

# Evaluation of initial atypical antipsychotic monitoring parameters in children and adolescents

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## Abstract

**Introduction:** Atypical antipsychotics (AAPs) are associated with serious cardiometabolic disturbances, including hyperlipidemia, hyperglycemia, and weight gain. The American Academy of Child and Adolescent Psychiatry Practice parameter for the use of AAPs in children and adolescents encourages that the same monitoring schedule as recommended by the American Diabetes Association be applied to the pediatric population. This study assessed adherence to these monitoring recommendations for AAPs in children and adolescents admitted to a community teaching hospital's inpatient child and adolescent psychiatry unit.

**Methods:** Patients age <18 years were included if therapy was initiated with an AAP during an inpatient admission to the child and adolescent psychiatry unit. Patients were excluded if prescribed an AAP prior to admission or if the AAP was ordered as needed. The presence of the following was collected upon initiation: body mass index (BMI), fasting blood glucose (FBG), blood pressure (BP), fasting lipids, heart rate (HR), waist circumference, electrocardiogram when indicated, and assessment of efficacy and extrapyramidal symptoms (EPS). Any adverse effects and means of mitigation of those adverse effects were also collected.

**Results:** In the 45 patients included, the following monitoring parameters were collected: 91.1% had BMI, 84.4% had FBG, 46.6% had fasting lipids, and 0% had waist circumference recorded. Additionally, 100% of patients had an assessment of efficacy and EPS and BP and HR documented.

**Discussion:** Although this study included a small number of patients, there is area for improvement in obtaining baseline monitoring parameters in children and adolescents initiated on AAPs during an inpatient admission.

**Keywords:** atypical antipsychotics, metabolic monitoring, children and adolescents

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## Introduction

Antipsychotics are increasingly prescribed to children and adolescents, largely for off-label indications, such as agitation, aggression, and disruptive behavior.<sup>1</sup> There is

weak evidence to support the use of antipsychotics for these symptoms, which likely stem from a much more complex disorder.<sup>2</sup> Atypical antipsychotics (AAPs) are more commonly used in children and adolescents than typical antipsychotics because they are less likely to cause extrapyramidal symptoms (EPS), such as akathisia, dyskinesias, dystonia, and Parkinsonism. Children are more likely to be affected by both the neuromotor and metabolic adverse effects of AAPs than adults, which stresses the importance of frequent monitoring in this population.<sup>3</sup>

Atypical antipsychotics are associated with serious cardiometabolic disturbances, including hyperlipidemia,



**TABLE 1:** American Diabetes Association and American Academy of Child and Adolescent Psychiatry recommended monitoring parameters for patients being treated with atypical antipsychotics<sup>4,8</sup>

	Baseline	4 Weeks	8 Weeks	12 Weeks	Every 12 Weeks	Annually	Every 5 Years
Personal/family medical history	X						
Weight (body mass index)	X	X	X	X	X	X	
Waist circumference	X					X	
Blood pressure	X			X		X	
Fasting plasma glucose	X			X		X	
Fasting lipid profile	X			X			X

hyperglycemia, and weight gain.<sup>4</sup> These adverse effects are especially concerning in the child and adolescent population because the use of AAPs has been found<sup>5</sup> to predict the development of obesity as an adult, predispose patients to metabolic syndrome, and extend lifetime risk for cardiovascular disease. Studies<sup>6,7</sup> have shown that these changes occur rapidly and most significantly with AAPs commonly associated with significant cardiometabolic disturbances (eg, risperidone, quetiapine, and olanzapine). The American Diabetes Association recommends obtaining markers of cardiometabolic disturbances at baseline and throughout the course of therapy with AAPs (Table 1).<sup>4</sup> Although these recommendations are for adult patients, the American Academy of Child and Adolescent Psychiatry Practice parameter for the use of AAPs in children and adolescents encourages the same monitoring schedule be applied to the pediatric population.<sup>8</sup>

This study describes the prescribed indications and monitoring practices of AAPs in an inpatient child and adolescent psychiatry unit in order to identify opportunities for pharmacist intervention.

## Methods

This was a single-center, retrospective study of children and adolescents who received AAPs during their hospital admission to the 13-bed child and adolescent psychiatry unit in a community teaching hospital between October 1, 2018 and October 31, 2019. Patients were included if they were under the age of 18 and were initiated on an AAP during their admission. Patients were excluded if they were prescribed AAPs immediately prior to admission or if the AAP was ordered only as needed for the patient's hospital stay. Patients with remote trials of an AAP were not excluded. All information was collected from the electronic medical record. Prescribing of AAPs was assessed, including indication, and the presence of the following monitoring parameters at any time during the admission was assessed: weight and body mass index (BMI), blood pressure, heart rate, fasting lipid profile, fasting blood glucose, waist circumference, and electrocardiogram for patients receiving ziprasidone. Sex, age on

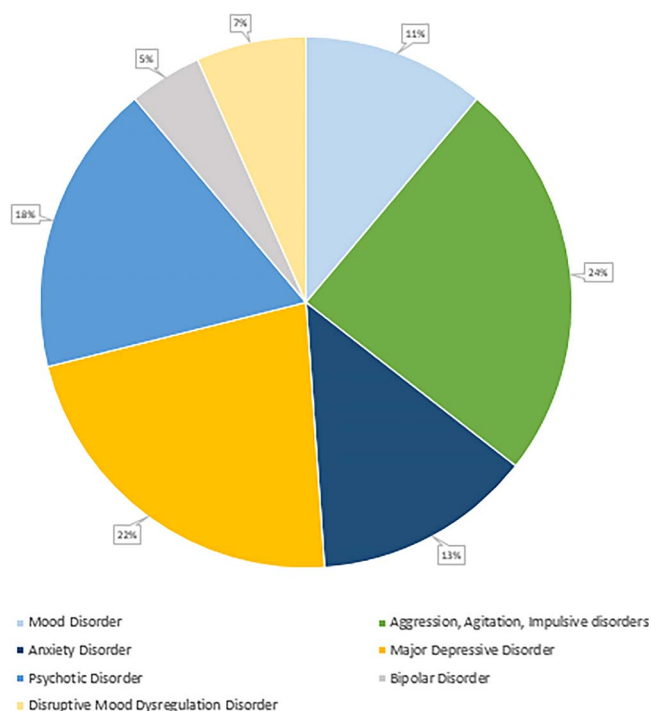
admission, and length of stay were also collected. Additionally, the patient charts were reviewed for documented assessment of EPS, other adverse effects, and efficacy measures for the prescribed AAP. Presence of assessment of EPS was obtained from the neurology component of the physical exam. Presence of assessment of efficacy was obtained from the daily progress note so long as the provider discussed the improvement or lack of improvement in symptoms. This study was approved by the Cleveland Clinic Institutional Review Board.

## Results

A total of 45 patients were included in this analysis. About half of the population was female (51.2%) with average age of 14.1 years and a 5.1-day average length of stay. Aripiprazole (37.8%) and risperidone (28.9%) were the most commonly prescribed antipsychotics. Other antipsychotics prescribed were quetiapine (20%), lurasidone (4.4%), olanzapine (4.4%), ziprasidone (2.2%), and paliperidone (2.2%). Most antipsychotics were prescribed to target specific symptoms of the diagnosed disorder, most commonly symptoms of aggression and agitation and explosive/impulsive disorders (Figure). Of those treated for symptoms of agitation or aggression, 1 patient was treated for aggression associated with autism spectrum disorder. All patients had a recorded blood pressure, heart rate, electrocardiogram (if indicated), and assessment of both EPS and efficacy. Table 2 shows the frequency of baseline monitoring parameters obtained in the studied population. Although all patients had a weight documented during their visit, not all had a height recorded, resulting in 8.8% of patients not having a calculable body mass index.

## Discussion

In this inpatient population, metabolic monitoring was not optimal. This could potentially be due to differences in pediatric psychiatry admission order sets and whether they are placed from the emergency department or when the patient arrives on the unit. Although a comprehensive metabolic panel is present on both order sets, a fasting



**FIGURE:** Indication for prescribed atypical antipsychotic

lipid panel is only present on the floor pediatric psychiatry admission order set. Although EPS assessment was optimally recorded, there was a very low incidence of other reported adverse effects in this study population. Reasons for this may include underreporting from patients or because patients were less likely to develop dose-dependent adverse effects because of being initiated on low doses.

Previous studies assessing prescribing and monitoring parameters for AAPs have also produced results of suboptimal metabolic monitoring. One study<sup>9</sup> assessed metabolic monitoring obtained from commercial insurance plans in children and adolescents with 2 or more AAP prescription claims during 2 calendar years. Only 53.5% and 51.3% of patients had any metabolic monitoring per years 1 and 2, respectively, with glucose testing at a rate of 50.3% and 46.9% and low-density lipoprotein testing at a rate of 31.2% and 28.5%. This is consistent with the results of the present study, especially with the lower rates of lipid profile monitoring compared to glucose monitoring; however, these results are limited by the fact that patients could have been identified at any time during their course of therapy, including where lipid monitoring may not have been indicated (eg, if the patient's prescription was identified 2 years after they initiated therapy, lipid testing would not be indicated for 3 more years).

Another study<sup>10</sup> assessing metabolic monitoring in patients receiving antipsychotics included patients at a large academic medical center in both the general

**TABLE 2:** Frequency of baseline monitoring parameters obtained, N = 45

Parameter	Total Present, n (%)
Body mass index	41 (91.1)
Blood pressure	45 (100.0)
Heart rate	45 (100.0)
Fasting glucose	38 (84.4)
Fasting lipids	21 (46.7)
Waist circumference	0 (0.0)
Electrocardiogram <sup>a</sup>	1 (100.0)
Assessment of extrapyramidal symptoms	45 (100.0)
Assessment of efficacy	45 (100.0)
Adverse effects	Drowsiness, 1 (2.2)
Mitigation of adverse effects	Scheduled to take at bedtime

<sup>a</sup>Electrocardiogram indicated and presence or absence recorded only if ziprasidone was prescribed (n = 1).

pediatric medical and child and adolescent psychiatry settings. Patients admitted to the child and adolescent psychiatry unit were more likely to receive metabolic and symptomatic monitoring than those on the general pediatric units; however, only 85% received glucose monitoring, 65% received a lipid panel, and around 30% of patients were newly initiated on antipsychotic therapy and had not received an AAP prior to their admission to the child and adolescent psychiatry unit. These results are limited by the 6-month study period, and similar to the previously described study, patients could have been identified at any time during their course of therapy.

The present study assessed monitoring parameters at the initiation of treatment with AAPs when all studied monitoring parameters would be indicated. Although lipid and glucose monitoring were not consistently performed, the providers at the studied institution almost always gathered the other monitoring parameters studied. Additionally, symptom response and adverse effects, including EPS, were documented in each progress note. Despite these strengths, this study has noteworthy limitations. This was a retrospective cohort study, which has inherent limitations. Additionally, the sample size was small, likely due to the exclusion of patients who had been receiving antipsychotics prior to admission. However, this study was aimed at assessing monitoring practices at initiation of therapy. Most of the patients in this study (24%) were treated for agitation, aggression, or disruptive disorders. It may be more difficult to obtain blood work for these patients, potentially limiting the generalizability and contributing to the lower rates of glucose and lipid monitoring. Additionally, there was no standardized tool used to measure antipsychotic efficacy or adverse events, including EPS.

Pharmacists have the potential to increase adherence to guideline-recommended monitoring schedules for patients being initiated on therapy with an AAP. As part of the treatment team, labs could be recommended to the team when initiating AAP therapy, or in places where pharmacists have a broader scope of practice, these labs could be ordered upon initiation of an AAP. Utilizing clinical decision support is another method of improving monitoring practices, whether that be including these key monitoring parameters on all admission order sets for patients admitted to child and adolescent psychiatry units, which is planned at the studied institution, or building requirements for documentation in the electronic medical record. Patient education is another key component of ensuring adherence to monitoring guidelines for AAPs, and pharmacists could inform their patients of the importance of bloodwork to make sure their medications are being used safely. This is especially true in the child and adolescent population, in which patients may be fearful of having blood drawn and have less knowledge of medication therapy.

## Conclusion

Studies in addition to the present one have consistently shown that metabolic monitoring of AAPs for children and adolescents can be improved; however, this study is the first to our knowledge to assess obtaining parameters at only initiation of therapy. This represents an opportunity for pharmacists to make interventions on drug therapy monitoring and improve patient care. Future studies could assess the efficacy of the creation of pharmacist monitoring tools or standardized interventions to further demonstrate the value of a psychiatric pharmacist on the patient care team.

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