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Antipsychotic Medication Use In Medicaid-Insured Children Decreased Substantially Between 2008 And 2016

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Abstract

Following rapid growth of pediatric antipsychotic prescribing in the early 2000s, especially in the Medicaid population, concerns regarding safety and appropriateness of such prescribing increased. Many states implemented policy and educational initiatives aimed at safer and more judicious antipsychotic use. Antipsychotic use leveled off in the late 2000s, but there have not been recent national estimates of trends in antipsychotic use in children enrolled in Medicaid, and it is unclear how use varied by race and ethnicity. This study observed a sizeable decline in antipsychotic use among children aged 2–17 between 2008–2016. While the magnitude of change varied, declines were observed across foster care status and age, sex, and racial and ethnic groups studied. The proportion of children with an antipsychotic prescription who received any diagnosis associated with an FDA-approved pediatric indication increased from 38% (2008) to 45% (2016), which may indicate a trend toward more-judicious prescribing.

Keywords

Antipsychotics; children; adolescents; trend; Medicaid; racial disparities

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Introduction

Selected antipsychotic medications are approved by the US Food and Drug Administration (FDA) for treatment of schizophrenia, irritability associated with autism, Tourette's disorder, and bipolar disorder in children. Indications for use vary by age(1) and antipsychotics are also used off-label for unapproved indications and ages. Antipsychotics should be prescribed with caution as antipsychotic treatment is associated with potentially serious side effects, including type 2 diabetes, cardiometabolic effects, and unexpected death.(2, 3, 4, 5)

Antipsychotic use in US children increased sharply in the early 2000s, corresponding with rising off-label use in children with ADHD, conduct disorders, and mood disorders(6, 7, 8). Several states enacted policies to address potential inappropriate use including prior authorization restrictions, secondary review by peers, and population-level monitoring of antipsychotic prescription utilization.(9)

Subsequently, a 20-state analysis found growth in pediatric antipsychotic use in Medicaid to level off from 2008 through 2010.(6) Declines in antipsychotic use past 2010 have been observed in privately insured children(10, 11) and samples of Medicaid-enrolled children(12), including children in foster care.(13) However, we are unaware of published national analyses of antipsychotic trends among Medicaid-enrolled children extending into the 2010s. Further, while prior research found US antipsychotic use to be more prevalent in White children compared to Black, Hispanic, and other racial/ethnic groups,(14) there is limited research on whether trends are similar across racial/ethnic groups.

We provide updated estimates of trends in antipsychotic prescribing from 2008 to 2016 among US children enrolled in Medicaid and evaluate trends by race/ethnicity and foster care status.

Methods

Our analysis used 2008–2016 Medicaid administrative claims data from 45 states drawn from the Medicaid Analytic eXtract (MAX) and Transformed Medicaid Statistical Information System (T-MSIS) Analytic Files (TAF), inclusive of the most recently available data at the time of analysis. We used information on eligibility and enrollment, demographics, inpatient and outpatient services, and dispensed pharmacy prescriptions. For each study year, we included children aged 2–17 with full calendar year enrollment in Medicaid. We excluded children with dual Medicaid-Medicare eligibility or in long-term care facilities during the calendar year.

Antipsychotic use was defined as at least one prescription during the calendar year for a first or second-generation antipsychotic. Race/ethnicity, from enrollment files, was classified into mutually exclusive groups: White, non-Hispanic; Black, non-Hispanic; Asian, non-Hispanic (hereafter White, Black, and Asian, respectively); Hispanic, all races; other or multiple races, non-Hispanic; unknown. Foster care status was based on Medicaid eligibility in December of that year.

Among youth with an antipsychotic prescription fill, we examined psychiatric diagnoses during that calendar year. An indicator for a diagnosis with an FDA approved indication (regardless of antipsychotic agent and age) was included. Diagnoses were classified into hierarchical, mutually exclusive categories, ordered by estimated level of evidence for antipsychotic treatment (Appendix exhibit A).(6, 11, 15) Children were assigned to the highest-listed diagnostic group in which they received a diagnostic (ICD-9-CM or ICD-10-CM) code during that year.

Analysis.

The annual proportion of children with antipsychotic use was calculated by dividing the number of eligible enrollees filling an antipsychotic prescription during the year by all eligible enrollees during that year. When calculating annual proportions, we pooled data from all 45 states. Statistical significance trend tests were not performed, given size of full Medicaid population.

Annual antipsychotic use proportions were stratified by foster care status, age, sex, and race/ethnicity. The primary stratification by race/ethnicity was limited to 26 states identified by the Centers for Medicare and Medicaid Services' DQ Atlas as having low or medium concern for quality of race/ethnicity data in 2016.(16) Two sensitivity analyses on race/ethnicity stratification included: 1) More-restrictive analysis excluding 8 states missing >10% race/ethnicity data any year from 2008–2016; 2) all 45 states (Appendix exhibit B) (15). In post-hoc analyses, we examined trends by sex and race and ethnicity (White, Black, Hispanic) in children ages 13–17 years, given that the largest overall absolute declines were observed in this age group.

We analyzed: 1) diagnoses among antipsychotic users and 2) antipsychotic use within each diagnostic category. 1) We described psychiatric diagnoses among antipsychotic-treated children at the beginning (2008) and end (2016) of our timeframe (2016) and at an intermediary point prior to Medicaid expansion (2013). For a sensitivity analysis, all mental health diagnoses in the calendar year were described (Appendix Exhibit F)(15). 2) We estimated trends in antipsychotic use by mental health diagnosis. For example, among children enrolled in Medicaid with an attention-deficit/hyperactivity disorder (ADHD) diagnosis during that calendar year (denominator), we estimated the proportion with antipsychotic use that calendar year (numerator).

Limitations.

Observed trends in antipsychotic use may be influenced by shifts in the underlying enrolled population such as those following Medicaid expansion. Data completeness and quality may vary across states by managed care organizations and fee-for-service Medicaid.(17) Our study population is limited to children with 12 months of continuous enrollment in Medicaid and reflects filled prescriptions, not ingested medication. Foster care status was determined based on Medicaid eligibility in December; however, status may have differed at the time of antipsychotic prescription. We examine five racial/ethnic groups and do not capture the diversity within each of these groups. For the category pervasive developmental disorder (PDD) and intellectual disabilities, we did not distinguish between these diagnoses. The

hierarchical classification of diagnoses captures the highest-listed diagnosis in that calendar year and is a crude approximation of the indication for antipsychotic treatment. We do not have access to the clinical indication motivating the antipsychotic prescription. Additionally, the transitions from MAX to TAF data and from ICD-9-CM to ICD-10-CM codes may have influenced results. We evaluated trends through 2016, which covers the time the majority of initiatives were implemented; as more national data becomes available, future research can determine whether and when trends began to stabilize.

Results

The annual antipsychotic use in Medicaid-enrolled children was 2.31% in 2008 and declined by 43%, to 1.32%, by 2016 (Exhibits 1 and 2). Antipsychotic fills declined in children in foster care and not in foster care, with use remaining substantially higher in foster care children (2016=7.09%) than others (2016=1.19%).

In 2016, antipsychotic use ranged from 3.00% in males aged 13–17 years to 0.05% for females aged 2–5 years (Exhibit 1). The largest relative decline from 2008 to 2016 was in children aged 2–5 years (females: –70%, 0.17% to 0.05%; males: –67%, 0.47% to 0.16%). The largest absolute decline was in males aged 13–17 years (–2.46%, 5.46% to 3.00%).

By race/ethnicity, antipsychotic use in 2016 ranged from 1.94% for White individuals to 0.24% in Asian individuals (Exhibit 3). There was a decline in antipsychotic use across all racial/ethnic groups from 2008–2016. Relative changes ranged from –34% (Black children) to –41% (White children). The largest absolute decline was observed in White children (–1.37%) vs. Black (–0.62%), Hispanic (–0.31%), and Asian (–0.17%) children. Overall trends by race and ethnicity were consistent in sensitivity analyses (Appendix exhibit B) (15). The decline in antipsychotic use among children aged 13–17 years was observed across sex and race/ethnicity strata; however, the magnitude of decline varied (Appendix Exhibit C)(15).

When examining diagnoses among antipsychotic users, the proportion of children with antipsychotic use who were diagnosed with an FDA-approved antipsychotic indication (for any age), increased from 38% in 2008 to 45% in 2016 (Exhibit 4). The proportion of antipsychotic-treated children without a psychiatric diagnosis recorded in claims declined (2008=10%, 2016=4%). There was an increase in the proportion of antipsychotic-treated children with PDD or intellectual disability diagnosis (2008=14%, 2016=23%) and slight decline in the proportion with ADHD diagnosis (2008=23%, 2016=20%), under the hierarchical diagnostic classification. Considering all mental health diagnoses in the calendar year, ADHD (2008=54.7%, 2016=61.8%) and conduct or disruptive behavior disorder (2008=32.0%, 2016=35.7%) remained the most common diagnoses in antipsychotic users (Appendix Exhibit D)(15).

Antipsychotic use within each diagnostic category are displayed in Appendix Exhibit E(15). Use declined across all mental health diagnoses, remaining highest among children with a diagnosis of schizophrenia or bipolar disorder.

Discussion

Between 2008 and 2016, antipsychotic use declined among children enrolled in Medicaid across all age, sex, and racial and ethnic groups studied along with within diagnostic group. These declines occurred in the context of state-level policy changes aimed at promoting safe antipsychotic use in children.

By 2014, 31 states had implemented prior authorization policies related to pediatric antipsychotic use(18). The implementation of state-level policies was associated with declines in antipsychotic prescribing(10, 19). While the percent difference from 2008–2016 in the pooled 45-state Medicaid data was –1.0%, this difference ranged from –4.8% to +0.6% by state. This state-level heterogeneity in prescribing trends, while beyond the scope of the current paper, may be related to state prior authorization and other state-level policies. State-specific investigations are needed to evaluate the specific impact of local policy changes on within state trends.

In addition to prior authorizations, states implemented a number of other initiatives for judicious prescribing, building on the work of the 16-state Medicaid Medical Directors Learning Network/Rutgers CERTs Antipsychotics in Children consortium.(20) This consortium shared promising practices between states and developed and piloted measures of safe and judicious prescribing. Quality metrics for pediatric antipsychotic use were subsequently endorsed nationally(6, 21, 22). Efforts during the early 2010s to improve antipsychotic use included peer-review programs, state specialized interventions, educational initiatives, and multistate consortium(9, 23, 24, 25). Professional guidelines on antipsychotic prescribing(26) and management of maladaptive aggression,(27) often associated with antipsychotic prescribing, were published along with HEDIS quality measures for pediatric antipsychotic use(21). Other ongoing initiatives include programs such as the Safer Use of Antipsychotics in Youth (SUAY) clinical trial.(28)

The proportion of children with an antipsychotic prescription with any diagnosis associated with an FDA-approved pediatric indication increased from 38% (2008) to 45% (2016), potentially indicating prescribing improvements. Still, most antipsychotic use continued to be among children without such diagnoses. Antipsychotic use declined across all mental health diagnoses. The decline across diagnoses may be influenced by changes in diagnostic practices during the study period such as recording of comorbid diagnoses, severity at diagnosis, and time to diagnosis. These factors may alter the population with affected diagnoses over time and thus alter treatment rates. For example, while the proportion of children with a schizophrenia or psychotic-related diagnosis who received an antipsychotic prescription that calendar year declined from 2008 to 2016, more focused research is required before drawing conclusions concerning quality of care. In general, a higher threshold is used to defined schizophrenia disorders in Medicaid claims data;(29, 30) whereas our definition only required one ICD code and included the broad psychotic-related disorder category. There may also have been shifts in antipsychotic use in children with first-episode psychotic symptoms during the study period.(31, 32)

We observed higher antipsychotic use in White children compared to the other racial/ethnic groups. Similar differences have been previously described.(14, 33, 34) Factors contributing to lower antipsychotic use among non-white children are likely complex and structural, and may include differential access to mental healthcare, diagnostic and treatment biases, views on psychotropic treatment, and trust in the healthcare system(14, 35, 36). The role of under-treatment for children with indications for antipsychotic medications and over-prescription for White children remain key questions. Future research is needed to shed light on disparities by considering appropriateness of prescribing and quality metrics such as psychotherapy and metabolic monitoring.(21)

As described in prior research,(6, 13, 37, 38, 39) antipsychotic use is more prevalent in children in foster care. In California, despite declines in prescribing, lack of adherence to metabolic screening remained for children in foster care.(13) However, shortfalls in management of antipsychotic use are seen across all groups of children insured by Medicaid. (40) One concern is polypharmacy among children receiving antipsychotics.(41, 42) While antipsychotic prevalence did decline during the study period, safety concerns with antipsychotic use remain.

While there was an annual decline in antipsychotic use, the decline was most pronounced from 2013–2014. Medicaid expansion may have contributed to the post-2013 decline. Among individuals newly eligible for Medicaid(43, 44) antipsychotic use rates may have been lower. We conducted a post-hoc trend analysis stratified by states with and without Medicaid expansion by 2016 (Appendix Exhibit F). In states with Medicaid expansion, the largest decline in antipsychotic use was from 2013–2014 and from 2015–2016; in states that did not expand, the largest declines were not limited to the time post-2013 (2009–2010 and 2014–2015). In addition to Medicaid expansion, the post-2013 decline may reflect growing concerns on metabolic risks of atypical antipsychotics for children(2) and increasing implementation of the above-noted initiatives(9, 21, 23, 24, 26, 27). For example, as an increasing number of states newly imposed prior authorization requirements, many states with existing requirements broadened the covered age range.(18)

Conclusions.

From 2008–2016, national prevalence of antipsychotic use in Medicaid children underwent a sizeable decline. While varying in magnitude, overall declines in antipsychotic use were observed across sex, age, foster care status, and racial and ethnic groups and antipsychotic prescribing became more focused on children with FDA approved indications. Nationwide trends likely reflect the convergence of multiple factors including evolving state oversight policies, clinical practice standards, professional guidance, and deployment of quality metrics for safe and judicious prescribing.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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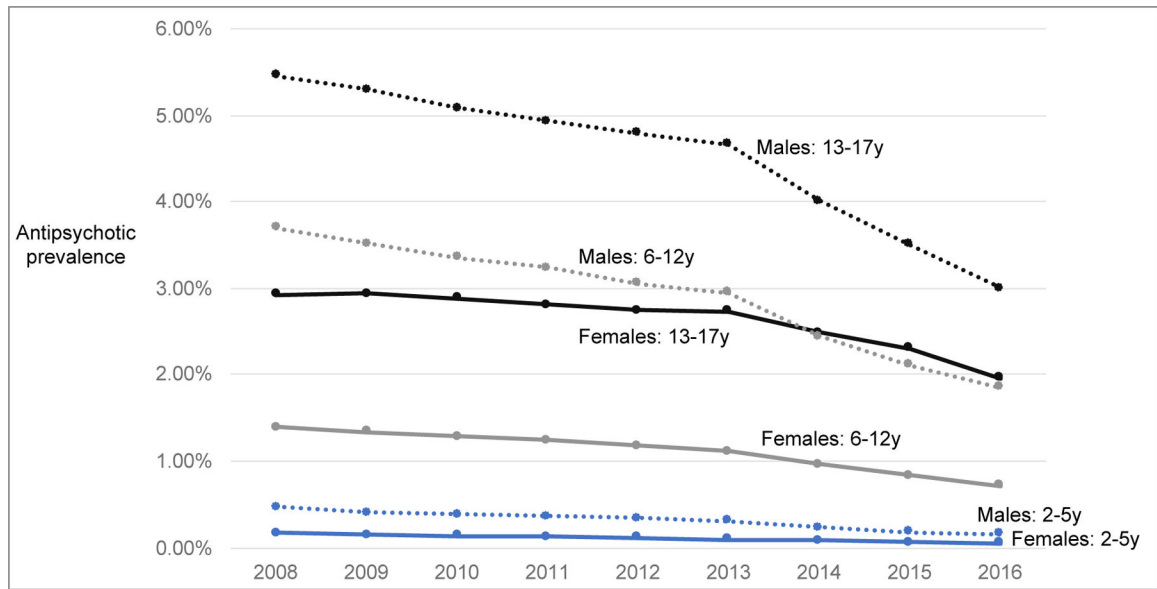


Exhibit 1. Antipsychotic use in children (2–17 years) enrolled in Medicaid from 2008 to 2016 by age and sex
SOURCE [Authors’ analysis of data from CMS Medicaid data from 2008–2016]

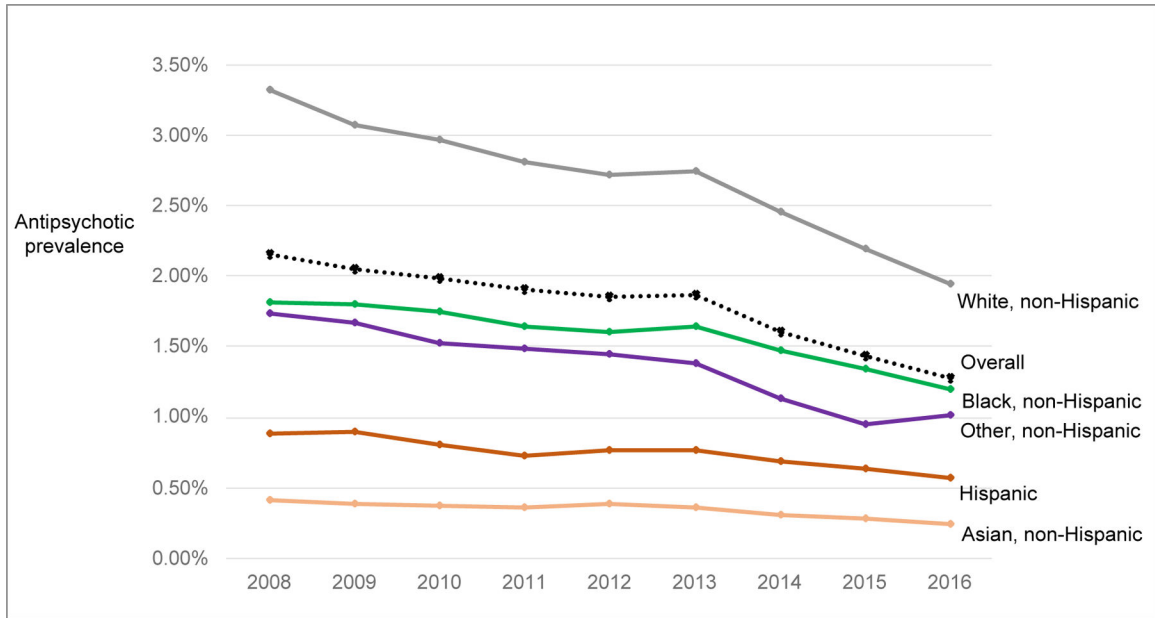


Exhibit 3. Antipsychotic use in children enrolled in Medicaid from 2008 to 2016 by race and ethnicity^{a,b}

SOURCE [Authors’ analysis of data from CMS Medicaid data from 2008–2016]

^aRestricted to 26 states identified by the Centers for Medicare and Medicaid Services’ DQ Atlas as having low or medium concern for the quality of race/ethnicity data in 2016 data (AK, CA, FL, GA, ID, IN, IL, ME, MD, MI, MN, MT, NH, NJ, NM, NC, ND, OH, OK, PA, SD, TX, VT, VA, WA, WI); Appendix exhibit B displays results with 45 states and 18 states.

^bThe proportion of children with unknown race and ethnicity ranged from 5–8% annually.

Exhibit 2.Prevalence of antipsychotic use in children (2–17 years) enrolled in Medicaid, 2008–2016 ^{a,b}

Year	Children with antipsychotic use, Full sample		Children in foster care ^c		Children not in foster care	
	No.	%	No.	%	No.	%
2008	348,253	2.31	68,657	10.89	279,596	1.93
2009	366,072	2.20	66,578	10.86	299,494	1.87
2010	374,715	2.10	62,332	10.40	312,383	1.81
2011	385,357	2.04	58,972	10.32	326,385	1.78
2012	392,168	1.98	61,582	10.05	330,586	1.72
2013	395,424	1.95	61,382	9.81	334,042	1.70
2014	372,037	1.70	50,535	9.15	321,502	1.51
2015	358,904	1.52	35,389	8.88	323,515	1.39
2016	323,861	1.32	37,369	7.09	286,492	1.19

SOURCE [Authors' analysis of data from CMS Medicaid data from 2008–2016]

^aAntipsychotics included first-generation antipsychotic medications: chlorpromazine, fluphenazine, haloperidol, loxapine, mesoridazine, molindone, perphenazine, pimozide, promazine, thioridazine, thiothixene, trifluoperazine, triflupromazine; and second-generation antipsychotic medications: aripiprazole, asenapine, brexpiprazole, cariprazine, clozapine, iloperidone, lurasidone, olanzapine, paliperidone, quetiapine, risperidone, ziprasidone; Combination products olanzapine/fluoxetine and perphenazine/amitriptyline were included.

^bMedicaid data from 45 states (excluded states include Arizona, Delaware, Nevada, Oregon, Rhode Island, along with the District of Columbia); For 2015 Maryland data, we required only 11 months of enrollment given missing March 2015 monthly enrollment indicator

^cFoster care status was based on Medicaid eligibility in December of that calendar year

Exhibit 4.

Characteristics and mental health diagnoses (hierarchical classification) in children enrolled in Medicaid with antipsychotic use in 2008, 2013, 2016

Patient characteristic	Children with antipsychotic use					
	2008 N=348,253		2013 N=395,424		2016 N=323,861	
	No.	%	No.	%	No.	%
Female	104,142	29.9	122,830	31.1	106,435	32.9
Age, median (IQR)	12 (9–15)		12 (9–15)		13 (10–15)	
2–5 years	15,176	4.4	12,229	3.1	6,748	2.1
6–12 years	165,879	47.6	187,766	47.5	147,651	45.6
13–17 years	167,198	48.0	195,429	49.4	169,462	52.3
Race, ethnicity						
White, non-Hispanic	192,587	55.3	200,169	50.6	144,839	44.7
Black, non-Hispanic	73,991	21.2	77,490	19.6	53,498	16.5
Hispanic	37,563	10.8	44,939	11.4	42,985	13.3
Asian, non-Hispanic	1,370	0.4	1,851	0.5	2,328	0.7
Other non-Hispanic	5,827	1.7	9,839	2.5	4,628	1.4
Unknown	36,915	10.6	61,136	15.5	75,583	23.3
Any diagnosis associated with an FDA approved indication (1+ drug in class, any age <18)	133,378	38.3	160,237	40.5	145,569	44.9
Hierarchical classification (mutually exclusive groups) ^a						
Schizophrenia, psychotic-related disorders	18,995	5.5	29,711	7.5	26,663	8.2
Pervasive developmental disorder; Intellectual disabilities	49,880	14.3	73,327	18.5	74,419	23.0
Bipolar disorder	62,086	17.8	54,123	13.7	41,808	12.9
Tic disorder	2,417	0.7	3,076	0.8	2,679	0.8
Conduct, disruptive behavior disorder, without ADHD	23,448	6.7	24,480	6.2	15,856	4.9
Conduct, disruptive behavior disorder, with comorbid ADHD	43,011	12.4	61,800	15.6	50,312	15.5
ADHD	79,733	22.9	88,593	22.4	65,706	20.3
Depression	11,923	3.4	14,668	3.7	15,848	4.9
PSTD	3,318	1.0	3,432	0.9	2,980	0.9
Anxiety disorder or obsessive-compulsive disorder	2,956	0.8	4,078	1.0	3,993	1.2
Adjustment-related disorders	3,674	1.1	2,900	0.7	1,856	0.6
Other/unspecified mood disorder	4,638	1.3	7,251	1.8	3,963	1.2
Sleep disorder	887	0.3	886	0.2	729	0.2
Other mental health diagnosis	5,865	1.7	4,985	1.3	4,146	1.3
No mental health diagnosis	35,422	10.2	22,114	5.6	12,903	4.0

SOURCE [Authors' analysis of data from CMS Medicaid data from 2008–2016]

^aHierarchical classification results presented from 45 states; hierarchical classification results restricted to the 20 states matching Stephen Crystal et al (2016)(6) are available on request.