

The Diagnosis and Treatment of Attention Deficit/Hyperactivity Disorder (ADHD)
in Children and Young Adults in the State of Georgia

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Abstract:

Background and purpose of study: The aim of this study was to describe the diagnosis and management of ADHD in children and adolescents within a commercially insured population in Georgia.

Objectives of Study: Four major categories were studied: demographics of ADHD; prevalence of individual and family comorbidity; management practices for individuals diagnosed with ADHD including pharmacologic and other therapeutic options; and resource utilization in the care of ADHD patients.

Methodology: This was a retrospective review of administrative and claims data for calendar years 1997 and 1998 in which 683 newly diagnosed cases were compared with age and sex matched controls.

Results:

Demographics: The incidence was 4.18%. The diagnosis was made after age eleven in 42.9% of cases. A child was most likely to live in an urban area (88.7% of new cases). Drug therapy was the primary treatment (84.4%). Therapy was employed by 43.6%, with average length of treatment being only 1.93 months. Anxiety/mood disorders were 10.5 times more common in children with ADHD and 8.2 times more common in patients' family members than age and sex-matched controls. Learning disorders were 9.5 times more common in children with ADHD. Numerous other disorders including adjustment disorder, hay fever, eczema were more common in patients with ADHD and their families. In terms of cost, Ritalin comprised 48% of total drug cost, Adderall 25%, and Dexedrine 10%. Total cost of

drug therapy was \$102,671, and total cost of therapy was \$25,576. Neurologists charged \$12,337 for ADHD diagnoses.

Conclusion: Since over 50% of cases were diagnosed over the age of 11, physicians need to consider the diagnosis at an earlier age; by definition, the symptoms must have started before age seven. The majority of patients seemed to reside in urban areas, suggesting that rural physicians may be underdiagnosing the disorder. Physician awareness of specific co-morbid conditions of both patients and families with a child with ADHD such as anxiety/mood disorders and learning disorders can expedite diagnosis in both patients and family members. These findings have implications about anticipatory guidance given by physicians when making the diagnosis of ADHD.

Abbreviations

ADD: Attention Deficit Disorder

ADHD: Attention Deficit Hyperactivity Disorder

BCBSA BlueCross and BlueShield Association

BCBSGA BlueCross and BlueShield of Georgia

CHI Center for Healthcare Improvement

DSM – IV-TR Diagnostic and Statistical Manual – Fourth Edition, Text Revision

EDW Electronic data warehouse

MCG Medical College of Georgia

NCQA National Committee on Quality Assurance

ODD: Oppositional Defiant Disorder

Introduction -

The incidence and prevalence of ADHD has increased markedly since the early 1960's, and it is now estimated to affect 3-5% of the non-adult population, though some estimates range from 1-10% (1). The rate of medication treatment amongst elementary school students increased from 1.07% in 1971 to 5.96% in 1987 (2). ADHD is the most common mental health diagnosis made in children under 12 years of age. As outlined in Table 1, the Diagnostic and Statistical Manual IV-TR (DSM-IV-TR) mandates that six symptoms of either inattention or hyperactivity have persisted for at least 6 months to a degree that is

maladaptive and inconsistent with developmental level in two or more settings (i.e. school and home), that the symptoms were present before age 7 years, and that these symptoms do not occur exclusively during the course of another psychiatric disorder (3). However the disorder still remains difficult to define (4). The aim of this study was to describe the demographics, comorbidities, management and resource utilization of ADHD in children and young adults within a commercially insured population in Georgia. It is hoped by defining this population more specifically, we can offer the physician other ways to consider this diagnosis.

Methods

The study was a retrospective review of administrative and claims data. All data were held in the BCBSGA electronic data warehouse (EDW), a secure computerized information system to which the research team had access. The study period involved the calendar years 1997 and 1998: 1/1/97 through 12/31/98. We focused on members enrolled solely in the managed care and fee-for-service populations. We selected all members with an ICD-9 diagnosis of 314, which includes Attention Deficit Disorder (ADD), Attention Deficit Hyperactivity Disorder (ADHD), and Hyperkinetic Syndrome made in both inpatient and outpatient settings. The age constraints were a minimum age of zero and a maximum age of 21 years (at date of last claim submission during study period). We identified only new claims.

Enrollment criteria were as follows: All BCBSGA HMO members (i.e. medical) and Greenspring/Magellan members (i.e. mental health). Each member must have had continuous enrollment for minimum of 12 calendar months. If enrollment was continuous throughout the study period or ongoing, then all claims data were to be included up to 12/31/98.

A six month 'qualifying period' without any claims related to ADHD was required. That is, we excluded any members with pre-existing diagnoses or management related to ADHD. In effect, this left the enrollment period from 1/1/97-12/31/98, but expanded the qualifying period to include any ADHD-related claims from 7/1/96 onwards. The patients were then compared with age- and sex-matched matched controls.

Patient and healthcare provider consent was approved by the MCG Human Assurances Committee for both phase I and phase II as a result of expedited review (Approval number: 99-04-347, 5/12/99)

All data abstracted from the BCBSGA EDW were delivered to the PI in the form of a text file. These data were imported into the statistical software package SAS for analysis. The following statistical techniques/tests were conducted on the data: Chi-squared, T-tests, and ANOVA.

Results

Demographics:

The number of newly diagnosed cases of ADHD in the calendar years 1997 and 1998 was 683, which constituted an incidence of 4.18% of HMO BCBSGA members aged 21 years or less. The 683 case studies were age and sex-matched with a control group. Males comprised 75.4% of new cases, females 24.6%. The incidence of ADHD by age was: re-school/kindergarten age children (age 0-5) 8.6% of cases, elementary school (age 6-10) totaled 48.5%, junior high school (age 11-14) 27.7%, and senior high school (age 15-21) 15.2%. Almost 89% of patients resided in urban areas, while the rest resided in rural areas (see table 2).

Presentation and Diagnosis:

Tests billed in conjunction with a diagnosis of ADHD revealed rare use of test of variable attention (TOVA) (3.2%), EEG (2.4%), CT (1.6%), and MRI (1.5%)

Co-morbidities:

According to BCBSGA data, numerous conditions were found to be co-morbid with ADHD in patients as well as their families vs. age and sex-matched controls and their families. Anxiety/mood disorder was 10.5 times as likely in patients, and 8.2 times as likely in ADHD families vs. controls. Learning disorders were 9.5 times more frequent in subjects. Other disorders significantly more likely in patients included adjustment disorder, depression, and oppositional defiant disorder (ODD) ($p < 0.05$). Disorders more likely in families included ODD, depression, adjustment disorder, and ADHD ($p < 0.05$) (see figure 1).

Treatment:

According to BCBSGA data, drug therapy was the mainstay of treatment, with 84.4% of cases receiving some kind of pharmacotherapy. Counseling was sought by 43.6% of patients, with an average length of treatment of 1.93 months. Ritalin (methylphenydate) was the drug of choice, with 35.6% of all prescriptions, followed by Adderall at 26.6%, Dexedrine 8.6%, Wellbutrin 4.1%, and Cylert 3.2%, Tegretol 1.5%, Catapres 1.5%, Mellaril 1.3%, Tofranil 1.0%, Lithium 0.9%, and Norpramine 0.9%. (see figure 2). A neurologist referral was made in 12.9% of cases, and 2 cases required hospitalization under the primary diagnosis of ADHD. In terms of cost, Ritalin comprised 48% of total drug cost, while Adderall comprised only 25% of cost, and Dexedrine 10%. Total cost of drug therapy was \$102,671, and total cost of counseling therapy was \$25,576. Neurologists claimed \$12,337.

Discussion

Overall, the results of the study correlate closely with the American Academy of Pediatrics national literature review and consultation with numerous pediatric specialists (5). The 3-1 male to female preponderance also coincides with national averages, which estimate a 9.2% male and a 2.9% female prevalence. This is thought to be because males are usually more active and aggressive, and therefore come to the attention of teachers and parents more

readily. Females are often diagnosed with the inattentive type of the disorder, though the precise demographics of the disorder in females have not been adequately studied (1,3). Girls who are merely distractable are probably the most underidentified group (6).

A high number (27.7%) of diagnoses are made between the ages of 11-14 and even 15.2% are made in adolescence, despite the criteria stating that symptoms must be present before age 7. This seems to imply a high number of retrospective diagnoses. The etiology of these late diagnoses is unclear. With time a child may experience increasing difficulty in school, with a concurrently increasing number of teachers' opinions that a child has ADHD. If all of the symptoms have not been present before age seven, a child may in fact be suffering from another disorder such as absence seizures, sleep apnea, or depression (7). Stimulants may suboptimally treat the latter two, and the true disorder may remain undiagnosed.

In keeping with study findings, the AAP states that, other than the Conners Rating Scale and Breen (a school situations questionnaire) tests, blood tests such as blood lead levels, thyroid function tests, MRIs, EEGs, and continuous performance tests contribute very little to the diagnosis of ADHD (5). Co-morbid disorders correlate strongly with national results. The AAP found that up to 35.2% of children with ADHD can be expected to also have ODD, 25.7% can have conduct disorder, 25% may have an anxiety disorder, and 18.2% will likely suffer from depression (5). The AAP also states that it is important to recognize these disorders in both patients with ADHD and in family members, since co-morbid disorders may adversely affect prognosis in both patients and family members.

ODD and conduct disorder can lead to increased disruptive behavior and violence, with ensuing criminal acts and trouble with the law (5). Depression leads to increased risk of suicide, currently the 3rd leading cause of death among teenagers (8). Learning disorder and anxiety can impede school performance and thus also vocational success.

Co-morbid conditions are also much more likely in family members of children with ADHD, leading to impaired social interaction amongst family members, inability to hold a job well, and increased incidence of criminal behavior (1) Parents with co-morbid disorders may have 'ADHD-style' parenting techniques, and therefore reinforce their child's undesirable behaviors instead of creating the structured environment necessary for a child with ADHD. Parents may also be unable to properly 'cope' with their child's disorder.

Ritalin is still the number one treatment for ADHD, though the frequency of using Adderall, Dexedrine and other drugs is increasing. Drugs such as Adderall have a longer half-life and can therefore be prescribed with less frequency than Ritalin, which is usually given two-three times a day on school days. Less frequent dosing increases convenience and decreases cost, as evidenced by the fact that, though Ritalin only comprised 35.6% of prescriptions, it comprised 48% of cost. Only 43.6% of patients actually sought therapy, and counseling lasted an average of 1.93 months. Cognitive behavior modification or psychotherapy has not been shown to be highly effective in treating pure ADHD because the child's environment changes at school and/or home (9). However in children with comorbid anxiety disorder or a disruptive behavior disorder, behavioral therapy plus pharmacotherapy improved outcomes more than pharmacotherapy alone (10). Therapy can also be aimed at parental counseling for 8-12 weeks, in order to teach ways of providing a highly structured

environment in which a child with ADHD will do well (5) Of note, treatment protocols in the UK suggest that a psychological intervention should be tried before a medication trial (11).

Limitations: The study was entirely based on BCBSGA claims and administrative data and did not include any clinical or case note review. BCBSGA experiences a 15% member turnover per year, which is not reflected in data on co-morbid disorders and treatment. Within the database of BCBSGA, some names of parents and siblings may differ from the patient's, or the patient may not be covered by BCBSGA, therefore the non-nuclear family may have been excluded in select cases. Lastly the drugs studied were limited to the aforementioned, and the study was completed before Ritalin SR or other long-acting stimulants were introduced.

Conclusion and recommendations

Physicians must rely upon teachers, parents, as well as the history and physical exam to make the diagnosis of ADHD. Specific blood tests, imaging studies, and EEGs are superfluous and are not useful in making the diagnosis. Early recognition of co-morbid disorders in patients and family members will likely improve prognoses in both patients and family members as there is substantial evidence that many children with ADHD and their family members will have another disorder such as mood/anxiety disorder, or a learning disorder. Pharmacotherapy is the mainstay of treatment, but in children with comorbid anxiety disorder or a disruptive behavior disorder, combined behavioral treatment and pharmacotherapy is more beneficial than pharmacotherapy alone. Family counseling can also be a useful adjunctive measure. Physicians must bear in mind the risks associated with the long-term use of stimulant medications including the possibility of growth suppression and ventricular arrhythmias. Given the high incidence of the disorder in urban populations, rural physicians should be more aware of the disorder. Likewise physicians should be alert to females presenting with an inattentive or mixed type of ADHD, as they are less likely to come to the attention of teachers or parents.

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Table 1

Attention-Deficit/Hyperactivity Disorder DSM-IV-TR Criteria

- A. Either (1) or (2)
1. six (or more) of the following symptoms of inattention have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:
Inattention
 - (a) often fails to give close attention to details or makes careless mistakes in schoolwork, work or other activities
 - (b) often has difficulty sustaining attention in tasks or play activities
 - (c) often does not seem to listen when spoken to directly
 - (d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
 - (e) often has difficulty organizing tasks and activities
 - (f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
 - (g) often loses things necessary for tasks or activities (e.g. toys, school assignments, pencils, books or tools)
 - (h) is often easily distracted by extraneous stimuli
 - (i) is often forgetful in daily activities
 2. six (or more) of the following symptoms of hyperactivity-impulsivity have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:
Hyperactivity
 - (a) often fidgets with hands or feet or squirms in seat
 - (b) often leaves seat in classroom or in other situations in which remaining seated is expected
 - (c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
 - (d) often has difficulty playing or engaging in leisure activities quietly
 - (e) is often "on the go" or often acts as if "driven by a motor"
 - (f) often talks excessively**Impulsivity**
 - (g) often blurts out answers before questions have been completed
 - (h) often has difficulty awaiting turn
 - (i) often interrupts or intrudes on others (e.g. butts into conversations or games)

Table 2

Demographic characteristics of ADHD cases (n=683) and an age and sex matched comparison group (n=683)

	ADHD cases % (n)	Comparison group % (n)
Sex		
Male	75.4 (515)	75.4 (515)
Female	24.6 (168)	24.6 (168)
Age breakdown (years)		
Pre-school/kindergarten (0-5)	8.6 (59)	8.6 (59)
Elementary school (6-10)	48.5 (331)	48.5 (331)
Junior high school (11-14)	27.7 (189)	27.7 (189)
Senior high school (15-21)	15.2 (104)	15.2 (104)
Residence		
Urban	88.7 (606)	85.6 (585)
Rural	11.3 (77)	14.4 (98)

Figure 1

Ratio of comorbid disorders in ADHD patients, family members, and a comparison group of patients (matched for age and sex) and their families

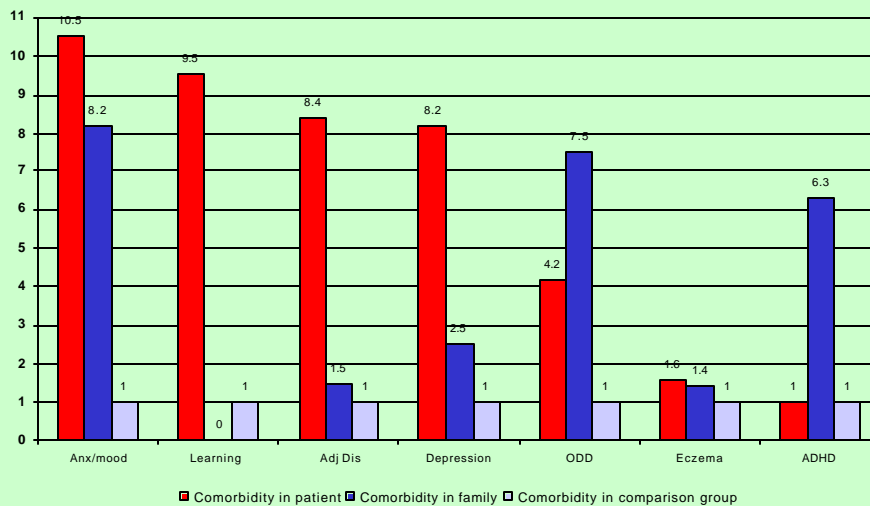


Figure 2

Percentage of total drug cost accounted for by different therapies

(Total drug cost \$102,671 for the 577 of 683 patients in receipt of pharmacotherapy in calendar years 1997 and 1998)

