

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 = 1.49; 95% CI, 1.23-1.80), rural residence (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

To ensure the quality of care for children diagnosed with attention-deficit/hyperactivity disorder (ADHD), the National Committee for Quality

Assurance (NCQA) has a requirement for follow-up monitoring for children who have a newly prescribed ADHD medication stipulated in the Healthcare Effectiveness Data and Information Set (HEDIS).¹ The NCQA requires that children 6 to 12 years of age diagnosed with ADHD have 1 follow-up visit with a practitioner with prescribing authority within 30 days (initiation phase) of their first prescription of ADHD medication (Index Prescription Start Date or IPSD) and at least 2 follow-up visits with a practitioner in the 270 days (continuation and maintenance phase or C&M phase) after the 30-day initiation phase.

A study by Patel and colleagues² found 38.1% of patients had a follow-up visit within 30 days of the IPSD and 33.7% met both the initiation phase and C&M phase HEDIS measurements. Geltman and colleagues³ found that 50% and 35% of patients met the initiation phase and C&M phase measurements, respectively. Bussing and colleagues⁴ found that 49.8% and 45.8% of patients met the 2 criteria, respectively, and adolescents were less likely to continue taking ADHD medication than were younger children.⁴ The study by Bussing and colleagues also

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The datasets generated during and/or analyzed during the current study are not publicly available, but are available from the corresponding author on reasonable request.

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found initiation and C&M phase compliance rates were higher for behavioral health providers than for non-behavioral health providers, and for elementary school children than for older children. Patel and colleagues² 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 colleagues⁵ 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 IPSP 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 IPSP and at least 300 days after the IPSP. 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.¹

Based on findings in the literature, age,⁴ the specialty of practitioners,^{2,4} and geography of residence (urban vs rural)⁵ 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.⁶ Urban or rural county residence was defined based on the county where a patient lived on the IPSP following the definition of the Georgia Department of Public Health.⁷

A member was defined as *newly diagnosed* for ADHD if the diagnosis was initially documented on or within 10 days prior to the IPSP. If the diagnosis of ADHD was documented prior to the 10 days before the IPSP, 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 IPSP. *Psychosocial or behavioral therapy* includes mental health crisis intervention, psychotherapy, and other behavioral health counseling that are provided to treat ADHD or other mental or behavioral health conditions during the 90 days prior to and on the IPSP. *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 IPSP. Due to the low number of members (N = 18) with a hospital admission before the IPSP, that variable was excluded from the statistical analyses. To examine the effect of *school season* on initiation phase compliance, IPSPs 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 IPSP 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 χ^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 χ^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)⁸ 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.⁸ 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 IPSPD 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.⁹ A *P* value $\leq .05$ 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 IPSPD, other psychosocial or behavioral diagnoses prior to IPSPD, psychosocial or behavioral therapy prior to IPSPD, 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 IPSPD, gender, and school season were dropped from the multiple regression model.

In the final model, the confounding effects among the covariates were assessed by excluding and then adding each covariate and monitoring how the coefficients of other variables changed. Only newly diagnosed ADHD had a coefficient change of more than 20%. Since newly diagnosed ADHD was also

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

	Measure Unmet n (%)	Measure Met n (%)	χ^2
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 (46.8)	
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 IPSPD			
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 IPSPD			
Yes	29 (41.4)	41 (58.6)	5.47 ^a
No	1277 (55.6)	1022 (44.4)	
Psychosocial or behavioral therapy prior to IPSPD			
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 ^b	146 (44.0)	186 (56.0)	26.54 ^a
Primary care practitioners ^c	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; IPSPD, Index Prescription Start Date.

^a*P* < .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) ^a	2.13 (1.64-2.76) ^a
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) ^a	1.49 (1.23-1.80) ^a
Geography of member residence		
Urban	Reference	Reference
Rural	1.19 (0.98-1.43)	1.27 (1.05-1.55) ^a
ED visits prior to IPSPD		
≥1 visits	Reference	Reference
0 visit	1.61 (1.20-2.17) ^a	1.57 (1.16-2.12) ^a
Psychosocial or behavioral therapy prior to IPSPD		
Yes	Reference	Reference
No	2.22 (1.61-3.03) ^a	2.30 (1.65-3.21) ^a
Specialty of the prescriber of ADHD medication		
Behavioral health practitioners	Reference	Reference
Primary care practitioners	1.84 (1.44-2.34) ^a	1.88 (1.45-2.44) ^a
Others	1.32 (0.85-2.05)	1.40 (0.88-2.21)
Newly diagnosed ADHD		
No	Reference	Reference
Yes	1.36 (1.13-1.64) ^a	1.47 (0.48-4.54)
Interaction terms ^b		
Newly diagnosed ADHD among African Americans	N/A	0.59 (0.40-0.87) ^a
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; IPSPD, Index Prescription Start Date; N/A, not available.

^aP < .05.

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

included in the interaction terms (Table 2), the variable was kept in the final model.

Although rural residence (vs urban) was not significantly associated with noncompliance with the initiation phase measure in the bivariate analysis, it was statistically significant in the multiple logistic regression analysis (Table 2). Specifically, the adjusted odds ratio showed that the middle school age group

(vs elementary school age group), rural residence (vs urban residence), and primary care practitioners (vs behavioral health practitioners) had 49%, 27%, and 88% greater odds of being noncompliant with the initiation phase measure, respectively. Those members who had no ED visit(s) prior to the IPSPD (vs had ≥1 ED visits) and no psychosocial or behavioral therapy prior to IPSPD (vs had psychosocial or behavioral therapy) had 57% and 130% greater odds of being noncompliant with the initiation phase measure, respectively.

Among the interactions examined, only the interaction between race and whether ADHD was newly diagnosed was found significant (Tables 2 and 3). Specifically, among those not newly diagnosed with ADHD, African Americans had 113% higher odds than Caucasians to have no follow-up visit within 30 days. However, there was no significant difference between the 2 racial groups among those newly diagnosed with ADHD.

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 al⁴ 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^a

	Adjusted Odds Ratio (95% CI)	
	African Americans vs Caucasians (Reference)	Other races vs Caucasians (Reference)
Not newly diagnosed ADHD	2.13 (1.64-2.76) ^b	1.33 (0.68-2.61)
Newly diagnosed ADHD	1.25 (0.65-2.40)	1.54 (0.27-8.97)

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

^aCalculation was based on the interaction terms from Table 2.

^bP < .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 al⁵ 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 the children 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 colleagues¹³ 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 al² and Bussing et al.⁴ 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 how 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 practition-

ers. 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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