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Disparities in Identification of Comorbid Diagnoses in Children With ADHD

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Abstract

Aims—This study explores disparities in identification of educationally relevant comorbidities and medication prescribing practices for children with attention-deficit hyperactivity disorder (ADHD) and either comprehensive neurodevelopmental evaluations or evaluations limited by insurance to behavior management with medication.

Methods—This study was a retrospective chart review of 5- to 10-year-old children with ADHD diagnosed at the initial evaluation. Data collected included demographics, rates of comorbid conditions, medication management, and educational interventions.

Results—The 2 groups were similar in age, educational supports, and medication management. The group with insurance permitting comprehensive evaluations was more likely to be Caucasian, have higher parental education levels, and have more comorbid conditions identified with academic impact.

Conclusions—School-aged children with ADHD are likely to receive similar educational and medication management despite differences in evaluations. However, our data suggest that children who received comprehensive evaluations had greater identification of comorbid conditions that may influence academic, behavioral, and social outcomes.

Keywords

attention-deficit hyperactive disorder; comorbidity; polypharmacy

Introduction

Attention-deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder that affects attention and behavior in children and adults. The American Academy of Child and

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Declaration of Conflicting Interests

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Adolescent Psychiatry recommend an initial assessment that includes information from parents and teachers typically collected using standard rating scales for ADHD as well as evaluation for possible comorbid diagnoses.¹ The American Academy of Paediatrics has additional management guidelines that include educational support as well as behavioral and medication management.²

Comorbid diagnoses in children with ADHD are fairly common. Oppositional defiant disorder, the most common coexisting condition, is seen in almost 50% of cases.³ Learning disabilities, cognitive impairments, language disorders, tic disorders, anxiety or mood disorders, conduct disorder, and sleep disorders may also occur.^{4,5} Systematic reevaluation is warranted as individuals mature because prevalence rates of the comorbid conditions vary in children and adults^{6–8} and may change over time in individual patients.⁹ Initial assessment optimally includes a comprehensive evaluation to assess for comorbidities prior to initiating treatment regimens¹⁰ because undiagnosed comorbidities may contribute to perceived increases in disease severity and decreased treatment responsiveness.¹¹ Insurance approval for these comprehensive evaluations represents one potential barrier to proper diagnosis and management of pediatric ADHD.

Polypharmacy has been defined as the prescription of 2 or more medications to an individual for the same disorder or multiple medications given to the same individual to treat the comorbid conditions of the primary disorder.¹² Although the rate of polypharmacy among children with ADHD seems to be increasing, according to a recent survey, there is little evidence to support this practice.¹³ Reviews of polypharmacy have revealed concerns about minimal additional therapeutic benefit and increased rates of adverse outcomes.^{14,15} Concerns have also been expressed regarding a potential association between polypharmacy and visits limited by insurance companies to medication management for behavior.¹⁶ When examining factors that may be associated with polypharmacy, one study noted an increased rate of polypharmacy among patients evaluated by psychiatrists and decreased rates among patients with health maintenance organizations.¹⁷ Conversely, another study did not note an association between insurance, age, or race and polypharmacy.¹⁸ A beneficial effect of polypharmacy for comorbid symptoms was observed, but the core symptoms of ADHD did not improve.¹⁹

When management of ADHD seems to be ineffective or has adverse effects, it is important to determine if it may be a result of unidentified or inadequately treated comorbid conditions. Multiple studies have shown increased severity of ADHD symptoms, poor response to treatment, and worse outcomes in patients with comorbidities.^{20,21} Limited data are available regarding the outcome and treatment of children with unidentified psychiatric, educational, and developmental comorbidities.^{22,23}

In this retrospective study of our clinical population, we sought to evaluate the outcomes associated with insurance approval by determining the differences between 2 populations of children diagnosed with ADHD: one with insurance approval to receive comprehensive neurodevelopmental evaluations, including assessment of learning, cognition, and language, and the other with insurance approval to receive only mental health services and medication management for behavior. The same specialized group of nurse practitioners and physicians

evaluate and treat patients in both populations. We hypothesized that children with ADHD without comprehensive neurodevelopmental evaluations would have lower rates of identified comorbid conditions than those with comprehensive evaluations. Additionally, we postulated that children with ADHD without comprehensive neurodevelopmental evaluations may have higher rates of polypharmacy for management of ADHD because of failed recognition of these comorbid conditions.

Materials and Methods

We conducted a retrospective medical records review of patients who presented to the Center for Development and Learning Clinic for initial evaluations in the 2010 fiscal year. Medical records were systematically reviewed by a trained research assistant (MBG) and lead coinvestigators (TTG and EIL). Electronic medical records were also downloaded into an electronic database for review of study data. All record inconsistencies were double reviewed by the study team.

Participants were included if they had a diagnosis of ADHD and were 5 to 10 years old at the time of the evaluation. ADHD diagnoses in our clinic are typically made with parent and teacher report as well as various rating scales based on the age and additional symptomatology of the patient. Participants were excluded if they did not have a diagnosis of ADHD, were in foster care, or had been diagnosed with severe or profound intellectual disability. This study was reviewed and approved by the Johns Hopkins Institutional Review Board.

SPSS (Statistical Package for Social Sciences; versions 19 and 20, SPSS Inc, Chicago, IL) was used for data analyses, using χ^2 tests, t tests, and binomial and multinomial odds ratios, with a significance level of $P < .05$.

Results

Differences in Clinic Demographics

In the group with limited evaluations, there were 12 times as many African Americans and twice as many girls; also levels of parental education were lower and mothers were younger (Table 1). ADHD subtypes also differed between these groups. Inattentive ADHD was less commonly diagnosed in the limited evaluation group. There was no difference between the number of children with educational services documented in an Individualized Education Program (IEP) or 504 Rehabilitation plan; however, the status of educational plans was largely unknown.

Differences in Comorbidities

Individuals with comprehensive evaluations had a significantly higher mean number of comorbid diagnoses (Table 1). Intellectual disability, autism spectrum disorder, learning disability, language impairment, and psychosocial disorders were the most frequent diagnoses (Figure 1).

Differences in Medication Management and Polypharmacy

There were no significant differences between the mean number of total medications or the medication prescribing practices between the 2 groups (Table 2).

Discussion

The data from this retrospective comparison of children with different health insurance benefits reflect existing knowledge in many aspects. The pitfalls of racial disparities, young maternal age, and lower parental education have all been previously reported in a wide range of health disparities affecting children.^{24–27} In this study, we sought to compare the rates of identification of comorbid conditions with potential for academic impact in children with ADHD who are limited by insurance to medication management for behavior with those of children with ADHD who had the benefit of comprehensive neurodevelopmental evaluations. In this comparison, the rates of identification of intellectual disability, autism spectrum disorder, and language disorders were highest among those children with comprehensive neurodevelopmental evaluation. This supported our first hypothesis that the comprehensive evaluation would identify more comorbidities. However, our second hypothesis that children with unidentified comorbidities would have higher rates of polypharmacy was not supported by the data. Additionally, there were no differences in the number of children with formal education plans among the 2 groups. However, we do not have information regarding the content, quality, or effectiveness of the services provided by these plans using validated medical or academic outcome measures.

Many types of disparities have been reported among individuals with ADHD. Racial, socioeconomic, and educational disparities and those associated with access to health care have been well described. In our population, we observed racial and suspected socioeconomic disparities that were a result of young maternal age and lower level of parental education.

Our data suggest that another type of disparity may exist in type of health care among individuals who have overcome some levels of disparity by being diagnosed and treated for ADHD. Evaluations limited to behavior management only may result in underidentification of comorbid diagnoses or potential underidentification of inattentive-type ADHD. In our population, these potentially missed diagnoses did not lead to significant changes in prescribing practice. The influence of unidentified comorbidities on outcome in our population is unknown. One study noted better adherence to ADHD guidelines by providers in one clinic through the use of a standardized diagnostic protocol.²⁸ However, there is no standard protocol for completing comprehensive evaluations in the setting of insurance limitations. Best practices for identification of comorbidities in ADHD that are both efficient and effective should also be investigated further.

Intellectual disability, autism spectrum disorder, and language impairments were commonly identified in children with insurance that allowed comprehensive evaluation. One may infer that these same conditions were underidentified in the children with limited evaluations. Without a comprehensive evaluation to detect the presence and severity of comorbid conditions, poor school performance may be attributed solely to features of ADHD.²⁹

Clinically, school performance is one of the factors used in assessment of the response to treatment for ADHD. However, our prediction that limited evaluations would be associated with increased polypharmacy was not supported by the data. Compatible data for comparison of these findings with those in other settings was not found in the literature reviewed.

There were several limitations in this study. Lack of complete educational records prohibited assessment of specific comorbidities identified solely in the school setting, specific services provided in school, and services provided but not documented in an IEP or 504 plan. The retrospective design prohibited direct contact with families to assess current status and prospective evaluation with standard outcome measures using masked investigators. However, the same clinicians treated patients in both populations following the same structured approach, increasing the consistency of the data in these reports. Ascertainment bias may be a factor in this study because of our tertiary care level and multiple professionals with advanced training in neurodevelopmental disabilities. Thus, our comorbidity numbers and prescribing practices may not be generalizable and may increase the identified rate of comorbidities.

The risks and outcomes in this vulnerable population of children from disadvantaged families warrants further investigation in prospective, multi-center studies designed for observation and intervention. Collaboration of educators and clinicians with insurers is warranted for assessing and increasing compliance with the provision of health insurance coverage that provides the standard of care to all children with ADHD.

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Figure 1.
Comorbid diagnoses of each clinic by percentage.

Table 1

Demographic Information for Clinics.

	Comprehensive Clinic ^d , Total n = 286	Behavior Focused Clinic, Total n = 103	Total, n = 389	Statistical Analyses	
				χ^2 , P Value	OR (95% CI)
Gender				$P < .01$	1.99 (1.22, 3.23)
Female	65 (23%)	38 (37%)	103		
Male	221 (77%)	65 (63%)	286		
Age at initial visit (mean)	7.86 years (n = 286)	7.84 years (n = 103)		$P > .05a$	
Race ^b				$P < .001$	
African American	44 (15%)	59 (57%)	103		12.82 (6.27, 24.47)
Asian	2 (0.7%)	0 (0%)	2		
Multiracial	4 (1.4%)	2 (1.9%)	6		
Other	14 (4.9%)	2 (1.9%)	16		1.91 (0.58, 6.29)
Unknown	69 (24.1%)	24 (23%)	93		3.33 (1.66, 6.65)
Caucasian	153 (56%)	16 (16%)	169		1.00
School services				$P < .04$	
IEP	94 (33%)	33 (32%)	127		0.83 (0.50, 1.40)
504	16 (6%)	5 (5%)	21		0.74 (0.26, 2.13)
Unknown	49 (16.1%)	7 (7%)	56		0.34 (0.14, 0.8)
Pending	11 (4%)	9 (9%)	20		1.94 (0.75, 4.97)
No support	116 (41%)	49 (48%)	165		1.00
Maternal age at birth (mean)	30.6 Years (n = 235)	23.4 Years (n = 77)		$P < .001^a$	
Maternal education ^c				$P < .001$	
<High school	1 (0.3%)	4 (4%)	5		
GED	3 (1%)	6 (6%)	9		70 (16.21, 302.31)
High school	52 (18%)	46 (45%)	98		24.77 (9.33, 65.71)
Some college	37 (13%)	19 (18%)	56		14.38 (5.03, 41.07)
Unknown	53 (19%)	23 (19%)	76		12.15 (4.39, 33.61)
College degree	87 (30%)	5 (5%)	92		1.00
Professional degree	53 (19%)	0 (0%)	53		

	Comprehensive Clinic ^d , Total n = 286	Behavior Focused Clinic, Total n = 103	Total, n = 389	Statistical Analyses	
				χ^2 , P Value	OR (95% CI)
Paternal education ^c				$P < .001$	
<High school	1 (0.3%)	2 (2%)	3		
GED	5 (2%)	7 (7%)	12		162 (17.53, 1446.87)
High school	62 (22%)	45 (44%)	107		78.39 (10.54, 582.74)
Some college	38 (13%)	6 (6%)	44		17.05 (1.98, 146.25)
Unknown	72 (25%)	42 (38%)	114		63 (8.48, 468.06)
College degree	64 (22%)	1 (1%)	65		1.00
Professional degree	44 (15%)	0 (0%)	44		
ADHD subtype				$P < .01$	
Hyperactive	8 (3%)	7 (7%)	15		1.99 (0.69, 5.74)
Inattentive	72 (25%)	10 (10%)	82		0.32 (0.15, 0.66)
Unknown	67 (22%)	25 (24%)	92		0.85 (0.49, 1.47)
Combined	139 (49%)	61 (60%)	200		1.00
Comorbid diagnoses	1.9	1.03		$P < .003a$	

^a Groups were compared using *t* test analysis.

^b For statistical analysis, Asian and multiracial groups were combined with the Other group because of small group size.

^c For statistical analysis, <High School and GED groups were combined and College Degree and Professional Degree groups were combined because of small group size.

^d For odds ratio, reference clinic is comprehensive clinic and reference group is listed last for each category.

Table 2

Medication Information for Clinics.

	Comprehensive Clinic	Behavior-Focused Clinic	Total	Statistical Analyses	
				χ^2, P value	OR (95% CI)
Medications					
Methylphenidate	80 (28%)	35 (34%)	115	$P = .26$	0.76 (0.47, 1.22)
Dextroamphetamine	35 (12.2%)	12 (12.9%)	48	$P = .86$	1.06 (0.54, 2.09)
α -Agonist	9 (3.1%)	7 (6.8%)	16	$P = .15$	2.24 (0.81, 6.19)
SSRIs	13 (4.5%)	2 (1.9%)	15	$P = .37$	0.42 (0.09, 1.88)
Atypical antipsychotic	10 (3.5%)	3 (2.9%)	13	$P = 1.0$	0.83 (0.22, 3.07)
Atomoxetine	4 (1.4%)	1 (1%)	5	$P = 1.0$	0.69 (0.08, 6.26)
Total medications prescribed	0.85 (n = 286)	0.82 (n = 103)		$P = .75^a$	

^a Groups were compared using *t* test analysis.
SSRIs = selective serotonin reuptake inhibitors.