain the difference. However, other reasons (eg, lack of specialized practitioners or other resources) in rural areas may also be considered.

This study found that children with no ED visit prior to IPSD had higher unmet follow-up in the initiation phase. No published studies have examined whether ED visits prior to IPSD may be associated with initiation phase measure compliance. Having had no ED visit may indicate a child had better overall health and thus was less likely to see a physician.

This study found children who had no psychosocial or behavioral therapy prior to IPSD were more likely to have no follow-up within 30 days. Given that psychosocial or behavioral therapy tends to be provided by a psychiatrist or behavioral health practitioner, this finding is consistent with the other finding in this study that children treated by a psychiatrist or behavioral health practitioner were more likely to receive successful initiation phase follow-up compared with those treated by a pediatrician. No published study has examined whether having psychosocial or behavioral therapy may be associated with the initiation phase measure compliance. This can be an interesting factor for future studies.

A study by Snowden and colleagues found that African American children were more likely to receive behavioral health care from pediatricians while Caucasian children were more likely to receive behavioral health care from behavioral health practitioners. The current study found there was a significant disparity in follow-up care that existed between African American and Caucasian children even after adjusting for the effects of physicians’ specialty. Our finding that children treated by a primary care practitioner had a higher unmet follow-up rate than those treated by a behavioral health practitioner was consistent with findings by Patel et al and Bussing et al. In the sample analyzed, 84.4% of children were treated by a primary care practitioner or other nonphysician providers, which calls for policy intervention to improve referral to a specialized physician and/or provide more communication between primary care providers and behavioral health practitioners to improve initiation phase follow-up.

The current study found that among children newly prescribed ADHD medication, children who were newly diagnosed experienced higher unmet in follow-up care than those who had been previously diagnosed. No published study has examined the timing of diagnosis and medication treatment affect follow-up care in ADHD. It is likely children who had been diagnosed with ADHD but not received medication treatment before had received psychobehavioral treatment from specialized behavioral health practitioners. As shown earlier, children treated by specialized behavioral health practitioners tended to have a higher success rate with the initiation phase measure.

This study had limitations. First, factors not captured in the administrative data could not be examined (eg, parent’s education level and marital status). Further research using chart reviews, surveys, or focus groups with patients’ families and health care practitioners may be conducted to examine additional factors. Second, some members moved from one health plan to another. If they were prescribed an ADHD medication during the first 120 days after enrollment into the health plan, they were excluded from the analysis given that they did not have enough enrollment history to meet the requirements of the HEDIS definition. The effect of excluding such members on the findings of the present study is uncertain. Third, there were missing data in race and specialty of the prescriber, which may cause bias in the analysis. Lastly, caution should be exercised in generalizing our findings to other populations.

CONCLUSION

The current study shows the odds of having the 30-day follow-up after newly receiving an ADHD prescription were lower among African American children with an existing diagnosis of ADHD, middle school children, children living in rural areas, children who had no ED visit prior to IPSD, children not receiving psychosocial or behavioral therapy prior to IPSD, and children receiving the initial ADHD prescription from a primary care practitioner. Managed care organizations can focus intervention efforts to improve compliance with the initiation phase measure for Medicaid children by targeting the high-risk categories identified previously for improvement. They can also focus efforts on coordinating the communication between behavioral health practitioners and pediatricians about several key points: (1) the importance of using behavioral health therapy prior to prescribing medication; (2) the importance of a follow-up visit within 30 days of newly prescribing an ADHD medication; and (3) the importance of utilizing medication management in combination with behavioral health therapy.

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