EE138

Healthcare Resource Utilization and Costs Associated with Psychiatric Comorbidities in Adult Patients with Attention-Deficit/Hyperactivity Disorder

Jeff Schein[1], Martin Cloutier[2], Marjolaine Gauthier-Loiselle[2], Rebecca Bungay[2], Kathleen Chen[2], Deborah Chan[2], Annie Guerin[2], Ann Childress[3]

[1]Otsuka Pharmaceutical Development & Commercialization, Inc., 508 Carnegie Center, Princeton, NJ 08540, USA;
[2]Analysis Group, Inc., 1190 avenue des Canadiens-de-Montréal, Tour Deloitte, Suite 1500, Montréal, QC H3B 0G7, Canada;
[3]Center for Psychiatry and Behavioral Medicine, 7351 Prairie Falcon Rd STE 160, Las Vegas, NV 89128, USA

BACKGROUND

- Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental condition characterized by inattention, hyperactivity, and impulsivity, and is associated with substantial clinical and economic burden[1-4]
- Anxiety and depression are common among adults with ADHD, which further complicate ADHD management[5,6]
- However, information on the incremental clinical and economic burden associated with anxiety and depression in adults with ADHD in the United States (US) is limited

OBJECTIVE

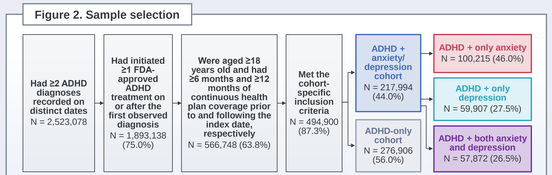
To assess the impact of anxiety and depression, on healthcare resource utilization (HRU) and costs in adults with ADHD in the US

METHODS

Data Source and Study Design

- A retrospective case-control study was conducted using the IQVIA PharMetrics® Plus (IQVIA) database from October 1, 2015, to September 30, 2021 (**Figure 1**)

Figure 1. Study design

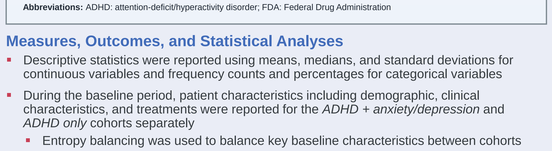


Abbreviations: ADHD: attention-deficit/hyperactivity disorder

Study Population

- Eligible treated adults with ADHD were classified into 2 cohorts based on the presence of anxiety and/or depression:
  - ***ADHD + anxiety/depression cohort:*** ≥1 diagnosis for anxiety and/or depression during both the baseline and study period
  - ***ADHD only cohort:*** No diagnoses for anxiety nor depression at any time during the baseline and study period
- The *ADHD + anxiety/depression cohort* was further stratified into 3 mutually exclusive subgroups:
  - ***ADHD + only anxiety subgroup:*** ≥1 diagnosis for anxiety and no diagnoses for depression recorded during the baseline and study period
  - ***ADHD + only depression subgroup:*** ≥1 diagnosis for depression and no diagnoses for anxiety recorded during the baseline and study period
  - ***ADHD + both anxiety and depression subgroup***: ≥1 diagnosis for both anxiety and depression recorded during the baseline and study period

Figure 2. Sample selection



Abbreviations: ADHD: attention-deficit/hyperactivity disorder; FDA: Federal Drug Administration

Measures, Outcomes, and Statistical Analyses

- Descriptive statistics were reported using means, medians, and standard deviations for continuous variables and frequency counts and percentages for categorical variables
- During the baseline period, patient characteristics including demographic, clinical characteristics, and treatments were reported for the *ADHD + anxiety/depression* and *ADHD only* cohorts separately
  - Entropy balancing was used to balance key baseline characteristics between cohorts
- During the study period, annual all-cause HRU and healthcare costs were reported for each cohort separately
  - HRU was compared between balanced cohorts using weighted negative binomial regression models
  - Healthcare costs were compared between balanced cohorts using weighted two-part regression models
    - Healthcare costs were also compared between each of the mutually exclusive subgroups and the *ADHD only* cohort separately

RESULTS

Patient Characteristics

- A total of 494,900 patients met the cohort-specific inclusion criteria, of which 217,944 (44.0%) were included in the *ADHD + anxiety/depression* cohort and 279,906 (56.0%) were included in the *ADHD only* cohort
  - Mutually exclusive subgroups stratified by comorbid conditions included 100,215 patients with *ADHD + only anxiety*, 59,907 with *ADHD + only depression*, and 57,872 with *ADHD + both anxiety and depression*
- Patient characteristics were well balanced between cohorts
  - Patients in both cohorts were 34.1 years old on average and 54.8% were male (**Table 1**)
- Among the *ADHD + anxiety/depression* cohort, 76.2% had anxiety and 58.8% had depression, with 41.7% having a specialist visit during the baseline period compared to 16.5% in the *ADHD only* cohort

Table 1

	ADHD only N = 276,906	ADHD + anxiety/depression After weighting[1] N = 217,994	Std. diff.
Demographic characteristics as of the index date			
Age (years), mean ± SD [median]	**34.1 ± 11.9 [31.7]**	**34.1 ± 11.9 [31.9]**	**0.00**
Male, n (%)	151,626 (54.8%)	119,296 (54.7%)	0.00
South, n (%)	142,413 (51.4%)	112,095 (51.4%)	0.00
Clinical characteristics			
Number of ADHD treatments received on or after first ADHD diagnosis and prior to index date, mean ± SD [median]	**2.1 ± 2.1 [2.0]**	**2.1 ± 2.1 [2.0]**	**0.00**
0, n (%)	54,257 (19.6%)	42711 (19.6%)	0.00
1, n (%)	76,105 (27.5%)	59,908 (27.5%)	0.00
≥ 2, n (%)	146,544 (52.9%)	115,375 (52.9%)	0.00
Type of ADHD at most recent diagnosis on or prior to index date, n (%)			
Inattentive	141,964 (51.3%)	111,736 (51.3%)	0.00
Combined presentation	64,324 (23.2%)	50,684 (23.3%)	0.00
Hyperactive	8,354 (3.0%)	6,575 (3.0%)	0.00
Other/unspecified	62,264 (22.5%)	48,998 (22.5%)	0.00
Comorbidities during baseline, n (%)			
Anxiety	0 (0.0%)	166,113 (76.2%)	2.53†
Depression	0 (0.0%)	128,182 (58.8%)	1.69†
Hypertension	24,833 (9.0%)	27,559 (12.6%)	0.12†
Sleep-wake disorders	17,134 (6.2%)	33,310 (15.3%)	0.30†
Trauma- and stressor-related disorders	13,188 (4.8%)	26,264 (12.0%)	0.27†
Substance-related and addictive disorders	11,180 (4.0%)	26,138 (12.0%)	0.30†
Bipolar and related disorders	5,708 (2.1%)	22,509 (10.3%)	0.35†
Treatment[2]			
ADHD treatment initiated at index date, n (%)			
Stimulants	**268,292 (96.9%)**	**203,862 (93.5%)**	**0.16†**
Amphetamine-based short-acting stimulants	128,356 (46.4%)	89,524 (41.1%)	0.11†
Amphetamine-based long-acting stimulants	120,778 (43.6%)	92,114 (42.3%)	0.03
Methylphenidate-based long-acting stimulants	29,902 (10.8%)	24,668 (11.3%)	0.02
Methylphenidate-based short-acting stimulants	17,609 (6.4%)	15,027 (6.9%)	0.02
Non-stimulants	**9,259 (3.3%)**	**14,889 (6.8%)**	**0.16†**
Pharmacological treatments during baseline, n (%)			
ADHD treatments	213,115 (77.0%)	169,756 (77.9%)	0.02
Antianxiety agents	17,360 (6.3%)	65,676 (30.1%)	0.65†
Antidepressants	39,391 (14.2%)	148,486 (68.1%)	1.31†
Sleep aids	10,755 (3.9%)	17,828 (8.2%)	0.18†
Psychotherapy visits during baseline, n (%)	**30,148 (10.9%)**	**94,808 (43.5%)**	**0.79†**
Specialist visits during baseline, n (%)	**45,613 (16.5%)**	**90,962 (41.7%)**	**0.58†**

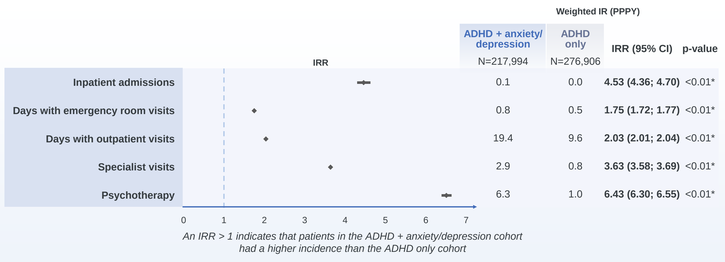
Abbreviations: ADHD: attention-deficit/hyperactivity disorder; SD: standard deviation; std. diff.: standardized difference
Notes: [1]Indicates std. diff >0.1; [2]Patients in the ADHD + anxiety/depression cohort were assigned weights such that the distribution of key characteristics (i.e., age, sex, region, health plan type, type of ADHD, calendar year of index date, number of agents received on or after ADHD diagnosis and before the index date, time from first observed ADHD diagnosis to first ADHD treatment, and time from first observed ADHD diagnosis to index date) had the same mean and standard deviation as the ADHD only cohort. Weights were normalized so that the sum of weights was equal to the number of patients in each cohort; [3]Patients could have ≥1 fill per treatment class or ≥1 treatment class (i.e., categories are not mutually exclusive).

HRU

All-cause HRU was significantly higher among the *ADHD + anxiety/depression* cohort compared to the *ADHD only* cohort (**Figure 3**)

- ADHD patients with anxiety and/or depression had a 1.7 to 6.4 times higher rate of HRU across components than patients with ADHD only

Figure 3. HRU during the study period



An IRR > 1 indicates that patients in the ADHD + anxiety/depression cohort had a higher incidence than the ADHD only cohort

Abbreviations: ADHD: attention-deficit/hyperactivity disorder; CI: confidence interval; IR: incidence rate; IRR: incidence rate ratio; PPPY: per patient per year
Notes: *Statistically significant at the 5% level.

Figure 4. Healthcare costs during the study period by cohort (PPPY; 2021 USD)[1,2]

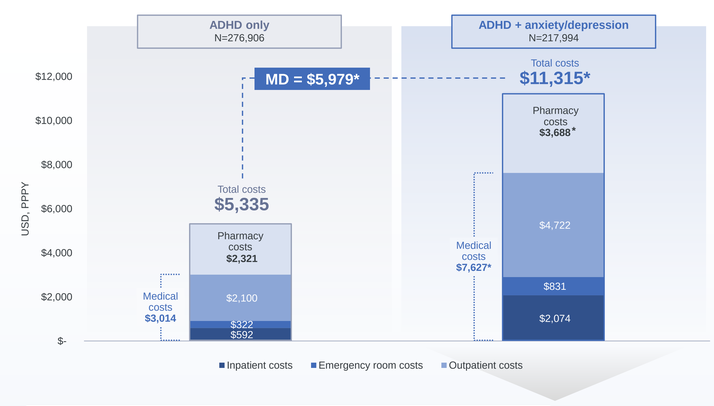
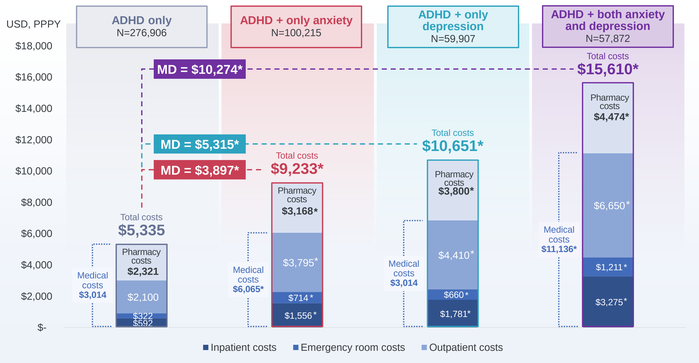


Figure 5. Healthcare costs during the study period by subgroup (PPPY; 2021 USD)[1,2]



Healthcare Costs

All-cause healthcare costs were more-than-twice higher among the *ADHD + anxiety/depression* cohort compared to the *ADHD only* cohort (**Figure 4**)

- When stratified by comorbid conditions, patients in each of the subgroups incurred significantly greater all-cause healthcare costs than those with *ADHD only* (**Figure 5**)
  - *ADHD + only anxiety*: $3,897 higher compared to the *ADHD only* cohort ($9,233 vs. $5,335; p<0.01)
  - *ADHD + only depression*: $5,315 higher compared to the *ADHD only* cohort ($10,651 vs. $5,335; p<0.01)
  - *ADHD + both anxiety and depression*: $10,274 higher compared to the *ADHD only* cohort ($15,610 vs. $5,335; p<0.01)

Abbreviations: ADHD: attention-deficit/hyperactivity disorder; ER: emergency room; IP: inpatient; N: number; OP: outpatient; MD: mean difference
Notes: *Statistically significant at the 5% level; [1]Healthcare costs were adjusted for inflation using the US Medical Care Consumer Price Index. The costs were reported PPPY in 2021 US dollars from the payers' perspective (i.e., as the sum of the paid amount and coordination of benefits); [2]The mean difference in healthcare costs was estimated using weighted two-part models, where the first part was a logistic model with a binomial distribution and the second part was a generalized linear regression model with a log link and a gamma distribution.

LIMITATIONS

- This study included commercially insured patients so the sample may not be representative of the ADHD adult population in the US
- This study has limitations inherent to retrospective databases using claims data, including the risk of data omissions, coding errors, and the presence of rule-out diagnosis
- Despite balancing, there may be residual confounding factors due to unobservable confounders

CONCLUSIONS

Comingling anxiety and depression are associated with additional HRU and cost burden in patients with ADHD

Among patients with ADHD, having anxiety, depression, or both was significantly associated with increased HRU compared to patients with ADHD alone

Increased HRU was translated to significantly increased healthcare costs, driven by both medical and pharmacy costs

Co-management of these conditions is important and has the potential to alleviate the burden experienced by patients and the healthcare system

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DISCLOSURES

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