Appendix 1. Guidelines and Measure-Specific Testing Results

Metabolic Monitoring for Children and Adolescents on Antipsychotics

Guidelines for Metabolic Screening and Monitoring in Children and Adolescents on Antipsychotics

Organization (Date)	Recommendation	Type/Grade
AACAP-AAA (2011) Practice parameter for the use of atypical antipsychotic medications in children and adolescents.[1]	"The acute and long-term safety of these medications in children and adolescents has not been fully evaluated and therefore careful and frequent monitoring of side effects should be performed…*Ideally, monitoring of BMI, blood pressure, fasting glucose and fasting lipid profiles should follow, whenever feasible, the recommendations found in the consensus statement put forth by the American Diabetes Association and American Psychiatric Association."* Table: Fasting plasma glucose—Baseline, 12 wks, annually; Fasting lipid profile—Baseline, 12 wks (Recommendation 10, and Table 2)	Clinical Guideline
	"Careful attention should be given to the increased risk of developing diabetes with the use of AAA, and blood glucose and other parameters should be assessed at baseline and monitored at regular intervals."(Recommendation 12)	Clinical Standard
	"In those patients with significant weight changes and/or a family history indicating high risk, lipid profiles should be obtained at baseline and monitored at regular intervals."(Recommendation 13)	Clinical Guideline
AACAP-BP (2007) Practice parameter for the assessment and treatment of children and adolescents with bipolar disorder.[3]	"Psychopharmacological interventions require baseline and follow-up symptom, side effect, and laboratory monitoring as indicated….*The American Diabetes Association's recommendations for managing weight gain for patients taking antipsychotics should be followed. This includes baseline BMI, waist circumference, blood pressure, fasting glucose, and a fasting lipid panel. The BMI should be followed monthly for 3 months and then quarterly. Blood pressure, fasting glucose and lipids should be followed up after 3 months then yearly*." (Recommendation 8)	Minimal Standard
AACAP-SZ (2001) Practice parameter for the assessment and treatment of children and adolescents with schizophrenia.[2]	"The use of antipsychotic agents requires….. documentation any required baseline and follow-up laboratory monitoring..."	Minimal Standard
CAMESA (2011) Canadian Alliance for Monitoring Effectiveness and Safety of Antipsychotics in Children—Evidence-based recommendations for monitoring safety of second generation antipsychotics in children and youth.[4]	The guideline provides antipsychotic medication-specific recommendations for monitoring physical examination maneuvers (height, weight, BMI, waist circumference, blood pressure, and neurological examination for extrapyramidal symptoms), and laboratory tests (glucose, insulin, lipid profile tests, AST, ALT, prolactin, and TSH) for children on AAAs. The GRADE rating system is used to rate each test, for each medication, at each time point examined (baseline, 3, 6, and 12 months). In recognition that clinicians may not have the resources to apply drug specific recommendations, the guideline developers also created a simplified version of the recommendations. *Summary recommendation:* All children prescribed AAAs should be monitored for metabolic side effects at baseline, 3, 6, and 12 months with the following tests: fasting glucose, fasting insulin, and fasting lipid profile (total cholesterol, LDL, HDL, TG). *(Note: Fasting insulin is not recommended for youth on aripiprazole, but is appropriate for all other AAAs.)*	Ranges from 1A (strong) to not recommended depending on the specific medication, laboratory test and timeframe. Strongest evidence and recommendations are for baseline tests.
	A baseline fasting glucose is recommended for all children and adolescents on AAAs (strong recommendation/low quality evidence all AAAs except Ziprasidone, weak recommendation/ consensus based).	1C (all AAA except Ziprasidone) 3 (Zip=3)
	A baseline fasting lipid profile is recommended for all children and adolescents on AAAs (strong recommendation with high to low evidence depending upon the AAA, except Ziprasidone, weak recommendation/consensus based).	1A-1C (all AAAs except Ziprasidone) 3 (Zip=3)

Organization (Date)	Recommendation	Type/Grade
	A follow-up fasting glucose and fasting lipid panel (one or more of the tests within the panel) is strongly recommended for all children at one or more time points during the year. (strong recommendation/high-moderate-low evidence for all AAAs, except Ziprasidone, weak recommendation/consensus based).	1A-1C (all AAAs except Ziprasidone) 3 (Zip=3)
PPWG (2007) The AACAP-sponsored Preschool Psychopharmacology Working Group—Psychopharmacological treatment for very young children: Contexts and guidelines.[5]	"Use of AAA should follow the AACAP practice parameter on AAAs. This practice parameter describes the minimum standards for monitoring vital signs, BMI, fasting blood glucose, extrapyramidal symptoms, lipid profiles, and electrocardiography." (Disruptive Behaviors Algorithm, Stage 2: Pharmacological Intervention).	Not specified
T-MAY (2012) Center for Education and Research on Mental Health Therapeutics—Treatment of maladaptive aggression in youth.[6]	Practitioners should conduct appropriate, guideline-based laboratory monitoring.	Evidence: A, Recommendation: Very strong
TX (2010) Texas Department of Family and Protective Services—Psychotropic medication utilization parameters for foster children.[7]	Practitioners should document appropriate monitoring of laboratory findings.	Not specified*

*TX (2010) did not specify the use of a rating system.

Grading System Key

Guideline Developer	Definition
AACAP	*Minimal Standard/ Clinical Standard:* Rigorous/substantial empirical evidence (meta-analyses, systematic reviews, RCTs) and/or overwhelming clinical consensus; expected to apply more than 95 percent of the time
	Clinical guidelines: Strong empirical evidence (nonrandomized controlled trials, cohort or case-control studies), and/or strong clinical consensus; expect to apply in most cases (75% of the time)
	Options: Acceptable but not required; there may be insufficient evidence to support higher recommendation (uncontrolled trials, case/ series reports).
	Not endorsed: Ineffective or contraindicated.
AACAP endorsed best-practice principles	Best-practice principles that underlie medication prescribing, to promote the appropriate and safe use of psychotropic medications
CAMESA	**GRADE[8,9]**
	1A: Strong recommendation, High-quality evidence
	1B: Strong recommendation, Moderate-quality evidence
	1C: Strong recommendation/ Low-quality evidence
	2A: Weak recommendation, High- or moderate-quality evidence
	2B: Weak recommendation, Low-quality evidence
	3: Weak recommendation, No evidence, consensus based
PPWG	*A:* Well controlled RCTs, large meta-analyses, or overwhelming clinical consensus
	B: Empirical evidence (open trials, case series) or strong clinical consensus
	C: Single case reports or no published reports, recommendation developed by expert consensus (informal)

Guideline Developer	Definition
TMAY Ratings	Oxford Centre for Evidence-Based Medicine grade of evidence (A-D)[10]
	Strength of Recommendation: Very strong (≥90% agreement)
	Strength of Recommendation: Very strong (70-89% agreement)
	Strength of Recommendation: Very strong (50-69% agreement)
	Strength of Recommendation: Very strong (<50% agreement)

References for Guidelines

American Academy of Child and Adolescent Psychiatry. Practice Parameter for the Use of Atypical Antipsychotic Medications in Children and Adolescents. http://www.aacap.org/App_Themes/AACAP/docs/practice_parameters/ Atypical_Antipsychotic_Medications_Web.pdf. (Accessed Jul 12, 2012)

American Academy of Child and Adolescent Psychiatry. July 2001. Practice parameter for the assessment and treatment of children and adolescents with schizophrenia. *Journal of the American Academy of Child and Adolescent Psychiatry.* 40(7 Suppl):4S-23S.2.

McClellan, J., R. Kowatch, R.L. Findling. January 2007. Practice parameter for the assessment and treatment of children and adolescents with bipolar disorder. *Journal of the American Academy of Child and Adolescent Psychiatry.* 46(1):107–25.

Pringsheim, T., C. Panagiotopoulos, J. Davidson, J. Ho. August 2011. Evidence-based recommendations for monitoring safety of second generation antipsychotics in children and youth. *Journal of the American Academy of Child and Adolescent Psychiatry.* 20(3):218–33.

Gleason, M.M., H.L. Egger, G.J. Emslie, et al. December 2007. Psychopharmacological treatment for very young children: contexts and guidelines. *Journal of the American Academy of Child and Adolescent Psychiatry.* 46(12):1532–72.

Scotto, Rosato N., C.U. Correll, E. Pappadopulos, A. Chait, S. Crystal, P.S. Jensen. June 2012. Treatment of maladaptive aggression in youth: CERT guidelines II. Treatments and ongoing management. *Pediatrics.* 129(6):e1577–86.

Texas Department of Family and Protective Services and University of Texas at Austin College of Pharmacy. 2013. Psychotropic Medication Utilization Parameters for Foster Children. http://www.dfps.state.tx.us/documents/Child_Protection/pdf/TxFosterCareParameters-September2013.pdf (October 22, 2013)

Andrews, J.C., H.J. Schunemann, A.D. Oxman, et al. July 2013. GRADE guidelines: 15. Going from evidence to recommendation-determinants of a recommendation's direction and strength. *Journal of Clinical Epidemiology.* 66(7):726–35.

Guyatt, G.H., A.D. Oxman, G.E. Vist, et al. April 26, 2008. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *British Medical Journal.* 336(7650):924–6.

OCEBM Levels of Evidence Working Group. 2011. The Oxford 2011 levels of evidence. 2011; http://www.cebm.net/index.aspx?o=5653 (Accessed Oct 12, 2013)

Table 1: Proportion of Children and Adolescents who Received Metabolic Monitoring by Race/Ethnicity among General and Foster Care Populations

RACE/ETHNICITY	General Population (%)	Foster Care Population (%)
White Non-Hispanic	19.1	24.0
Black Non-Hispanic	19.4	23.2
Hispanic	24.8	31.3
Other	25.0	26.5
Unknown	16.0	10.5

Table 2: Average State Performance by Population

	General Population (%)	Foster Care Population (%)
Percentage of children receiving both glucose and lipid screening	18.5	20.7

Table 3: Proportion of Children and Adolescents who Received Metabolic Monitoring by Rurality/Urbanicity among General and Foster Care Populations

URBANICITY (COUNTY-LEVEL)	General Population (%)	Foster Care Population (%)
Metropolitan	20.5	23.8
Non-metropolitan	16.3	21.2
Rural	16.3	22.2

Table 4: Metabolic Monitoring for Children and Adolescents on Antipsychotics by State

	General Population			Foster Care Population		
STATE	**%**	**Numerator**	**Denominator**	**%**	**Numerator**	**Denominator**
AZ	36.2	2914	8,053	38.1	448	1,175
CA	29.1	8441	28,997	34.6	2919	8,429
GA	6.5	808	12,372	3.0	91	2,996
IN	14.2	2222	15,657	18.2	445	2,443
KS	20.6	1294	6,272	25.3	557	2,202
KY	18.7	2122	11,366	20.7	410	1,977
MI	20.0	3735	18,684	25.1	931	3,706
MO	19.4	2694	13,874	26.7	1045	3,912
NM	19.6	650	3,312	17.5	65	371
NY	14.8	4238	28,539	11.5	479	4,154
RI	4.8	85	1,784	7.2	30	419
Min	4.76	85	1,784	3.04	30	371
25th	14.19	808	6,272	11.53	91	1175
Median	19.42	2,222	12,372	20.74	448	2443
Mean	18.54	2,655	13,537	20.74	675	2889

75th	20.63	3,735	18,684	26.71	931	3912
Max	36.19	8,441	28,997	38.13	2919	8429

Data source: MAX 2008

Table 5: Metabolic Monitoring for Children and Adolescents on Antipsychotics by Health Plan

PLAN	%	Numerator	Denominator
Plan 1	36.0	342	951
Plan 2	38.8	457	1177
Plan 3	2.3	19	826
Plan 4	28.4	287	1010
Plan 5	33.8	824	2437
Plan 6	34.0	368	1082
Plan 7	20.3	77	380
Plan 8	35.0	637	1822
Plan 9	30.8	165	536
Plan 10	40.0	114	285
Plan 11	29.1	89	306
Plan 12	34.7	413	1191
Plan 13	32.5	243	748
Plan 14	27.9	84	301
Plan 15	30.4	215	707
Plan 16	31.2	39	125
Plan 17	39.7	115	290
Min	2.3	19	125
25th	29.1	89	306
Median	32.5	215.0	748.0
Mean	30.9	264.0	833.8
75th	35.0	368	1082
Max	40.0	824	2437

Data Source: NYS Medicaid Managed Care Plan Data, 2010