Treated Prevalence of Attention-Deficit/Hyperactivity Disorder Increased from 2009 to 2015 Among School-Aged Children and Adolescents in the United States

Kwame A. Nyarko, PhD, **Scott D. Grosse, PhD**, **Melissa L. Danielson, MSPH**, **Joseph R. Holbrook, PhD**, **Susanna N. Visser, DrPH**, and **Stuart K. Shapira, MD, PhD**

National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, Atlanta, Georgia

Abstract

Objectives—The purpose of this brief is to describe changes in the treated prevalence of medically managed attention-deficit/hyperactivity disorder (ADHD) among insured school-aged children and adolescents in the United States from 2009 to 2015. We examine the differences between those with employer-sponsored insurance (ESI) and with Medicaid insurance.

Methods—We utilized two large longitudinal administrative datasets containing medical and drug claims data on individuals with ESI and Medicaid insurance from Truven Health MarketScan® Administrative Claims Databases. Treated prevalence was measured as the percentage of school-aged children and adolescents enrolled in a calendar year who met the criteria for medically managed ADHD in the same calendar year. Subjects were eligible for inclusion if they were aged 6–17 years and were continuously enrolled during a calendar year.

Results—The annual prevalence of treated ADHD among school-aged children and adolescents with ESI increased from 4.5% in 2009 to 6.7% in 2015. Among those with Medicaid it increased from 11.3% in 2009 to 13.3% in 2012, and fell after 2012, remaining steady from 2013 through 2015.

Conclusion—Treated prevalence of ADHD increased continuously over time among school-aged children and adolescents with ESI, but declined slightly after 2012 among those in the Medicaid sample.

Keywords

attention-deficit/hyperactivity disorder; treated prevalence; trend; children; adolescents

Address correspondence to: Kwame Nyarko, PhD, National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention, 4770 Buford Hwy, Mail Stop E-87, Atlanta, GA 30341, knyarko@cdc.gov.

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a common childhood condition characterized by symptoms of inattention, impulsive behavior, and hyperactivity (American Psychiatric Association 2013). The community prevalence of diagnosed ADHD among children and adolescents has steadily increased, with 2011–2012 rates ranging between 9% and 11%, compared with 6% in 1997–1999 (Olfson et al. 2003; Boyle et al. 2011; Wolraich et al. 2012; Visser et al. 2014; Collins and Cleary 2016). Less is known about trends in the treated prevalence of children and adolescents who are medically managed for ADHD, which may inform evaluations of rising health expenditures. The prevalence of clinical care for ADHD among children aged 2–5 years enrolled in 26 state Medicaid programs increased from 1.34% in 2008 to 1.50% in 2011, and in a weighted national sample of children aged 2–5 years with employer-sponsored insurance (ESI) it rose from 0.46% in 2008 to 0.60% in 2014 (Visser et al. 2016). This research brief investigates changes in treated prevalence of medically managed ADHD among insured school-aged children and adolescents (aged 6–17 years) from 2009 to 2015.

Methods

In this research brief, we utilized two large longitudinal administrative datasets containing medical and drug claims data for convenience samples of millions of individuals. The datasets were the Commercial Claims and Encounters Databases (i.e., ESI) and the Medicaid Multistate Databases of Truven Health (an International Business Machine Corporation company) MarketScan® Administrative Claims Databases (MarketScan). The ESI version contains information on adjudicated and paid outpatient drug, outpatient service, inpatient service, and inpatient admission claims of employees and their dependents across the United States. The Medicaid database includes similar claims data for children and adolescents enrolled in the Children Health Insurance Program (CHIP) or in Medicaid within a subset of U.S. states (Adamson et al. 2008). We accessed the claims using Treatment Pathways 4.0 (T×P), an online analytic platform. The MarketScan data used with T×P are restricted to people enrolled in insurance plans with prescription drug coverage.

The MarketScan Medicaid database includes records for all children and adolescents submitted by participating state Medicaid programs, without distinction between Medicaid and CHIP status, but Truven does not reveal information about the states contributing data. We restricted the analysis to children and adolescents with known Medicaid basis of eligibility (BOE) to assure comparability of the Medicaid sample over time; the percentage of the sample with unknown BOE, many presumably enrolled in CHIP, changed over time.

Using these claims, we described the treated prevalence of medically managed ADHD among school-aged children and adolescents (aged 6–17 years) from January 1, 2009 to December 31, 2015. We defined treated prevalence as the percentage of school-aged children and adolescents enrolled in a calendar year who met the criteria for medically managed ADHD in the same calendar year using a previously defined algorithm (Visser et al. 2016). Individuals were classified as having medically managed ADHD in a given year if during that year they had (1) two or more outpatient claims with an International

Classification of Diseases (ICD) version 9 or 10 diagnosis code for ADHD (ICD-9: 314.XX; ICD-10: F900-2, F908-9) 7 or more days apart, or (2) one outpatient claim with an ADHD code and two or more prescription drug claims (a subsequent claim at least 14 days after the first) for a Food and Drug Administration-approved ADHD medication (Visser et al. 2016). ICD-10 codes were required for billing in the United States beginning October 1, 2015.

Subjects were eligible for inclusion if they were aged 6–17 years and were continuously enrolled for all 12 months during a calendar year. Because enrollees are assigned a unique identification number in MarketScan, it is possible to track healthcare use over time, including during multiple years, as long as they remain with the same employer or health plan.

In the Medicaid samples, we also compared treated prevalence of ADHD stratified by race/ethnicity [non-Hispanic White (NHW), non-Hispanic Black (NHB), Hispanic, and Other (includes multiracial and unknown)]; race/ethnicity information was not included in the ESI database. We also explored the treated prevalence of ADHD among school-aged children and adolescents stratified by BOE (disability or no disability) because disability is a BOE for Medicaid and the presence of other conditions has been suggested to complicate the measure of ADHD prevalence (Steinhausen et al. 2006; Taurines et al. 2010).

We calculated 95% confidence intervals. However, we do not present them because the intervals were extremely narrow due to large sample sizes.

Results

Demographic characteristics of both samples (ESI and Medicaid) are reported in Supplementary Table S1 (Supplementary Data are available online at www.liebertpub.com/cap). Approximately, 46%, 36%, 8%, and 2% of the school-aged children and adolescents in the Medicaid sample were NHW, NHB, Hispanic, and Other, respectively. About 8% of the Medicaid sample did not have information on race/ethnicity.

The prevalence of treated ADHD within a single calendar year among school-aged children and adolescents with ESI increased from 4.5% in 2009 to 6.7% in 2015. Among those with Medicaid, it increased from 11.8% in 2009 to 13.3% by 2012, but thereafter stayed relatively stable at about 12.5% (Table 1). The ratio of 2015 treated prevalence of ADHD to 2009 prevalence was 1.49 among school-aged children and adolescents with ESI, and 1.07 among those with Medicaid. The ratio of treated prevalence of Medicaid to treated prevalence of ESI decreased from 2.6 in 2009 to 1.9 in 2015.

The treated prevalence of ADHD by race/ethnicity in the Medicaid sample was highest among NHW school-aged children and adolescents and lowest among those who are Hispanic (Table 2). Among all school-aged children and adolescents, the treated prevalence of ADHD peaked during 2011 to 2012 and was consistently lower from 2013 to 2015. However, among those who are Hispanic, it started to drop in 2012. Among those with missing information on race/ethnicity, treated prevalence of ADHD increased until 2014.

The lower part of Table 2 shows the treated prevalence of ADHD in the Medicaid sample, stratified by BOE. The trend in treated prevalence of ADHD among both the disability BOE group and those who did not have disability as a BOE showed the same inverted U-shape that was observed for the Medicaid sample overall.

Discussion

Our findings of an increasing trend in the treated prevalence of ADHD in school-aged children and adolescents in the United States were similar to those from surveys on the prevalence of ever-diagnosed ADHD (Olfson et al. 2003; Boyle et al. 2011; Visser et al. 2014; Collins and Cleary 2016). We observed an increasing trend in treated prevalence of ADHD in school-aged children and adolescents in the United States. This increase was observed among children and adolescents aged 6–17 years with ESI from 2009 through 2015, and among Medicaid recipients from 2009 through 2012, consistent with a previous report for children aged 2–5 years (Visser et al. 2016).

The treated prevalence of ADHD among school-aged children and adolescents with Medicaid was consistently higher than that of those with ESI, similar to a previous analysis of administrative data for preschool-aged children (Visser et al. 2016). There are potential explanations for this difference in prevalence. First, the percentage of children and adolescents with ADHD is higher among those who live in poverty (Scahill et al. 1999; Akinbami et al. 2011). Second, the diagnosis of pediatric ADHD is often a basis for receipt of supplemental security income disability benefits, which in turn make children and adolescents eligible for Medicaid (Ettner et al. 2000). The higher treated prevalence rate of ADHD among children with Medicaid relative to the sample with ESI reflects in part the higher prevalence of ADHD among those with a disability BOE. For example, in our study, the treated prevalence of ADHD was roughly 30% among school-aged children and adolescents eligible for Medicaid based on disability, compared with 10%–12% of other children enrolled in Medicaid (Table 2).

The decrease after 2012 in the treated prevalence of ADHD in the Medicaid group overall may be due to the enrollment of more children in Medicaid who did not have disability. The number of Medicaid enrollees with disability as a BOE was relatively stable over the study period; however, the number of Medicaid enrollees increased by about one-third, resulting in a corresponding decline in the percent of participants with disability as a BOE from 8.7% in 2009 to 6.0% in 2015 (Supplementary Table S1). The 0.7% point decrease in treated prevalence from 13.3% in 2012 to 12.6% in 2015 (Table 1) was matched by the 0.8% point decrease in the combined frequency of ADHD and disability BOE from 2.6% in 2012 to 1.8% in 2015 (Supplementary Table S1).

Our study has several limitations. First, the Medicaid sample is from unidentified state Medicaid plans, and individual state inclusion in the MarketScan databases may change from year to year. If we had state-specific Medicaid information, we could stratify our analysis by whether or not states expanded their Medicaid eligibility criteria. Also, our ESI study sample was not representative of children and adolescents with other types of private insurance (e.g., individual insurance or those without prescription drug coverage). Finally,

the case definition of ADHD—limited to claims within a 12-month period—used for this trend analysis excluded children and adolescents who had medically managed ADHD, but did not utilize ADHD-related clinical services with sufficient frequency in a given year to be included. These children and adolescents may be more likely to have milder forms of ADHD.

Conclusions

In summary, we found that the treated prevalence of ADHD increased continuously over time among school-aged children and adolescents with ESI, but declined after 2012 and was consistently lower from 2013 to 2015 among those with Medicaid. These findings require confirmation by state-based Medicaid claims data after those data become available.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Clinical Significance

ADHD, the most common neurodevelopmental disorder of childhood, has had a documented dramatic increase in diagnosed prevalence in children and adolescents since the late 1990s. Clinicians can follow the American Academy of Pediatrics and the American Academy of Child and Adolescent Psychiatry diagnosis, evaluation, and treatment guidelines for ADHD to provide appropriate intervention and minimize unnecessary or inappropriate treatment for ADHD (Pliszka and AACAP Work Group on Quality Issues 2007; Subcommittee on Attention-Deficit/Hyperactivity Disorder et al. 2011).

Table 1

Treated Prevalence of Individuals with Attention-Deficit/Hyperactivity Disorder Aged 6–17 Years

| | | Children and adolescents with ADHD | | | |
| | ESI claims | | Medicaid claims | | |
Year	N	Treated prevalence (%)	N	Treated prevalence (%)	Medicaid/ESI prevalence ratio
2009	242,885	4.5	142,521	11.8	2.6
2010	250,348	4.8	168,983	12.2	2.5
2011	289,531	5.2	174,528	13.2	2.5
2012	310,678	5.5	189,388	13.3	2.4
2013	256,700	5.8	192,567	12.7	2.2
2014	279,298	6.3	198,964	12.3	2.0
2015	219,973	6.7	208,438	12.6	1.9

MarketScan ESI Claims and Encounters and Medicaid Multistate Treatment Pathways, 2009–2015.

ADHD, attention-deficit/hyperactivity disorder; ESI, employer sponsored insurance.

Table 2

Treated Prevalence of Attention-Deficit/Hyperactivity Disorder Among Medicaid Recipients Aged 6–17 Years First Stratified by Race and Ethnicity and Second by Disability as the Basis of Eligibility

Year	NHW, N (%)	NHB, N (%)	Hispanic, N (%)	Other, N (%)	Missing, N (%)
		Treated prevalence of ADHD			
2009	80,804 (15.3)	43,115 (9.7)	2,892 (4.2)	2,073 (7.7)	13,637 (9.7)
2010	99,513 (15.2)	47,447 (10.4)	4,077 (4.4)	2,522 (8.0)	15,424 (10.4)
2011	101,279 (16.1)	50,748 (10.7)	4,545 (4.6)	2,661 (8.0)	15,295 (17.5)
2012	108,912 (16.4)	55,668 (10.9)	5,437 (4.4)	3,099 (8.1)	16,272 (18.6)
2013	110,615 (15.8)	55,794 (10.4)	5,813 (4.0)	3,190 (7.5)	17,155 (18.8)
2014	112,503 (15.1)	60,314 (10.2)	5,258 (3.7)	3,228 (7.2)	17,661 (18.3)
2015	116,239 (15.2)	64,669 (10.8)	5,458 (4.1)	3,623 (7.6)	18,449 (18.0)

	Disability as BOE, N (%)	Other BOE, N (%)
2009	31,832 (30.3)	110,689 (10.0)
2010	35,735 (30.7)	133,248 (10.5)
2011	35,705 (31.8)	138,823 (11.5)
2012	36,426 (31.6)	152,962 (11.7)
2013	33,458 (29.5)	159,109 (11.3)
2014	31,033 (29.1)	167,931 (11.0)
2015	29,947 (30.1)	178,491 (11.5)

MarketScan Medicaid Multistate Treatment Pathways, 2009–2015.

ADHD, attention-deficit/hyperactivity disorder; BOE, Medicaid basis of eligibility; NHB, non-Hispanic Black; NHW, non-Hispanic White.