

Appendix Table 1: HEDIS List of Prescription Medications for ADHD

Drug Class	Prescription
CNS stimulants	Amphetamine-dextroamphetamine
	Dexmethylphenidate
	Dextroamphetamine
	Methylphenidate
	Lisdexamfetamine
	Methamphetamine
Alpha-2 receptor agonists	Clonidine
	Guanfacine
Miscellaneous ADHD medications	Atomoxetine

Notes: HEDIS: Healthcare Effectiveness Data and Information Set.

ADHD: attention-deficit/hyperactivity disorder.

CNS: central nervous system.

Appendix Table 2: ICD9-CM Codes of Mental Health and Physical Health Comorbidities

Condition	ICD9-CM code
Mental health comorbidity	
Depressive disorder	296.2, 296.3, 300.4, 311
Conduct disorder / oppositional defiant disorder (CD/ODD)	312.81, 312.82, 312.89, 313.81, 312.9
Anxiety disorder	300.0-300.3, 300.5-300.9
Bipolar disorder	296.0-296.1, 296.4-296.9
Schizophrenia / other psychotic disorder	295, 297.0-297.3, 297.8-298.4, 298.8-298.9
Other mental health disorder	291-294, 299, 301, 306-310, 312 excluding CD/ODD, 313, 315-316
Physical health comorbidity	
Asthma	493
Other chronic medical condition [§]	
Cerebral palsy	343
Cystic fibrosis	277
Diabetes	250, 251
Spina bifida	741
Seizure disorder	345
Congenital heart disease	745-747.49
Sickle cell disease	282.6
Malignant neoplasms	140-208

Notes: [§] “Other chronic conditions” included cerebral palsy, cystic fibrosis, diabetes, spina bifida, seizure disorder, congenital heart disease, sickle cell disease, and malignant neoplasms; these eight conditions were selected due to their link to high healthcare utilization among Medicaid-insured children, and were grouped into one dichotomous indicator due to their small sample sizes.

Appendix Table 3: Current Procedural Terminology (CPT) Codes for Psychotherapy

CPT Codes	Description
90804	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an office or outpatient facility, approximately 20 to 30 minutes face-to-face with the patient;
90805	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an office or outpatient facility, approximately 20 to 30 minutes face-to-face with the patient; with medical evaluation and management services
90806	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an office or outpatient facility, approximately 45 to 50 minutes face-to-face with the patient;
90807	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an office or outpatient facility, approximately 45 to 50 minutes face-to-face with the patient; with medical evaluation and management services
90808	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an office or outpatient facility, approximately 75 to 80 minutes face-to-face with the patient;
90809	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an office or outpatient facility, approximately 75 to 80 minutes face-to-face with the patient; with medical evaluation and management services
90810	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an office or outpatient facility, approximately 20 to 30 minutes face-to-face with the
90811	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an office or outpatient facility, approximately 20 to 30 minutes face-to-face with the
90812	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an office or outpatient facility, approximately 45 to 50 minutes face-to-face with the
90813	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an office or outpatient facility, approximately 45 to 50 minutes face-to-face with the
90814	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an office or outpatient facility, approximately 75 to 80 minutes face-to-face with the
90815	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an office or outpatient facility, approximately 75 to 80 minutes face-to-face with the
90816	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an inpatient hospital, partial hospital or residential care setting, approximately 20 to 30 minutes face-to-face with the patient;
90817	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an inpatient hospital, partial hospital or residential care setting, approximately 20 to 30 minutes face-to-face with the patient; with medical evaluation
90818	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an inpatient hospital, partial hospital or residential care setting, approximately 45 to 50 minutes face-to-face with the patient;

Appendix Table 3 (Continued): Current Procedural Terminology (CPT) Codes for Psychotherapy

CPT Codes	Description
90819	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an inpatient hospital, partial hospital or residential care setting, approximately 45 to 50 minutes face-to-face with the patient; with medical evaluation
90821	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an inpatient hospital, partial hospital or residential care setting, approximately 75 to 80 minutes face-to-face with the patient;
90822	Individual psychotherapy, insight oriented, behavior modifying and/or supportive, in an inpatient hospital, partial hospital or residential care setting, approximately 75 to 80 minutes face-to-face with the patient; with medical evaluation
90823	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an inpatient hospital, partial hospital or residential care setting, approximately 20
90824	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an inpatient hospital, partial hospital or residential care setting, approximately 20
90826	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an inpatient hospital, partial hospital or residential care setting, approximately 45
90827	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an inpatient hospital, partial hospital or residential care setting, approximately 45
90828	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an inpatient hospital, partial hospital or residential care setting, approximately 75
90829	Individual psychotherapy, interactive, using play equipment, physical devices, language interpreter, or other mechanisms of non-verbal communication, in an inpatient hospital, partial hospital or residential care setting, approximately 75
90846	Family psychotherapy (without the patient present)
90847	Family psychotherapy (conjoint psychotherapy) (with patient present)
90849	Multiple-family group psychotherapy
90853	Group psychotherapy (other than of a multiple-family group)
90857	Interactive group psychotherapy

Appendix Table 4: A New Specification of Multinomial Logistic Model of Racial/Ethnic Differences in Patterns of Medication Treatment among Medicaid-insured Children that Initiated ADHD Medication, Excluding Measures of County-Level Characteristics, Use of New Medication, and Medication Switching

	Continuous Medication [‡]		Early Termination [‡]		One Gap with Re-initiation [‡]		Two Gaps [‡]		≥ 3 Gaps [‡]	
	ME (%) [¶]	SE	ME (%) [¶]	SE	ME (%) [¶]	SE	ME (%) [¶]	SE	ME (%) [¶]	SE
Race/ethnicity (reference: Non-Hispanic White)										
Non-Hispanic Black	-23.4***	.6	4.2***	.3	.3	.2	7.2***	.2	11.8***	.3
Hispanic	-18.9***	1.0	4.2***	.6	.1	.2	5.8***	.5	8.9***	.4
Non-Hispanic Other	-16.0***	3.0	4.8**	1.6	1.2	.7	5.4***	1.1	4.6***	1.4
Unknown	-11.2***	1.0	1.2*	.5	.2	.3	3.3***	.5	6.5***	.7
Demographics										
Age	-3.5***	.1	1.0***	.05	-.03	.04	1.2***	.1	1.4***	.1
Female (reference: Male)	-.9**	.3	1.1***	.2	.01	.1	.1	.2	-.3	.2
Plan type (reference: Fee-for-service only)										
Any behavioral health care carve-out plan	2.0	1.9	-.5	.9	-.4	.5	-.7	.9	-.4	1.2
Comprehensive managed care plan (no carve-out plan)	1.7	1.1	-.9	.6	-.02	.3	-.8	.6	.03	.8
Primary care case management (no carve-out plan)	-1.0	1.2	.7	.5	.4	.4	.3	.7	-.3	.7
More than one type of plan	-4.0***	1.1	.8	.5	.8*	.3	1.7**	.5	.8	.7
Eligibility type (reference: Blind/disabled)										
Foster care	19.4***	.9	-3.1***	.5	-.9**	.4	-7.6***	.6	-7.8***	.7
Other eligibility type	-2.0**	.7	.1	.3	.03	.3	.4	.4	1.5**	.5
Physical health comorbidity										
Asthma (reference: no)	.5	.4	-.7**	.3	.5**	.2	-.5	.3	.2	.3
Any other chronic condition (reference: no)	1.8	1.0	-.3	.5	.3	.3	.2	.7	-2.0**	.6

Appendix Table 4 (Continued): A New Specification of Multinomial Logistic Model of Racial/Ethnic Differences in Patterns of Medication Treatment among Medicaid-insured Children that Initiated ADHD Medication, Excluding Measures of County-Level Characteristics, Use of New Medication, and Medication Switching

	Continuous Medication [‡]		Early Termination [‡]		One Gap with Re-initiation [‡]		Two Gaps [‡]		≥ 3 Gaps [‡]	
	ME (%) ¶	SE	ME (%) ¶	SE	ME (%) ¶	SE	ME (%) ¶	SE	ME (%) ¶	SE
Mental health comorbidity										
Depressive disorder (reference: no)	1.9**	.7	.6	.4	.03	.2	-.2	.5	-2.3***	.5
Conduct/oppositional defiant disorder (reference: no)	2.7***	.4	.2	.3	-.1	.2	-.5	.3	-2.3***	.3
Anxiety disorder (reference: no)	2.1**	.7	.3	.4	.5	.3	-.8	.4	-2.0***	.5
Bipolar disorder (reference: no)	5.4***	.6	-.3	.4	.8***	.2	-1.1**	.4	-4.8***	.4
Schizophrenia/other psychotic disorder (reference: no)	2.9	1.6	-.1	.9	1.0	.5	-1.6	1.1	-2.2	1.2
Other mental health disorder (reference: no)	2.1***	.4	.6**	.2	-.1	.1	-.8**	.3	-1.8***	.3
Received any psychotherapy service in treatment period (reference: no)	7.5***	.5	-3.3***	.3	.001	.2	-1.3***	.3	-2.9***	.3
Intercept [§]	49.3		11.5		4.4		15.9		18.9	

Notes: ME: Marginal Effects; SE: Standard Errors.

[‡] The estimates reported in this table were from a single multinomial logistic regression model, and the number of observations for this model was the size of our analytic sample, N=102,669. We used the “margins” post-estimation command of multinomial logistic model in Stata software to obtain the marginal effects and model-adjusted percentage for each pattern of medication treatment. We also adjusted for state indicators in the multinomial logistic regression and clustered standard errors at the county-level.

¶ Marginal effects (in percentage) were estimated at the reference of race/ethnicity (i.e., Whites), and at the observed values of other covariates in the model.

§ Model-based predicted percentage of having a specific pattern of medication gaps/termination, which was estimated at the reference of race/ethnicity (i.e., Whites) and at the observed values of other covariates in the model.

* $p < .05$, ** $p < .01$, *** $p < .001$

Appendix Table 5: Patterns of Summer Medication Gaps Among Medicaid-Enrolled Youth (Age 6-12 Years) That Initiated ADHD Medication, By Patterns of Medication Gaps/Termination and By Race/Ethnicity[§]

	Total	White	Black [±]	Hispanic [±]	Other [±]	Unknown [±]
<i>Had any summer medication gaps (%)</i>						
Total that did not have continuous medication [N=62,540]	67.2	66.9	67.2	67.9	61.9*	67.0
Early Termination [N=13,527]	34.1	34.5	33.8	34.0	27.7	34.5
One Gap with Re-initiation [N=4,384]	48.0	50.4	45.1**	47.8	52.4	43.5*
Two Gaps [N=19,391]	67.9	70.0	65.3***	69.8	59.1**	67.4
≥ 3 Gaps [N=25,238]	87.6	88.1	86.8**	88.8	91.3	87.4
<i>Among those with any summer gaps, length of medication gaps in summer (month)</i>						
Total that had any summer gaps [N=41,996]	2.8	2.9	2.8**	2.8**	2.8	2.8**
Early Termination [N=4,611]	2.9	2.9	2.9	2.9	3.1	3.0
One Gap with Re-initiation [N=2,103]	3.0	3.0	3.0	2.9	2.8	2.9
Two Gaps [N=13,167]	2.8	2.8	2.8	2.8**	2.8	2.7*
≥ 3 Gaps [N=22,115]	2.8	2.8	2.8	2.8	2.8	2.8*
<i>Among those with any summer gaps, had summer medication gaps extended to post-summer months (%)</i>						
Total that had any summer gaps [N=41,996]	55.2	52.6	56.3***	58.0***	63.3***	56.2***
Early Termination [N=4,611]	97.3	95.7	98.7***	98.5***	97.4	97.6
One Gap with Re-initiation [N=2,103]	77.5	73.9	80.7**	80.8**	95.5***	82.2*
Two Gaps [N=13,167]	61.7	55.9	66.7***	63.6***	70.2**	63.9***
≥ 3 Gaps [N=22,115]	40.4	37.2	41.7***	43.6***	47.8**	40.9*

Notes: [§] Because our MAX data provide no information about whether and when children were on a “drug holiday,” we used medication gaps that occurred in the summer months (i.e., May, June, July, and August) as a proxy measure of a “drug holiday.” More specifically, a summer medication gap was defined as any medication gap that started in the summer months and ended within the summer months or extended to the post-summer months.

[±] Statistical tests were conducted using adjusted Wald tests to compare youth in each racial/ethnic minority group to White youth.

* p<.05, ** p<.01, *** p<.001