Baseline Characteristics of Pediatric and Adult Patients with ADHD Prescribed Viloxazine ER, Stimulants or Atomoxetine, in Open Claims Data

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Background

- Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by pervasive and enduring symptoms of inattention, hyperactivity, and impulsivity, that typically persist into adulthood and cause impairments in multiple domains of everyday functioning.[1,2]
- U.S. prevalence of ADHD is 9.5%[3] among children and adolescents, with variable prevalence estimates in adults increasing over the last decade.[4]
- Stimulant medications, such as amphetamine salts and methylphenidate are commonly prescribed for ADHD. However, sustained use can pose challenges, particularly in pediatric patients, due to their potential for side effects.
- Viloxazine ER is a novel nonstimulant medication approved by the FDA in April 2021 for use in children aged 6–17 and in April 2022 for use in adults aged 18+, the first novel medication in over a decade and two decades, respectively.

Objective

As the initial step in an ongoing healthcare utilization study, we evaluated the characteristics of patients with ADHD who filled prescriptions for FDA-approved ADHD treatments.

Methods

Data: Kythera Labs medical and prescription drug open claims covering 79% of all U.S. patients.[5]

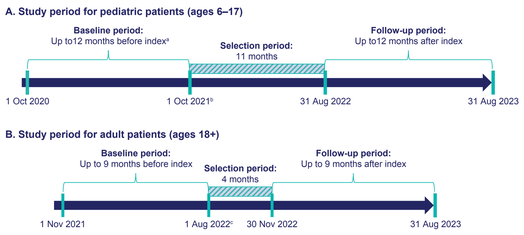
Study design: A retrospective cohort study of ADHD-diagnosed patients (ICD-10: F90.x), from three age-based cohorts (6–11 yrs, children; 12–17 yrs, adolescents; and 18+ yrs, adults), who received a prescription for viloxazine ER (VLX), atomoxetine (ATX), stimulant monotherapies (SMT), or their combinations for ≥60 days in the selection period **(Figure 1)**.

Analyses:

- Patient characteristics including ADHD Complexity Factor, concomitant psychiatric medications and comorbidities were evaluated across treatment arms using non-parametric tests for continuous and categorical variables.
- We defined an ADHD complexity factor categorizing patients as ADHD +0,+1, +2, +3, or +4 or more, based on the findings of Sun (2019),[6] who found that all-cause mortality risk in ADHD incrementally raised to 1.6x the general population in ADHD+0 group to 4x, 9x, 16x, and 30x for additional psychiatric comorbidity* present

*Assessed comorbidities include: Anxiety, Autism Spectrum, Bipolar, Conduct, Depressive, Eating, Intellectual disability, Personality, Schizophrenia, and Substance use disorders.

Figure 1. Study period definitions, by age cohort



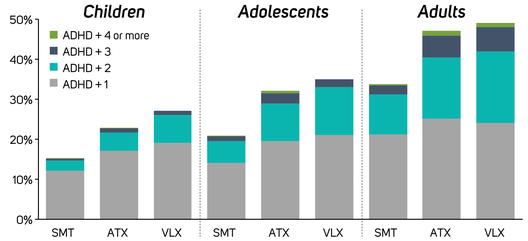
[a]Index date: Date of the first prescription of an ADHD medication or first drug used in a combination that was continued for ≥60 days during the selection period.
[b]6 months after FDA approval of VLX for treatment of ADHD in pediatric patients (Apr 2021);
[c]4 months after FDA approval of VLX for treatment of ADHD in adults patients (Apr 2022).

Patients with ADHD who filled prescriptions for Viloxazine ER were more likely to be using other psychiatric medications and have higher psychiatric complexity than patients prescribed only stimulants

Table 1. Patient demographic characteristics by age cohort and ADHD regimen

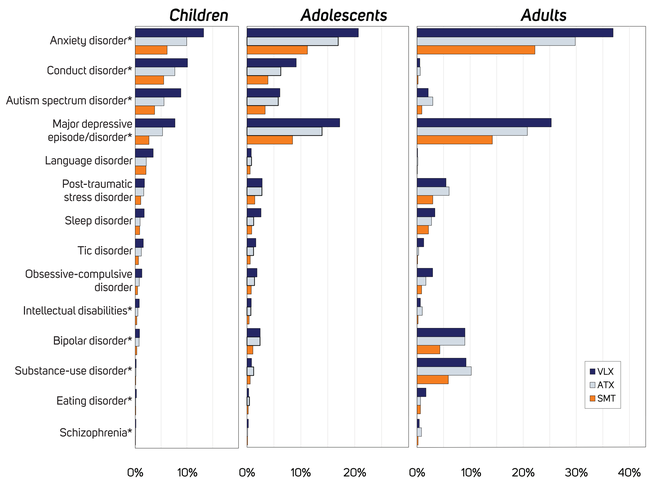
Patient Characteristics	Children (N=216,184)			Adolescents (N=252,780)			Adults (N=577,882)		
	SMT	ATX	VLX	SMT	ATX	VLX	SMT	ATX	VLX
Patient distribution									
Total patients, n (% of cohort)	203,361 (94.1%)	10,640 (4.9%)	2,183 (1.0%)	235,429 (93.1%)	15,470 (6.1%)	1,881 (0.7%)	552,258 (95.6%)	24,671 (4.3%)	953 (0.2%)
Co-prescription with stimulant, n (%)	NA	1,736 (16.3%)	463 (21.2%)	NA	2,401 (15.5%)	300 (15.9%)	NA	2,473 (10.0%)	133 (14.0%)
Demographics									
Female, %	27.8	28.6	27.3	32.1	34.3	31.3	56.7	54.6	51.0
Male, %	68.6	68.5	70.8	64.4	63.2	66.5	41.4	43.6	48.1
Mean (SD) age, years	9.0 (1.6)	9.2 (2.1)	8.9 (2.2)	14.3 (1.7)	14.4 (2.4)	14.0 (2.2)	37.9 (13.2)	36.4 (19.0)	31.3 (18.4)
Region of residence, %									
Midwest	26.2	29.5	31.8	26.4	29.4	31.9	26.1	28.6	36.5
South	22.8	18.9	28.9	23.5	23.6	14.9	25.8	26.4	21.8
Northeast	22.5	23.1	15.6	20.7	17.3	26.3	22.2	24.6	19.9
West	16.7	19.3	18.2	18.0	21.3	21.1	18.5	14.0	17.7
Other	11.8	9.2	5.5	11.4	8.3	5.8	7.4	6.3	4.0
Health plan types in post-index period, %									
Commercial	52.6	55.2	64.8	53.3	56.6	66.7	48.2	50.7	59.0
Medicaid	18.4	22.2	20.6	15.7	20.5	16.9	6.1	10.7	10.4
Medicare	n/a	n/a	n/a	n/a	n/a	n/a	3.3	5.6	1.7

Figure 2. ADHD Complexity Factor by age cohort and ADHD regimen



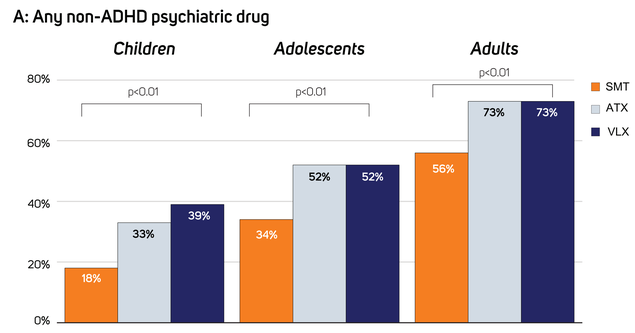
*SMT, stimulant monotherapy; ATX, Atomoxetine and Atomoxetine+Stimulants; VLX, Viloxazine and Viloxazine+Stimulants. The remaining patients in each group have none of the assessed comorbidities (ADHD +0)

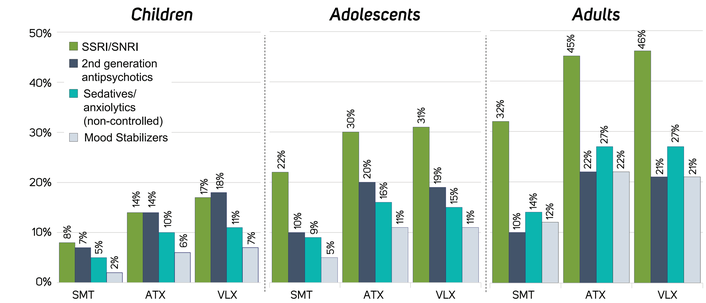
Figure 3. Prevalence of psychiatric comorbidities in patients with ADHD, by age cohort and ADHD regimen



*SMT, stimulant monotherapy; ATX, Atomoxetine and Atomoxetine+Stimulants; VLX, Viloxazine and Viloxazine+Stimulants.

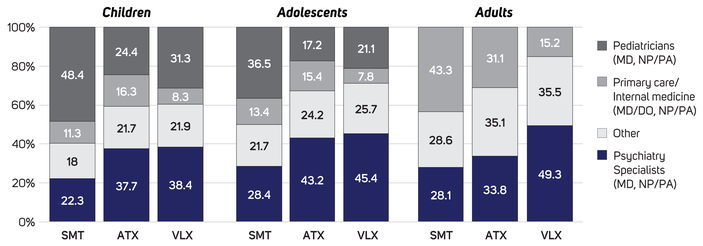
Figure 4. Patients prescribed nonstimulants for ADHD were more likely to be co-prescribed other psychiatric medications





*SMT, stimulant monotherapy; ATX, Atomoxetine and Atomoxetine+Stimulants; VLX, Viloxazine and Viloxazine+Stimulants.

Figure 5. Psychiatric specialists represent a larger prescribing share of nonstimulants than stimulants across all age groups



Results

- The cohorts included 1,046,846 patients; 55% were adults, 24% adolescents, and 21% children. Approximately 95% of patients across all age groups were prescribed only stimulants for ADHD (SMT cohort; **Table 1**).
- Compared to patients on other regimens, patients on VLX tended to be younger, male, and covered by a commercial plan. The largest percent of patients resided in the midwest; medication use patterns varied by region (**Table 1**).
- Across all age groups, patients on VLX regimens exhibited higher ADHD complexity (**Figure 2**), and presence of a higher percentage of psychiatric comorbidities (**Figure 3**) than patients on SMT or ATX.
- Significantly fewer patients in the SMT cohort had co-prescriptions for other (non-ADHD) psychiatric medications compared with the ATX and VLX cohorts (**Figure 4, Panel A**).
- The most commonly co-prescribed psychiatric medications (all cohorts) were SSRI/SNRIs, second-generation antipsychotics, sedatives, and mood stabilizers. Each was used by a lower percentage of patients on SMT than ATX or VLX regimens (**Figure 4, Panel B**).
- While family medicine physicians and pediatricians were by far the most common prescribers of SMT, psychiatry was the dominant specialty of providers prescribing nonstimulants (**Figure 5**).

Conclusions

- Within each age group, patients filling prescriptions for viloxazine ER regimens had a higher complexity of ADHD than those filling prescriptions for atomoxetine regimens or stimulants alone.
- At baseline, patients with ADHD who filled nonstimulant medications were more likely to be co-prescribed other psychiatric medications, such as SSRIs, 2nd generation antipsychotics, sedatives/anxiolytics, and mood stabilizers, compared to patients receiving SMT.
- Patients whose ADHD medications included nonstimulants were more likely to have received their ADHD medications from a psychiatric specialist than patients whose ADHD medications included stimulants alone.
- Further research is needed to determine whether the greater psychiatric complexity in patients receiving prescriptions for viloxazine ER results from its recent market entry, or step-therapy rules, or intent to also treat comorbid conditions; however, these demographic health and healthcare utilization differences are important to consider in outcomes analyses.

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Acknowledgements

This study was funded by Supernus Pharmaceuticals, Inc., Rockville, MD.
We acknowledge Holmusk for assistance with protocol development and statistical analysis.

Disclosures

AC, JTH, and AJG report nothing to disclose. **JLY** received grant and research support from Janssen Pharmaceuticals, Lumos Pharma, Jazz Pharmaceuticals, Supernus Pharmaceuticals, and Tris Pharma; and served on a speakers bureau/advisory board of Axsome Therapeutics, Corium Pharma, Janssen Pharmaceuticals, Noven Pharmaceuticals, Supernus Pharmaceuticals, and Tris Pharma. **SG** and **JE** are employees of Supernus Pharmaceuticals, Inc. For questions about these data, contact Supernus Medical Affairs at MedInfo@apcerls.com.

Presented at ISPOR 2024, May 5–8, 2024