Metabolic Screening in Children Receiving Antipsychotic Drug Treatment

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Objectives: To estimate metabolic screening rates, predictors of screening, and incidence of metabolic disturbances in children initiating second-generation antipsychotic (SGA) drug treatment.

Design: A retrospective, new-user cohort study (between July 1, 2004, and June 30, 2006) using Medicaid claims data.

Settings: California, Missouri, and Oregon.

Patients: A total of 5370 children (aged 6-17 years) without diabetes mellitus taking SGA drugs and 15 000 children without diabetes taking albuterol (control) but no SGA drugs.

Intervention: Findings 1 year after recommendations from the American Diabetes Association and American Psychiatric Association called for metabolic screening of patients receiving SGA drugs.

Outcome Measures: Serum glucose and lipid testing, 6-month incidence of diabetes, and dyslipidemia disturbances.

Results: Glucose screening was performed in 1699 (31.6% [95% confidence interval (CI), 30.4%-32.9%]) SGA-treated children vs 1891 (12.6% [12.1%-13.2%]) control individuals. Lipid testing was performed in 720 (13.4% [95% CI, 12.5%-14.4%]) SGA-treated children vs 458 (3.1% [2.8%-3.3%]) controls. In multivariate logistic regression analysis, children with serious and/or multiple psychiatric diagnoses and those who used health care services more intensively were more likely to receive metabolic screening. The case incidence of glucose and lipid disorders was higher in SGA-treated vs albuterol-treated children (8.9 per 1000 children [95% CI, 6.6%-11.8%] vs 4.9 per 1000 children [3.9%-6.2%]; and 9.7 per 1000 children [95% CI, 7.2%-12.7%] vs 4.6 per 1000 children [95% CI, 3.6%-5.8%], respectively).

Conclusion: Most children starting treatment with SGA medications in this public sector sample did not receive recommended glucose and lipid screening.
tions, the American Psychiatric Association, the North American Association for the Study of Obesity, and the American Association of Clinical Endocrinologists issued a joint consensus statement in early 2004 recommending metabolic screening and monitoring, consisting of weight and body mass index (calculated as weight in kilograms divided by height in meters squared), waist circumference, blood pressure, and fasting serum glucose and lipid profiles for all patients receiving these agents, regardless of age. The evidence base supporting metabolic testing for SGA-treated patients consisted of a synthesis of the literature and presentations from 14 experts drawn from the areas of psychiatry, obesity, and diabetes and from the Food and Drug Administration and representatives from the pharmaceutical industry.

Relatively little information exists regarding the short-term and long-term metabolic effects of antipsychotic use in children, although initial observations indicate that metabolic adverse effects of antipsychotic treatment in pediatric populations are readily detected. Compared with adults, children who take olanzapine, risperidone, and quetiapine fumarate are particularly at risk for weight gain. Type 2 diabetes and cardiovascular adverse events have also been identified in children and adolescents exposed to antipsychotics, especially when multiple antipsychotics are prescribed or antipsychotics are coprescribed with mood stabilizers and antidepressants. Moreover, the association between antipsychotic medication use and diabetes has been stronger in children and adolescents than adults. However, secondary analyses in some recent studies suggest that children are less likely to receive metabolic screening and monitoring compared with adults.

The present study aimed to estimate population-based rates of serum glucose and lipid testing in children from 3 state Medicaid programs who initiated SGA drug treatment compared with a pediatric reference population after the availability of Food and Drug Administration warnings and the American Diabetes Association, American Psychiatric Association, North American Association for the Study of Obesity, and American Association of Clinical Endocrinologists joint recommendations. Using this sample, we also sought to identify demographic and clinical predictors of glucose and lipid testing in SGA-treated children and to estimate the incidence of early detection of metabolic disorders, with the goal of informing strategies for improving metabolic monitoring of this at-risk population.

**STUDY POPULATION**

A new-user cohort was defined as Medicaid fee-for-service clients (aged 6-17 years) enrolled in California, Missouri, and Oregon who had started taking antipsychotic medication in 2005. Children were included if they had a prescription claim for 1 of 5 commonly prescribed SGA drugs (aripiprazole, olanzapine, quetiapine, risperidone, or ziprasidone hydrochloride) and continuous enrollment eligibility 180 days before and after the date of the first (index) antipsychotic pharmacy claim. Use of clozapine in children was so infrequent that it was not included in this study. Study participants had a unique encrypted identifier from which to identify their complete medical, pharmacy, and laboratory claims for the 180 days before and after the index date (representing an observation range of July 1, 2004, through June 30, 2006).

Children were not included in the study if they were Medicare dual eligible or in a managed care plan because complete laboratory and medical claims were not available. Because our aim was to estimate rates of glucose and lipid screening rather than monitoring related to existing disease, children with pre-existing diabetes or dyslipidemia (n=100), defined by a diagnosis in the medical claims or a pharmacy claim for an oral antidiabetic, insulin, or antidyshlipidemic drug in the 180 days before antipsychotic drug therapy initiation, were not included in the study.

To provide a relative comparison, we compared absolute rates in our sample of SGA-treated children with a reference population of chronically ill children for whom metabolic screening is not clinically indicated. A comparison cohort of children initiating albuterol, but not receiving antipsychotic medication, was identified (N=15 000). Albuterol is a commonly prescribed medication for children with asthma and has been used to identify a control group for other claims-based research in psychiatry because it selects for individuals across a broad age range typically receiving health care in a nonpsychiatric setting. We hypothesized that rates of screening in SGA-treated children would be higher than in an age-matched comparison group of albuterol-treated children receiving care during the same period.

**MAIN OUTCOME MEASURES**

Glucose testing was defined as a medical claim with an American Medical Association Current Procedural Terminology (CPT) code for a metabolic or general health panel (80048, 80050, or 80053) or glucose-specific serum test (82947, 82948, 82950, or 82951) occurring 30 days before through 180 days after the index date. Lipid testing was defined as a claim with a CPT code for a lipid panel (80061) or lipid-specific serum test (82465, 83700, 83701, 83715, 83716, 83721, or 84478), using the same time frame.

Diagnoses were recorded in the medical claims according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). Incident glucose disturbances were identified when a diagnosis in the medical claims or a prescription claim for an oral antidiabetic drug or insulin was present in the 180 days after the index date. Incident lipid disturbances were identified, using the Clinical Classifications Software (CCS) classification scheme developed by the Agency for Healthcare Research and Quality, when a prescription claim for an antidyshlipidemic drug or a diagnosis for disorders of lipid metabolism (CCS code 53) was present in the 180 days after the index date. Studies that examine the validity of using claims data to identify patients with chronic disease suggest our algorithm would yield specificity levels greater than 0.90.

**DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF PATIENTS**

Age (at the index date), sex, state of residence, and race/ethnicity (white, black, and other [including Hispanic and Asian]) were available from the Medicaid beneficiary records from the state in question for each child. Physiologic and developmental differences associated with puberty were accounted for by categorizing the study population into 2 age groups (6-12 and 13-17 years).

Patients with serious mental disorders have been a particular focus for cardiometabolic screening and intervention.

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rious mental illness was defined as having schizophrenia (CCS code 70), other psychoses (CCS code 71), or affective disorders (CCS code 69), which include bipolar disorder and major depression. Patients with medical claims associated with 2 or more diagnosed mental disorders (ICD-9-CM codes 290-319) were classified as having a comorbid mental disorder. 

Coprescribed psychotropic medications during the study period were identified from the pharmacy claims records and categorized as stimulants, antidepressants, mood stabilizers, and anxiolytics and hypnotics. Persistent antipsychotic users, defined as a maximum gap in therapy no greater than 30 days during the first 180 days of therapy, were identified to evaluate whether they had higher rates of metabolic monitoring because they would theoretically be at greater risk for developing metabolic adverse effects than patients receiving time-limited therapy.

As an indicator of the degree to which each child accessed general medical care, the number of medical claims for office visits (CPT codes 99201-99205, 99211-99215, or 99241-99245) occurring in the 180 days after drug initiation were determined and categorized as none, 1, or 2 or more. Children with a medical claim for an emergency department visit or a hospitalization were also identified because this may indicate greater use of medical services, greater severity of disorder, and increased access to general laboratory testing.

**STATISTICAL ANALYSIS**

The distribution of patient demographic and clinical characteristics and health care use patterns were stratified by age group, and proportions were compared between SGA-treated and albuterol-treated children using \( \chi^2 \) tests. The percentage of SGA-treated children who received glucose and lipid testing was stratified by age group and compared with the albuterol-treated comparison group using \( \chi^2 \) tests. Multivariate logistic regression was used to identify predictors of the likelihood of receiving testing among SGA-treated children after adjusting for age group, ethnicity, state, presence of serious mental illness and mental disorder comorbidity, persistent antipsychotic use, use of other psychotropic medications, number of medical office visits, emergency department use, and hospitalization. Glucose testing and lipid testing were modeled independently.

Incidence rates of glucose and lipid disturbances per 1000 treated children were calculated by age group and compared between the SGA-treated and albuterol-treated comparison groups using \( \chi^2 \) tests. All analyses were performed with SAS statistical software, version 9.2 (SAS Institute Inc, Cary, North Carolina). The study received approval from the Colorado Multiple Institutional Review Board and the California Committee for the Protection of Human Subjects.

**RESULTS**

**CHARACTERISTICS OF SGA-TREATED CHILDREN**

Among the 5370 children initiating SGA therapy, the most commonly prescribed antipsychotic was risperidone, which was prescribed to 2714 children and adolescents (50.5%). New prescriptions to children aged 6 to 12 years totalled 1729 (60.7%), and new prescriptions to adolescents aged 13 to 17 years totalled 985 (39.1%), followed by quetiapine, aripiprazole, olanzapine, and ziprasidone. Median days of index drug supplied for all children initiating antipsychotic therapy was 30 days (interquartile range, 30-90 days). Persistent use at 84 days was 62.7%, which decreased to 37.8% at 180 days. Persistence rates varied by 3.3% for each index antipsychotic drug. Children treated with SGAs were more often male, white, and hospitalized during the study period than the age-matched group of albuterol-treated children (Table 1). A total of 38.9% of children aged 6 to 12 years and 58.6% of adolescents aged 13 to 17 years who were initiating antipsychotic drug treatment had a recorded diagnosis for a serious mental illness. As indicated in Table 1, other psychotropic drug use was 4 to 6 times more prevalent among antipsychotic-treated children.

**RATES OF SERUM GLUCOSE AND LIPID TESTING**

Glucose screening was performed in 1699 (31.6% [95% confidence interval (CI), 30.4%-32.9%]) SGA-treated children vs 1891 (12.6 [12.1%-13.2%]) control individuals (P < .001). Lipid testing was performed in 720 (13.4% [95% CI, 12.5%-14.4%]) SGA-treated children vs 458 (3.1% [2.8%-3.3%]) controls. Glucose and lipid testing rates for the antipsychotic and albuterol cohorts, stratified by age group, are presented in the Figure. Glucose screening was 2 to 3 times more common than lipid screening in both age groups, and screening was more common in older children.

**PREDICTORS OF GLUCOSE AND LIPID TESTING**

Table 2 presents the results from the multivariate logistic regression analysis of patient characteristics associated with the likelihood of receiving glucose and lipid screening among SGA-treated children. The strongest determinants of glucose testing were having an emergency department visit (adjusted odds ratio [AOR], 2.52), having multiple mental health comorbidities (2.42), and having been hospitalized (2.15). The strongest determinants of lipid testing were having multiple mental health comorbidities (2.85), having 2 or more medical office visits (1.88), and having serious mental illness (1.51). Children receiving antipsychotic treatment in Missouri and Oregon were less likely to receive glucose testing (0.62 and 0.81, respectively) and lipid testing (0.29 and 0.57, respectively) than those in California. The adjusted likelihood of metabolic testing was not associated with the index antipsychotic.

**INCIDENCE OF DETECTED GLUCOSE AND LIPID DISTURBANCES**

The incidence of glucose disturbances during the first 6 months of treatment were more common in antipsychotic-treated compared with albuterol-treated children (0.9% vs 0.5%, P = .001) as were lipid disturbances (1.0% vs 0.5%, P < .001). The incidence of metabolic disturbances was not statistically different between children prescribed olanzapine, risperidone, or quetiapine (glucose, 0.8%; lipids, 1.2%) compared with children prescribed aripiprazole or ziprasidone (glucose, 0.9%; lipids, 1.3%). Table 3 presents the incidence of glucose and lipid disturbances and source of ascertainment stratified by the child’s age.
Glucose and lipid disturbances were more common in older than younger children. The overall difference in observed rates of metabolic disturbances between the antipsychotic-treated and albuterol-treated children appears to be primarily attributable to differences in rates of new diagnoses rather than rates of new antidiabetic and antidyslipidemic drug prescriptions.

The results of this multistate study of publicly insured children indicate that most children prescribed antipsychotic medication did not receive metabolic screening. Screening rates were approximately one-quarter to one-half lower than rates reported for adults.32,33 To our knowledge, this is the first study to compare rates of metabolic screening in antipsychotic-treated children with screening rates in an age-matched comparison pediatric population. As hypothesized, rates of glucose and lipid testing were significantly higher among antipsychotic-treated children, however, those rates fell short of consensus screening recommendations and they point to a substantial missed opportunity for metabolic screening in the vulnerable population of antipsychotic-treated children. This finding is disturbing, given the general environment of public health concern surrounding increasing rates of obesity and type 2 diabetes in adolescents and given specific concerns about metabolic risk for children with psychiatric conditions. Recent approvals of pediatric indications for 2 additional SGA drugs43,44 with approval of a third drug still pending,45 suggest...
gest that the number of children receiving antipsychotic medication, and therefore requiring metabolic monitoring, will increase.

The current results further indicate that children with serious and/or multiple psychiatric diagnoses and those who use health care services more intensively (eg, multiple medical office visits, emergency department use, and hospitalization) are the most likely to receive metabolic screening. This finding is consistent with determinants of metabolic testing in adults, which indicate that patients with greater severity of mental illness, higher levels of medical and psychiatric comorbidity, and higher use of health care services are more likely to receive metabolic testing. However, even among children with mental disorder comorbidity, who were persistent in taking their antipsychotic medication and who had 2 or more medical office visits after drug initiation, only 45.2% received glucose testing and only 22.1% received lipid testing.

### Table 2. Factors Predicting Glucose and Lipid Testing Among Children Receiving SGA Drug Treatment

<table>
<thead>
<tr>
<th>Patient Characteristic</th>
<th>Glucose</th>
<th>Lipid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-12</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>13-17</td>
<td>1.35 (1.18-1.53)</td>
<td>1.25 (1.08-1.49)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>NA</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>Black</td>
<td>NA</td>
<td>0.71 (0.54-0.93)</td>
</tr>
<tr>
<td>Other</td>
<td>NA</td>
<td>0.86 (0.70-1.06)</td>
</tr>
<tr>
<td>State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>Missouri</td>
<td>0.62 (0.53-0.71)</td>
<td>0.29 (0.23-0.37)</td>
</tr>
<tr>
<td>Oregon</td>
<td>0.81 (0.65-1.02)</td>
<td>0.57 (0.42-0.77)</td>
</tr>
<tr>
<td>Mental disorder diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serious mental illnessb</td>
<td>1.68 (1.46-1.93)</td>
<td>1.51 (1.26-1.81)</td>
</tr>
<tr>
<td>Mental disorder comorbidityc</td>
<td>2.42 (1.99-2.93)</td>
<td>2.85 (2.15-3.77)</td>
</tr>
<tr>
<td>Drug use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistent SGA medication use</td>
<td>1.23 (1.08-1.40)</td>
<td>1.43 (1.21-1.69)</td>
</tr>
<tr>
<td>Other psychotropic medication use</td>
<td>1.23 (1.08-1.41)</td>
<td>NA</td>
</tr>
<tr>
<td>Frequency of medical office visits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>1 [Reference]</td>
<td>1 [Reference]</td>
</tr>
<tr>
<td>1</td>
<td>1.40 (1.18-1.66)</td>
<td>1.66 (1.33-2.07)</td>
</tr>
<tr>
<td>≥2</td>
<td>1.84 (1.59-2.13)</td>
<td>1.88 (1.88-2.28)</td>
</tr>
<tr>
<td>Emergency department visit</td>
<td>2.52 (2.18-2.91)</td>
<td>1.23 (1.02-1.48)</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>2.15 (1.74-2.67)</td>
<td>NA</td>
</tr>
</tbody>
</table>

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; NA, not applicable (factor excluded from multivariate model because of statistical insignificance [P > .10] at the bivariate level); SGA, second-generation antipsychotic.

aData from California, Missouri, and Oregon state Medicaid programs of children initiating drug treatment in 2005. Antipsychotic-treated (n=5370) patients had no recognized diabetes or dyslipidemia at the start of therapy. Glucose and lipid models are adjusted for shown factors.

bSerious mental illness was defined as having schizophrenia, affective disorder, or other psychoses.
cPatients with medical claims associated with 2 or more diagnosed mental disorders (International Classification of Diseases, Ninth Revision, Clinical Modification codes 290-319) were classified as having mental disorder comorbidity.

### Table 3. Six-Month Incidence of Metabolic Disorders Among 20370 Children Receiving Second-Generation Antipsychotic and Albuterol Drug Treatment

<table>
<thead>
<tr>
<th>Metabolic Disturbance</th>
<th>Aged 6 to 12 Years, % (95% CI)</th>
<th>Aged 13 to 17 Years, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Antipsychotic Cohort (n=2850)</td>
<td>Albuterol Cohort (n=9000)</td>
</tr>
<tr>
<td></td>
<td>Antipsychotic Cohort (n=2520)</td>
<td>Albuterol Cohort (n=6000)</td>
</tr>
<tr>
<td>Glucose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes diagnosis</td>
<td>18 (6.3 [3.7-10.0])b</td>
<td>21 (8.3 [5.2-12.7])c</td>
</tr>
<tr>
<td>Antidiabetic medication use</td>
<td>4 [1.4 [0.4-3.6]]</td>
<td>16 (1.8 [1.0-2.9])d</td>
</tr>
<tr>
<td>Either diagnosis or medication use</td>
<td>20 (7.0 [4.3-10.8])</td>
<td>33 (3.7 [2.5-5.1])e</td>
</tr>
<tr>
<td>Lipids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyslipidemia diagnosis</td>
<td>19 (6.7 [4.0-10.4])c</td>
<td>32 (12.7 [8.7-17.9])d</td>
</tr>
<tr>
<td>Antidyslipidemic medication use</td>
<td>0 [4.0 [0.4-1.1]]</td>
<td>2 (0.8 [0.1-2.9])f</td>
</tr>
<tr>
<td>Either diagnosis or medication use</td>
<td>19 (6.7 [4.0-10.4])</td>
<td>31 (3.4 [2.3-4.9])g</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.

aData from California, Missouri, and Oregon state Medicaid programs of children initiating drug treatment in 2005. Antipsychotic and albuterol users had no recognized diabetes or dyslipidemia at the start of therapy. Metabolic disturbances were ascertained for 6 months after the index start date.
bP< .01 for the comparison between the antipsychotic and albuterol cohorts.
cP< .05 for the comparison between the antipsychotic cohort and albuterol controls.
One patient-level factor that notably did not influence screening rates in this study was race/ethnicity, despite certain racial/ethnic groups being at higher risk for developing type 2 diabetes and evidence that race/ethnicity can influence risk of antipsychotic-induced metabolic adverse events. More work is needed to confirm this finding because race/ethnicity measures in claims data can be imperfect. In addition to these patient-level factors, the observation of higher testing rates for glucose and lipids in children in the California Medicaid systems (vs in Missouri and Oregon) suggests that system-level or system-wide physician-level factors may also influence screening rates.

More research is needed to discern the root causes of the low metabolic screening rates observed in our study population; however, it may be useful to consider several potential obstacles to metabolic monitoring in children. First, pediatricians and primary care physicians may remain unconvinced of the need to monitor children receiving antipsychotic medication. Instead, some physicians may have decreased antipsychotic prescribing and/or switched to lower-risk agents in response to the metabolic warnings, as has been shown in some studies. Alternatively, the low rates of monitoring found in this study and others may reflect adoption of targeted screening for those with clinical changes (eg, those with significant weight gain) rather than mass screening. This hypothesis should be evaluated in future studies because our claims data do not include weight or body mass index measures. Furthermore, many physicians might order metabolic testing, but many families may be noncompliant with follow-through because of the child’s refusal to have blood drawn or the added hassle factor of fasting and traveling to another health care facility for testing. Finally, challenges to interpreting metabolic measures in children and disagreement in general about what constitutes a metabolic abnormality requiring intervention could dissuade physicians from collecting laboratory data altogether.

We also found evidence that the development of glucose and lipid disturbances among antipsychotic-treated children during the first 180 days after drug therapy initiation was more common than in our pediatric reference group. The findings are consistent with results from controlled trials and epidemiology studies that demonstrated early onset and rapid progression of metabolic risk factors after antipsychotic treatment in children. The fact that only a few children were screened suggests that actual rates of metabolic abnormalities in these settings may be higher and that claims-based estimates available to state policy makers may underestimate true rates of these problems. A recent Food and Drug Administration Psychopharmacologic Drugs Advisory Committee evaluating antipsychotic use in children strongly recommended that registries, or some other means, be established toward the goal of better safety surveillance in children.

Although psychiatrists have expertise in prescribing antipsychotic medications, increased attention to metabolic screening by all health care professionals is required. Pediatricians and other primary care physicians are uniquely positioned to identify early signs of cardiovascular and metabolic dysfunction related to antipsychotic medications. Increasing numbers of primary care physicians are treating children with psychotropic medications; some have reported nearly 85% of all prescriptions for psychotropic medications are provided by pediatricians and primary care physicians and as many as one-third of prescriptions for antipsychotic medications are provided by nonpsychiatrists. Primary care physicians are likely to encounter such children in their practices because data regarding effectiveness for treatment of major childhood-onset mental illnesses continue to accumulate and antipsychotic drug use increases.

Several limitations of this study deserve mention. For the purposes of this analysis, testing refers to laboratory testing alone and does not encompass other clinical measures of risk commonly performed in the primary care setting, such as weight, height, body mass index percentile, and family history of diabetes and cardiovascular disease. Furthermore, this study assessed only whether laboratory tests were ordered and obtained, not what the results were or what the clinical response was in terms of adjusting treatment plans to mitigate medication-associated risk. Furthermore, the results of testing performed more than 30 days before the index prescription or more than 180 days after prescription were not evaluated. However, monitoring recommendations call for baseline evaluation, which should fall within the period studied.

Caution should also be exercised when interpreting these results because they may not be generalizable to other populations or reimbursement settings, even though they represent a large sample from 3 states. Theoretically, metabolic screening rates may have improved since the time of data collection in response to either the prevalence of high body mass index among children and adolescents in the United States or specific communication about the metabolic risks associated with antipsychotic medication. However, little evidence is available with regard to substantial improvements over time in available Medicaid or managed care data sets.

In conclusion, children who are treated with antipsychotic medications are recognized as a higher-risk group for metabolic disorders because of potential adverse metabolic effects of these medications and other predisposing factors. Results from this study suggest that serum glucose and lipid monitoring, recommended tools for assessing metabolic risk, are greatly underused in pediatric populations receiving antipsychotic drug treatment. Despite the result that use of glucose and lipid screening was higher in the antipsychotic-treated group than in an age-matched reference pediatric population, screening rates are markedly low, are lower than rates reported in antipsychotic-treated adults, and are well below the recommended goal that “all patients” taking antipsychotics be monitored. Given evidence of short-term adverse metabolic changes and the potential long-term metabolic risk burden, greater effort is needed to ensure consistent screening for all children receiving antipsychotic medications.

Accepted for Publication: November 12, 2009.

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Author Contributions: Drs Morrato and Druss had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Morrato, Druss, Valuck, Campagna, and Newcomer. Acquisition of data: Hartung and Campagna. Analysis and interpretation of data: Morrato, Nicol, Maahs, Druss, Hartung, Valuck, Campagna, and Newcomer. Drafting of the manuscript: Morrato, Nicol, Campagna, and Newcomer. Critical revision of the manuscript for important intellectual content: Morrato, Nicol, Maahs, Druss, Hartung, Valuck, Campagna, and Newcomer. Statistical analysis: Valuck, Campagna, and Newcomer. Obtained funding: Morrato. Administrative, technical, and material support: Morrato, Nicol, and Hartung. Study supervision: Morrato and Newcomer.

Financial Disclosure: Dr Morrato has received past research funding from the National Institutes of Health, Pfizer Inc, and Eli Lilly and Company and is a consultant to the Food and Drug Administration. Dr Nicol has received research funding from the National Alliance for Research on Schizophrenia and Depression. Dr Maahs has received research funding from Merck/Schering-Plough for an investigator clinical trial of lipid-lowering medications and is supported by grant K23 DK073560. Dr Druss has received research funding from the National Institute of Mental Health and the Agency for Healthcare Research and Quality and has consulted with Pfizer Inc. Dr Valuck has received research grant support from the Agency for Healthcare Research and Quality, Eli Lilly and Company, Pfizer Inc, and Ortho-McNeil-Janssen Pharmaceutical Ltd and has served as a consultant to Eli Lilly and Company, Forest Laboratories, and H. Lundbeck A/S. Dr Newcomer has received research grant support from the National Institute of Mental Health, the National Alliance for Research on Schizophrenia and Depression, the Sidney R. Baer, Jr Foundation, Ortho-McNeil-Janssen Pharmaceutical Ltd, Bristol-Myers Squibb, Wyeth Pharmaceuticals, and Pfizer Inc; has served as a consultant to AstraZeneca Pharmaceuticals, Bristol-Myers Squibb, Janssen Pharmaceuticals, Pfizer Inc, Solvay Pharmaceuticals, Otsuka Pharmaceutical Group, Wyeth Pharmaceuticals, Forest Laboratories, Sanofi Aventis, H. Lundbeck A/S, Tikvah Therapeutics Inc, Otsuka Pharmaceuticals, and Vanda Pharmaceuticals; has been a member of data and safety monitoring boards for Organon Pharmaceuticals, Merck/Schering-Plough, Dainippon Sumitomo Pharma Co Ltd, and VIVUS Inc; has been a consultant to litigation; and has received royalties from Compact Clinicals/Jones and Bartlett Publishers for a metabolic screening form.

Additional Contributions: We acknowledge the collective efforts of our Medicaid collaborators from California, Missouri, and Oregon for their assistance in data acquisition and manuscript review.

REFERENCES

There are only 2 things a child will share willingly—communicable diseases and his mother’s age.
—Benjamin Spock, MD, Dr Spock’s Baby and Child Care, 1943
primarily from limitations imposed by conducting an epidemiologic study in the context of a cluster investigation. For example, the differential interval to interview for case and control mothers was a reflection of complete case ascertainment and careful information gathering, which is described in phases 1 and 2 of the Centers for Disease Control and Prevention guidelines. Also, the number of potential controls was quite high (n = 389) because of budget and time constraints, which prevented us from sending letters or making additional telephone calls to inquire about participation. (Although Kirby and Marshall suggest that only 57 of the 389 chose to participate, the “Methods” section states that 312 women [80%] were never contacted because of disconnected telephones or no answer after 4 calls.)

We acknowledge the imperfections of our study and encourage readers to critically evaluate the findings. Nevertheless, we believe that the study makes a contribution to the growing body of literature regarding gastroschisis etiology.

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**Financial Disclosure:** None reported.


**Errors in Table and Text.** In the Original Article titled “Metabolic Screening in Children Receiving Antipsychotic Drug Treatment” by Morrato et al, published in the April issue of the *ARCHIVES* (2010;164[4]:344-351), errors occurred in the Abstract section on page 344. The Patients section should have read: “A total of 5370 children (ages 6-17 years) without diabetes mellitus taking SGA drugs and 15 000 children without diabetes taking albuterol (control individuals) but no SGA drugs.” The first sentence of the Results section should have read, “Glucose screening was performed with 1699 (31.6% [95% CI, 30.4%-32.9%]) SGA-treated children vs 1891 (12.6% [12.1%-13.2%]) controls.” The final sentence of that section should have read, “The case incidence of glucose and lipid disorders was higher in SGA-treated vs albuterol-treated children (8.9 per 1000 children [95% CI, 6.6-11.8]; vs 4.9 per 1000 children [3.9-6.2]; and 9.7 per 1000 children [7.2-12.7]; vs 4.0 per 1000 children [3.6-5.8], respectively).” Also, in Table 3, errors occurred in 2 column headings on page 348. The top-centermost and top-rightmost column headings should have read, “Ages 6 to 12 Years, no.; rate per 1000 children (95% CI)” and “Ages 13 to 17 Years, no.; rate per 1000 children (95% CI),” respectively.