Impact of Attention-Deficit/Hyperactivity Disorder Treatment Adverse Effects on Quality of Life and Functioning of Pediatric Patients and Their Parents/Caregivers

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Background

- Attention-deficit/hyperactivity disorder (ADHD) is one of the most commonly diagnosed neurodevelopmental disorders in children and adolescents in the United States (US)[1]
- In children and adolescents, ADHD treatment is commonly associated with a range of adverse effects (AEs) that can have important impacts on daily functioning and quality of life, including sleep disturbances, headaches, decreased appetite, and emotional impulsivity[2-4]

Objective

This study assessed the impact of attention-deficit/hyperactivity disorder (ADHD) treatment-related AEs on health-related quality of life (HRQoL) and functioning of pediatric patients and their parents/caregivers

Methods

- An online survey was conducted in October 2023 among parents/caregivers of children and adolescents with ADHD, recruited via an existing US panel of geographically and demographically diverse individuals
- Prior to data collection, pilot tests were conducted with 4 eligible participants in the form of semi-structured virtual interviews to review the survey content, ensure comprehension, and refine questions as needed

Study population and cohorts

- Eligible participants were ≥18 years old, residing in the US, and at minimum somewhat comfortable reading and understanding English
- Participants were required to live with a child under the age of 18 years old who had been diagnosed with ADHD and was treated with a prescription medication approved for ADHD by the US Food and Drug Administration (FDA) at the time of data collection
- Participants were classified into mutually exclusive study cohorts based on whether or not their children with ADHD experienced treatment-related AEs in the past 30 days
  - ***Patients with treatment-related AEs*** included those who experienced symptoms/complications in the past 30 days that appeared, worsened, or remained unchanged after initiating their latest ADHD treatment
  - ***Patients without treatment-related AEs*** included those who did not experience any symptoms/complications in the past 30 days
  - Patients experiencing symptoms in the past 30 days that existed prior to the initiation of their latest ADHD treatment but improved while on treatment, and did not have any other symptoms that appeared, worsened, or remained unchanged after the initiation of their latest ADHD treatment were not included in any of the cohorts

Measures, outcomes, and statistical analyses

- Patient and parent/caregiver characteristics and outcomes were reported descriptively
- The survey included several instruments to assess patients' and parents/caregivers' HRQoL and functioning
  - ***The Pediatric Quality of Life Inventory*** (PedsQL; range: 0-100) was completed by parents/caregivers to assess patients' HRQoL and functioning
  - ***The Work Productivity and Activity Impairment: Caregiver*** (WPAI-CG; range: 0%-100%), ***Generalized Anxiety Disorder-2*** (GAD-2; range: 0-6 points), and ***Patient Health Questionnaire-2*** (PHQ-2; range: 0-6 points) were used to assess parents/caregivers' HRQoL and functioning
- Regression analysis was used to assess the association between the number of treatment-related AEs in the past 30 days and selected outcomes of interest
  - For binary outcomes (i.e., parents/caregivers having high likelihood of generalized anxiety disorder [GAD] and having high likelihood of major depressive disorder [MDD]), odds ratios for each additional treatment-related AE in the past 30 days were estimated using logistic regression models
  - For continuous variables (i.e., patient overall quality of life, physical functioning, emotional functioning, school functioning, and parent/caregiver activity impairment and work impairment), differences in outcome for each additional treatment-related AE in the past 30 days were estimated using ordinary least squares regressions
- Regressions were adjusted for key patient and parent/caregiver characteristics based on stepwise variable selection among the following: patient gender, patient race, patient age, age at diagnosis, prior pharmacological treatment, parent/caregiver gender, parent/caregiver age, parent/caregiver education level, household situation, number of children in the household, and region of residence

Results

- A total of N=401 parents/caregivers from all US census regions completed the survey (**Figure 1**)
- Overall, two thirds of patients experienced treatment-related AEs in the 30 days preceding data collection, with insomnia and decreased appetite/weight loss being the most common (**Figure 2**)

Figure 1. Patients' and caregivers' characteristics

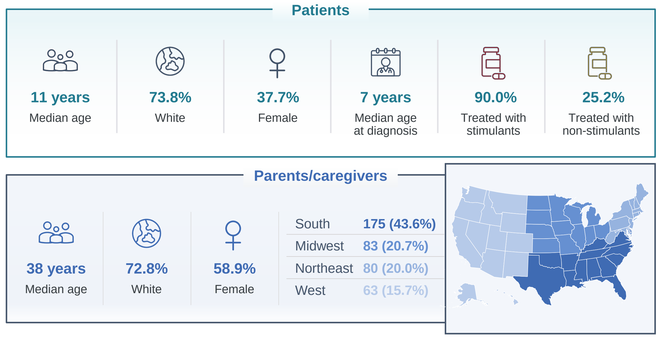
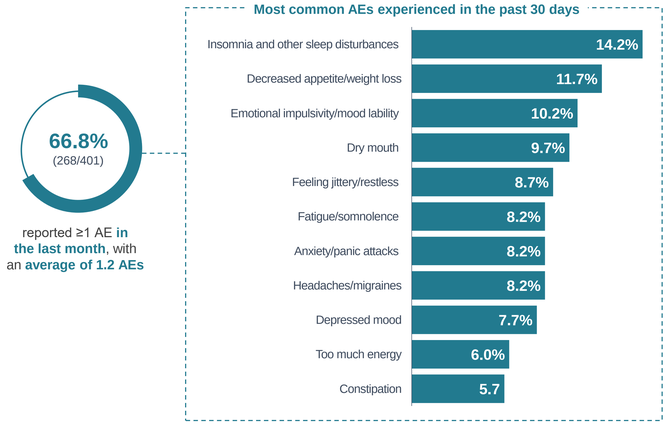


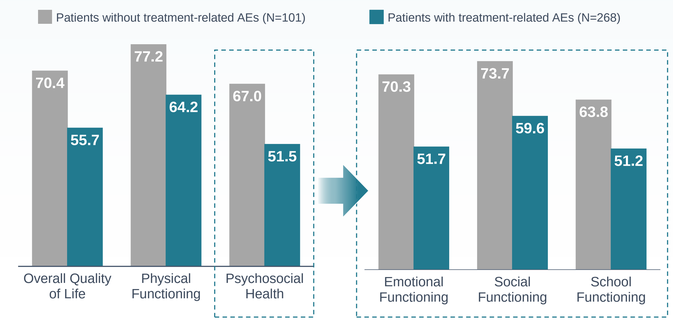
Figure 2. Treatment related AEs



Patient HRQoL and functioning

- Patients with ADHD treatment-related AEs had lower HRQoL than patients without ADHD treatment-related AEs (**Figure 3**)
- In adjusted regression analyses, treatment-related AEs were statistically significantly correlated with a reduction in HRQoL (**Table 1**)
  - Specifically, each additional treatment-related AE in the past 30 days was associated with a 4.9-point decrease ($p < 0.001$) in the PedsQL overall quality of life score
  - Similar statistically significant correlations were observed for each subscale of the PedsQL

Figure 3. Average Pediatric Quality of Life score and components

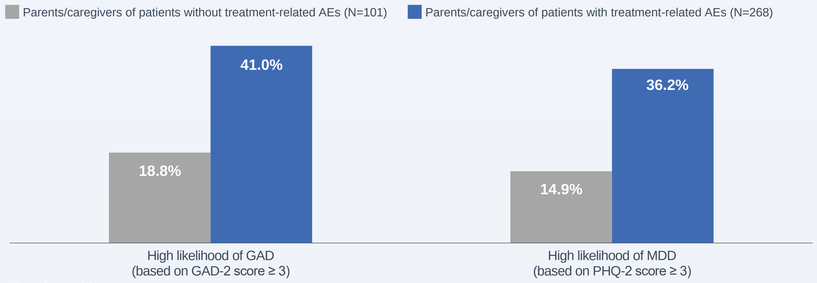


AEs: Adverse effects

Parent/caregiver HRQoL and functioning

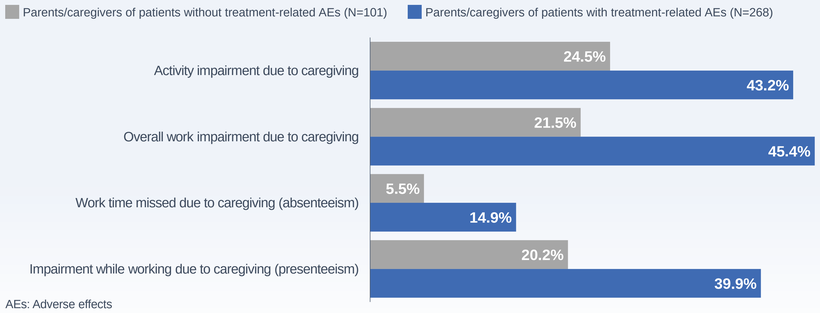
- A larger proportion of parents/caregivers of patients with treatment-related AEs had a high likelihood of GAD and MDD (**Figure 4**)
- In adjusted regression analyses, treatment-related AEs were statistically significantly correlated with increased odds of high likelihood of GAD and MDD (**Table 1**)
  - Specifically, each additional treatment-related AE in the past 30 days was associated with a 48% increase ($p < 0.001$) in the odds of having a high likelihood of GAD and a 44% increase ($p < 0.001$) in the odds of having a high likelihood of MDD
- Parents/caregivers of patients with treatment-related AEs reported having nearly twice as much activity and work impairment as parents/caregivers of patients without treatment-related AEs (**Figure 5**)
- In adjusted regression analyses, treatment-related AEs were statistically significantly correlated with an increased activity and work impairment (**Table 1**)
  - Specifically, each additional treatment-related AE in the past 30 days was associated with a 5.7-percentage point increase ($p < 0.001$) in activity impairment and a 6-percentage point increase ($p < 0.001$) in work impairment

Figure 4. Parent/caregiver mental health



AEs: Adverse effects

Figure 5. Parent/caregiver activity and work impairment (WPAI-CG)



AEs: Adverse effects

Table 1. Association between the number of treatment-related AEs in the past 30 days and key outcomes

	Regression coefficient for number of treatment-related AEs in the past 30 days		
Patient outcomes	**Estimate**	**(95% CI)**	**P-value**
Patient PedsQL score[1]			
Overall quality of life, points	-4.9	(-6.1; -3.7)	<0.001*
Physical Functioning, points	-3.5	(-5.1; -2.0)	<0.001*
Emotional Functioning, points	-5.9	(-7.3; -4.5)	<0.001*
School Functioning, points	-4.8	(-6.3; -3.4)	<0.001*
Parent/caregiver WPAI-CG[2]	**Estimate**	**(95% CI)**	**P-value**
Activity impairment, percentage points	5.7	(3.6; 7.8)	<0.001*
Work impairment, percentage points	6.0	(3.1; 8.9)	<0.001*
Parent/caregiver mental health[3]	**OR**	**(95% CI)**	**P-value**
High likelihood of GAD (based on GAD-2 score ≥ 3)	1.48	(1.24; 1.75)	<0.001*
High likelihood of MDD (based on PHQ-2 score ≥ 3)	1.44	(1.21; 1.72)	<0.001*

Abbreviations: CI: confidence interval; GAD: generalized anxiety disorder; GAD-2: Generalized Anxiety Disorder 2-item; MDD: major depressive disorder; OR: odds ratio; PedsQL: Pediatric Quality of Life; PHQ-2: Patient Health Questionnaire 2-item; WPAI-CG: work productivity and activity impairment - for caregivers. **Notes**: [1] Higher PedsQL scores indicate better quality of life. Thus, a negative estimate indicates that treatment-related AEs are associated with a lower quality of life; [2] Activity/work impairment is expressed as a percentage, with higher numbers indicating greater impairment. Thus, a positive estimate indicates that treatment-related AEs are associated with a larger impairment. Overall work impairment refers to the impact of caregiving on the ability to work and is equal to absenteeism (work time missed) plus presenteeism (impairment at work/reduced on-the-job effectiveness); [3] An OR >1 indicates that treatment-related AEs are associated with a higher probability of having a high likelihood of GAD or MDD.

Conclusions

Findings from this study suggest that treatment-related AEs were common among pediatric patients with ADHD and had a negative impact on both the patients' QoL and their parents/caregivers' mental health and work and activity impairment

Effective and tolerable treatment options along with better management of ADHD/treatment-related complications have the potential to improve experience for pediatric patients and their parents/caregivers

Limitations

- The sample may not be representative of the US population of parents/caregivers of children with ADHD given the convenience sample recruitment approach
- The study relied on anonymous, self-report of medical information, including for ADHD diagnosis and treatment-related AEs, which may result in inaccuracies or incompleteness of respondents' recalled experiences
- This is an observational study; thus, no causal inferences can be made

Acknowledgments

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Disclosures

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