

# Prevalence and Patterns of Antipsychotic Use in Youth at the Time of Admission and Discharge From an Inpatient Psychiatric Facility

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**Abstract:** The objective of this study was to examine the prevalence and patterns of antipsychotic use in children and adolescents at the time of admission and discharge from a tertiary care inpatient psychiatric facility. This retrospective analysis included all patients 18 years and younger, who were admitted and discharged from a child and adolescent tertiary care inpatient psychiatric facility between May 1, 2008 and December 31, 2009. Data for medications at admission were obtained using a province-wide network that links all pharmacies in British Columbia, Canada to a central set of data systems, whereas data for medications at discharge were obtained using the Department of Pharmacy's (British Columbia Children's Hospital, Vancouver, British Columbia, Canada) inpatient computer database. Apart from antipsychotics, overall drug use included antidepressants, mood stabilizers, benzodiazepines, anticholinergics, stimulants, and sleep medications. Referral and discharge diagnoses were also examined. During the study period, 335 patients were admitted and discharged from the tertiary care inpatient psychiatric facility. Significantly, more patients were prescribed with an antipsychotic at the time of discharge from hospital compared with that of the time when they were admitted to hospital (51.6% vs 30.7%;  $P < 0.0001$ ). Antidepressants were most often coprescribed with an antipsychotic at admission and discharge (32.0% vs 42.2%, respectively) followed by attention-deficit/hyperactivity disorder medications (22.3% vs 24.9% at admission and discharge, respectively) and anticonvulsants (19.4% vs 19.1% at admission and discharge, respectively). Whether the significant increase in antipsychotic use seen from the time of admission to discharge is solely attributed to clinical worsening or other variables requires further investigation.

**Key Words:** child, adolescent, antipsychotic, drug use

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According to a national survey of noninstitutionalized US children and youth aged 18 years and younger, the rate of antipsychotic use from 1987 to 1996 remained constant at approximately 0.2 per 100 children.<sup>1</sup> However, prescribing trends

of antipsychotics in this patient population changed dramatically as the second-generation antipsychotics (SGAs) have largely replaced the first-generation antipsychotics (FGAs) in the adult population. Using data from the National Ambulatory Medical Care Survey, the estimated number of office-based visits (ie, this does not include community mental health centers, outpatients clinics, and various other mental health facilities) by youth in the United States resulting in a prescription for an antipsychotic increased 6-fold from approximately 201,000 in 1993 to 1,224,000 in 2002.<sup>2</sup> Closer inspection of the years 2000 to 2002 revealed that 92.3% of the prescribed antipsychotics were for the newer SGAs. In a similar study that included data from the National Hospital Ambulatory Medical Care Survey, the investigators reported that the number of visits by US children (aged 2–18 years) to health providers resulting in a prescription for an antipsychotic increased 5-fold from 493,510 in 1995 to 2,490,720 in 2002.<sup>3</sup> Of these visits, 80% were to physician's offices, 4% to outpatient clinics, and 9% to emergency departments. Canadian studies are largely consistent with the results from the United States. In 1 study conducted in Manitoba, Alessi-Severini et al<sup>4</sup> reported an increase in the use of antipsychotics in children and adolescents aged 18 years or younger from 1.9 per 1000 in 1999 to 7.4 per 1000 in 2008. The growth in prescriptions for SGAs in children and youth is likely the result of multiple factors that include accumulating evidence and awareness of childhood schizophrenia and bipolar disorder,<sup>5,6</sup> reduced liability for extrapyramidal symptoms and tardive dyskinesia compared with FGAs,<sup>7,8</sup> and perhaps the generalizability of clinical trial data using adult subjects.

Despite this significant increase in the use of antipsychotics in children and youth, there is a dearth of literature detailing the assessment and treatment for a subset of this population that have been hospitalized. In a study conducted at a state hospital between January 1, 1997 and June 1, 2000, Kelly et al<sup>9</sup> retrospectively examined the medical records of 88 (of a total of 380 admitted) inpatients that had received a prescription of an antipsychotic (ie, risperidone, olanzapine, or quetiapine) while in the hospital. In only 17% of these patients was a psychotic disorder considered as the primary diagnosis. Concomitant prescriptions for mood stabilizers increased from 54% before admission to 68% during hospitalization. Conversely, prescriptions for antidepressants decreased from 37% on admission to 34% at discharge. Limiting the interpretation of these data are the following: (1) only 64% of the sample received an antipsychotic at the time of admission, and (2) diagnoses and concomitant medication were not known for 20 of the 88 patients. Although this study, conducted over a decade ago, has contributed preliminary data to the literature, many questions remain unanswered. The primary objective of this study sought to examine the prevalence and patterns of antipsychotic use in children and adolescents admitted and discharged from a tertiary care inpatient psychiatric facility. Our secondary

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**TABLE 1.** Demographics of All Patients Admitted and Discharged From the Tertiary Care Inpatient Psychiatric Facility

	Patients Prescribed With Antipsychotics (n = 189)	Patients Not Prescribed With Antipsychotics (n = 146)	P
Sex, male:female	119:70	67:79	0.005
Previous admissions, mean (SD)			
Total	7.3 (9.3)	7.3 (11.3)	NS
Emergency	1.1 (2.9)	0.9 (2.3)	NS
Inpatient	0.7 (1.3)	0.4 (1.2)	0.05
Outpatient clinic	5.5 (7.7)	6.1 (10.1)	NS
Age at admission, mean (SD), y	13.0 (3.0)	13.3 (2.9)	NS
5–9 y, n (%)	34 (10.1)	27 (8.1)	NS
10–14 y, n (%)	96 (28.7)	68 (20.3)	0.01
15–18 y, n (%)	59 (17.6)	51 (15.2)	NS
Length of stay in the hospital, mean (SD), d	29.1 (28.4)	17.8 (16.0)	0.001
Psychotropic medications at admission, mean (SD)	1.3 (1.1)	0.4 (0.6)	0.001
Psychotropic medications at discharge, mean (SD)	2.3 (1.1)	1.0 (0.9)	0.001

NS indicates not significant.

objective was to compare diagnoses of those patients treated with an antipsychotic at the time of admission and discharge from hospital.

## METHODS

This study is a retrospective analysis of data from patients, 18 years and younger, who were admitted and discharged from the Child and Adolescent Psychiatry Inpatient program at the British Columbia Children's Hospital between May 1, 2008 and December 31, 2009. The Child and Adolescent Psychiatry program at the British Columbia Children's Hospital is a tertiary care provincial resource providing mental health assessment and treatment for British Columbia. It is also British Columbia's major treatment, teaching, and research facility for child mental health. The inpatient mental health program consists of two 10-bed units providing assessment and treatment for children (aged 6–11 years) and adolescents (aged 12–18 years), and one 6-bed short-stay psychiatric emergency unit for children and adolescents up to the age of 16.

Medications at the time of admission refer to those drugs prescribed by physicians in the community before admission, whereas medications at the time of discharge refer to drugs prescribed by hospital-based physicians. Data for medications at the time of admission were obtained through British Columbia PharmaNet (a province-wide network that links all pharmacies in British Columbia to a central set of data systems). PharmaNet records include the name and manufacturer of the drug, prescribed dosage and directions, quantity dispensed, and name of the prescribing physician. For medications prescribed at discharge

from hospital, data were obtained using the Department of Pharmacy's inpatient computer database (ie, GE Centricity Pharmacy, v8.2; General Electric Company, Burnaby, British Columbia, Canada). Information on prescriptions was collected for the following list of psychotropic medications: antipsychotics, antidepressants, mood stabilizers, benzodiazepines, anticholinergics, stimulants, and sleep medications. Average daily dosages were analyzed only for the antipsychotics. This method did not include "as needed" *hora somni* medications.

Referral diagnoses represent diagnoses made by physicians in the community that were available at the time of admission to hospital. Discharge diagnoses refer to diagnoses made by hospital-based physicians. All diagnoses were obtained from electronic mental health records or physician's notes within the patient's medical chart. We grouped the diagnoses into the following categories: depression (dysthymia, major depression, major depression with psychotic features, and mood disorder not otherwise specified [NOS]), anxiety disorders (posttraumatic stress, separation anxiety, panic, obsessive-compulsive disorder, generalized anxiety, anxiety disorder NOS, social phobia, and adjustment), disruptive behavior disorders (oppositional defiant disorder, conduct, intermittent explosive disorder, attention-deficit hyperactivity [ie, attention-deficit/hyperactivity disorder (ADHD), inattentive type, hyperactive type, and combined types]), psychotic disorders (schizophrenia, schizoaffective, and psychotic disorder NOS), bipolar disorders, substance use disorders (alcohol, cannabis, and polysubstance), developmental disorder (autism, Asperger syndrome, pervasive developmental disorder NOS, and fetal alcohol spectrum disorder), and tic/neurological disorders (Tourette syndrome, chronic tic disorder, head injury). Demographic data were also obtained using the mental health database, along with paper and electronic hospital health records. Data collected included age, sex, previous number of admissions, and length of current stay in hospital.

Parametric analysis was conducted on continuous variables using the Student *t* test, assuming equal variances. To test categorical variables for independence, the  $\chi^2$  or Fisher exact test was performed. The study was conducted in accordance with the principles of *Good Clinical Practices* and the *Declaration of Helsinki*. This research protocol was reviewed and approved by both the Children's Clinical Research Ethics Board and Women's Research Review Committee and the University of British Columbia.

## RESULTS

Although the primary focus of this study was specific for a subpopulation of patients (ie, those prescribed antipsychotics), it was necessary to initially include the entire population of patients admitted and discharged from the inpatient psychiatry ward to determine the prevalence rates of antipsychotic use. Rather than just using the entire population to obtain a denominator to determine prevalence, we took the opportunity to briefly explore comparisons between patients prescribed with antipsychotics and those patients not prescribed with antipsychotics as presented in Table 1.

A total of 335 patients were admitted and discharged from the inpatient psychiatric program at the British Columbia Children's Hospital between May 1, 2008 and December 31, 2009 (Table 1). Just over half of these patients ( $n = 189$ ) were prescribed with an antipsychotic at some point during the study period. Overall, patients prescribed with an antipsychotic had significantly more previous inpatient admissions compared with those patients not prescribed with an antipsychotic ( $0.7 \pm 1.3$  vs  $0.4 \pm 1.2$ , respectively;  $P = 0.05$ ) and were more likely to be male ( $P < 0.01$ ). Almost one half ( $n = 164$ ) of the patients admitted to

TABLE 2. Antipsychotic Use at Time of Admission and Discharge

	Patient Prescribed With Antipsychotic at Time of Admission to Hospital (n = 103)*	Patient Prescribed With Antipsychotic at Time of Discharge From Hospital (n = 173)*	P	Dose of Antipsychotic Upon Admission to Hospital, Mean (SD), mg/d	Dose of Antipsychotic Upon Discharge From Hospital, Mean (SD), mg/d	P
Prevalence rate of antipsychotic use, <sup>†</sup> n/n (%)	103/335 (30.7%)	173/335 (51.6%)	<0.0001			
SGAs, n (%)						
Aripiprazole	0 (0)	2 (1.2)	0.53	0.0	13.1 (8.0)	
Clozapine	0 (0)	1 (0.6)	1.0	0.0	250.0 (0.0)	
Olanzapine	13 (12.6)	16 (9.2)	0.38	10.5 (5.2)	11.1 (5.0)	0.74
Quetiapine	38 (36.9)	90 (52.0)	0.01	197.2 (197.1)	235.6 (199.1)	0.32
Risperidone	54 (52.4)	68 (39.3)	0.03	1.0 (0.6)	1.2 (0.8)	0.17
Risperidone long acting injectable	1 (1.0)	0 (0.0)	0.37	1.8	0.0	
Ziprasidone	0 (0)	5 (2.9)	0.16	0	72.0 (52.2)	
FGAs, n (%)						
Chlorpromazine	3 (2.9)	3 (1.7)	0.67	125.0 (109.0)	183.3 (166.5)	0.64
Haloperidol	1 (1.0)	1 (0.6)	1.0	2.0 (0.0)	3.5 (0.0)	
Loxapine	1 (1.0)	1 (0.6)	1.0	5.0 (0.0)	7.5 (0.0)	
Methotrimeprazine	1 (1.0)	1 (0.6)	1.0	70.0 (0.0)	40.0 (0.0)	
Perphenazine	1 (1.0)	0 (0.0)	0.37	8.0 (0.0)	0.0	
Pimozide	1 (1.0)	1 (0.6)	1.0	1.0 (0.0)	3.0 (0.0)	
Antipsychotic polypharmacy	10 (9.7)	17 (9.8)	1.0			

\*Except to calculate the prevalence rate of antipsychotic use, we no longer use the total population (N = 335) as the denominator because we are only interested in comparing patterns of antipsychotic use among those treated with antipsychotics. The denominators are column totals (ie, n = 103 and 173 for those prescribed with antipsychotics at the time of admission and discharge respectively). These 2 columns are not mutually exclusive; 12 patients that were on antipsychotics at the time of admission had their antipsychotics discontinued before discharge. On the other hand, 82 patients that were not being treated with an antipsychotic at the time of admission were discharged on an antipsychotic.

<sup>†</sup>To calculate the prevalence rate of antipsychotic use, we used the total number of patients admitted and discharged during the study period as the denominator (ie, N = 335).

the psychiatric inpatient program during the study period were between the age of 10 and 14 years and accounted for most antipsychotics prescribed. On average, patients prescribed with an antipsychotic had longer lengths of stay in the hospital compared with patients not prescribed with an antipsychotic ( $29.1 \pm 28.4$  vs  $17.8 \pm 16.0$  days, respectively,  $P = 0.001$ ). Furthermore, patients prescribed with an antipsychotic received significantly more psychotropic medications compared with patients not prescribed with an antipsychotic, both at the time of admission ( $1.3 \pm 1.1$  vs  $0.4 \pm 0.6$ , respectively;  $P = 0.001$ ) and discharge ( $2.3 \pm 1.1$  vs  $1.0 \pm 0.9$ , respectively;  $P = 0.001$ ).

The prevalence of antipsychotic use was significantly less at the time of admission from the community (30.7%) compared with that of discharge (51.6%;  $P < 0.0001$ ; Table 2). Risperidone accounted for the greatest proportion of antipsychotics prescribed at the time of admission (52.4%); however, its use at discharge was significantly less (39.3%;  $P = 0.03$ ). On the other hand, the proportion of patients treated with quetiapine increased significantly from time of admission to discharge (36.9% vs 52.0%, respectively;  $P = 0.01$ ). No significant differences in dosages were noted for any antipsychotic between the time of admission and discharge. In addition, there was no significant difference in the proportion of patients prescribed with a combination of 2 antipsychotics at the time of admission (9.7%) and discharge (9.8%;  $P = 1.0$ ).

Table 3 shows the concomitant use of other psychotropic medications with antipsychotics. A significantly greater proportion

of patients treated with an antipsychotic were coprescribed with a benzodiazepine at discharge compared with that of admission (9.2% vs 2.9%, respectively;  $P = 0.05$ ). Similarly, a significantly greater proportion of patients treated with an antipsychotic were coprescribed with a sleep medication at discharge compared with that of admission (48.0% vs 1.0%, respectively;  $P < 0.0001$ ). Table 4 examines the referral and discharge diagnoses for those patients prescribed with antipsychotics. The proportion of patients treated with an antipsychotic and diagnosed with a psychotic disorder was significantly greater at the time of discharge compared with that of admission (14.5% vs 5.8%, respectively;  $P = 0.03$ ). On the other hand, there were proportionally fewer diagnoses at the time of discharge compared with that of admission for disruptive behavior disorders (21.4% vs 34.0%, respectively;  $P = 0.02$ ), developmental disorders (10.4% vs 19.4%, respectively;  $P = 0.04$ ), and tic/neurological disorders (0.6% vs 6.8%, respectively;  $P = 0.005$ ).

## DISCUSSION

Our main finding was that significantly more children and adolescents were prescribed with an antipsychotic at the time of discharge from hospital compared with that of admission from the community (51.6% vs 30.7%, respectively;  $P < 0.0001$ ). We are only aware of 1 study, which like ours that specifically compared antipsychotic use at the time of admission and discharge. Similar to our data, their study (n = 100) revealed that patients prescribed with antipsychotics were more likely to be male

**TABLE 3.** Concomitant Use of Psychotropic Medications for Patients Prescribed With Antipsychotics at the Time of Admission and Discharge

	Concomitant Medications for Patients on Antipsychotics at the Time of Admission to Hospital (n = 103)*	Concomitant Medications for Patients on Antipsychotics at the Time of Discharge From Hospital (n = 173)*	P
Antidepressants, n (%)	33 (32.0)	73 (42.2)	0.09
Lithium, n (%)	4 (3.9)	10 (5.8)	0.58
Anticonvulsants, n (%)	20 (19.4)	33 (19.1)	1.0
Benzodiazepines, n (%)	3 (2.9)	16 (9.2)	0.05
Anticholinergics, <sup>†</sup> n (%)	0 (0)	3 (1.7)	0.30
ADHD medications, <sup>‡</sup> n (%)	23 (22.3)	43 (24.9)	0.63
Sleep medications, <sup>§</sup> n (%)	1 (1.0)	83 (48.0)	<0.0001

\*We no longer use the total population (N = 335) as the denominator because we are only interested in concomitant medications for patients treated with antipsychotics. The denominators are column totals (ie, n = 103 and 173 for those prescribed with antipsychotics at the time of admission and discharge, respectively). These 2 columns are not mutually exclusive; 12 patients that were on antipsychotics at the time of admission had their antipsychotics discontinued before discharge. On the other hand, 82 patients that were not being treated with an antipsychotic at the time of admission were discharged on an antipsychotic.

<sup>†</sup>Anticholinergics include benztropine (0.5–2 mg).

<sup>‡</sup>ADHD medications include methylphenidate, dextroamphetamine, atomoxetine, and mixed amphetamine salts.

<sup>§</sup>Sleep medication at admission was zopiclone (n = 1). Sleep medications at discharge included melatonin (n = 79), zopiclone (n = 2), chloral hydrate (n = 1), and melatonin and zopiclone (n = 1).

(63% vs 69%, respectively) than female.<sup>10</sup> This sex difference might be explained, in part, by the fact that antipsychotics are commonly used to treat disruptive behavior disorders, pervasive developmental disorders, and tic disorders; all of which are more common in males than in females.<sup>11–15</sup> In our study sample, males accounted for most of the following diagnoses: disruptive behavior disorders (69.7%), developmental disorders (75.8%), and tic/neurological disorders (100%). Similarities were also noted between our findings and theirs for the number of psychotropic medications these patients were taking at the time of admission ( $1.3 \pm 1.1$  vs  $2.3 \pm 1.3$ , respectively) and discharge ( $2.3 \pm 1.1$  vs  $2.6 \pm 1.1$ , respectively). On the other hand, our rates of antipsychotic use at the time of admission (30.7%) and discharge (51.6%) were much lower than their rates at admission (71%) and discharge (86%). This large difference in antipsychotic use might be explained by the noted differences in the length of hospitalization that often serves as a proxy for the severity of

illness. In this case, our patients spent significantly fewer days in the hospital compared with their patients ( $29.1 \pm 28.4$  vs  $111.6 \pm 85.3$  days, respectively). This rationale is supported by a study in which length of stay significantly predicted pharmacotherapy among inner city children admitted to a university-based inpatient service.<sup>16</sup> On the other hand, it is not supported by a study in which medicated residential patients upon admission had a similar length of stay ( $662.5 \pm 426.6$  days) compared with nonmedicated residential patients upon admission ( $506 \pm 346.5$  days, not significant).<sup>17</sup>

We did not find any difference in the doses of individual antipsychotics between the time of admission and discharge. The dosages of antipsychotics at the time of admission were quite similar between our study and that of Kelly et al<sup>9</sup> for olanzapine ( $10.5 \pm 5.2$  vs  $9.3 \pm 3.9$  mg, respectively) and quetiapine ( $197.2 \pm 197.1$  vs  $200 \pm 0.0$  mg, respectively) but less so for risperidone ( $1.0 \pm 0.6$  vs  $2.4 \pm 1.9$  mg, respectively).

**TABLE 4.** Referral and Discharge Diagnoses for Patients Prescribed With Antipsychotics at the Time of Admission and Discharge From Hospital

	Referral Diagnoses (n = 103)*	Discharge Diagnoses (n = 173)*	P
Depression, n (%)	9 (8.7)	31 (17.9)	0.04
Anxiety disorders, n (%)	19 (18.4)	41 (23.7)	0.31
Disruptive behavior disorders, n (%)	35 (34.0)	37 (21.4)	0.02
Psychotic disorders, n (%)	6 (5.8)	25 (14.5)	0.03
Bipolar disorders, n (%)	7 (6.8)	19 (11.0)	0.25
Substance use disorders, n (%)	0 (0)	1 (0.6)	1.0
Developmental disorders, n (%)	20 (19.4)	18 (10.4)	0.04
Tic/neurological disorders, n (%)	7 (6.8)	1 (0.6)	0.005

\*We no longer use the total population (N = 335) as the denominator because we are only interested in diagnoses as it relates to those treated with antipsychotics. The denominators are column totals (ie, n = 103 and 173 for those prescribed antipsychotics at the time of admission and discharge, respectively). These 2 columns are not mutually exclusive; 12 patients that were on antipsychotic at the time of admission had their antipsychotics discontinued before discharge. On the other hand, 82 patients that were not being treated with an antipsychotic at the time of admission were discharged on an antipsychotic.



Similarly, the dosage of olanzapine at the time of discharge in our study is relatively similar to their inpatient dosage ( $11.1 \pm 5.0$  vs  $10.2 \pm 6.6$  mg, respectively). However, our patients received dosages of risperidone that were 2.3 times less than that received by their patients ( $1.2 \pm 0.8$  vs  $2.8 \pm 2.4$  mg, respectively), and our patients received dosages of quetiapine that were 2.5 times greater than that received by their patients ( $235.6 \pm 199.1$  vs  $93.8 \pm 51.5$  mg, respectively) at discharge.

As expected, the overall increase in the use of antipsychotics at discharge compared with that of admission was associated with the 8.7% increase in patients diagnosed with psychotic disorders. Similarly, the 9.2% increase in diagnosis of depression from admission to discharge was associated with the 10.2% increase in the use of antidepressants. Likewise, the 5.3% increase in the diagnosis of anxiety disorders was associated with the 6.3% increase in the prescribing of benzodiazepines.

In our study, antidepressants were the agents most often coprescribed with an antipsychotic at discharge (42.2%) followed by lithium/anticonvulsants (24.9%), ADHD medications (24.9%), and benzodiazepines (9.2%). These results differ from a previous report (conducted in 1997 to 2000) in which mood stabilizers/anticonvulsants were most often coprescribed with an antipsychotic during an inpatient stay (68%) followed by antidepressants (34%), stimulants (12%), and benzodiazepines (3%).<sup>9</sup> These differences may, in part, reflect changes in the evidence-based practice guidelines over the past decade that influence prescribing patterns. Among those treated with antipsychotics, we reported that 10 (9.7%) patients were admitted, and 17 (9.8%) patients were discharged on antipsychotic polypharmacy. This is slightly lower than the 14% reported by Pappadopulos et al<sup>10</sup> in child and adolescent public facilities in New York State. In any case, not only does antipsychotic polypharmacy lack clinical evidence in children and adolescents, but it is also associated with an increased risk of adverse events and increased cost.

Before our study, the Food and Drug Administration (FDA) had approved only 2 SGAs for some indications in this patient population. Specifically, aripiprazole had been approved for the treatment of (1) schizophrenia (aged 13–17 years) and (2) acute manic and mixed episodes associated with bipolar I disorder with or without psychotic features (aged 10–17 years). Similarly, risperidone had been approved for the treatment of (1) irritability associated with autistic disorder (aged 5–16 years), (2) schizophrenia (aged 13–17 years), and (3) bipolar I disorder (aged 10–17 years). Quetiapine also received official FDA indications for schizophrenia (aged 13–17 years) and manic episodes associated with bipolar I disorder (aged 10–17 years); however, this only occurred in the last month of our study (ie, December 2009). Unlike the United States, there were no Health Canada–approved indications for any of the SGAs in children and youth at the time of this study. Based on the FDA indications, the rate of off-label prescribing in our study was 92.0% at the time of admission and 90.5% at discharge. This is consistent with a reported off-label rate of 90% in a similar study conducted in hospitalized children and adolescents in Paris, France.<sup>18</sup> Even the older literature has documented that antipsychotics were often used for unapproved indications in hospitals (state, private, and county university) and residential care settings alike.<sup>19,20</sup>

Although off-label prescribing occurs in all fields of medicine and does not, in itself, imply a quality concern, it may be more common in psychiatry. One possible reason for these high rates of off-label prescribing might lie in the complex pharmacology of antipsychotic agents that in themselves are not diagnostically specific agents. In fact, the overlap of medication classes across diagnostic categories in our study would

substantiate this and would suggest more of a symptom-specific approach rather than categorical (or diagnostic) approach to treatment. Furthermore, it must be kept in mind that off-label prescribing does not necessarily imply that there is no evidence for using a particular medication for a given off-label indication. In fact, there are many randomized, controlled trials providing evidence for the use of antipsychotics for various off-label indications in the child and adolescent population.<sup>21</sup>

Our study has limitations that need to be considered when interpreting the results. First, this study was limited to a relatively small inpatient population. Second, this study was retrospective, and thus we cannot determine the exact reason(s) for the significant increase in the use of antipsychotics at discharge (compared with admission). Obviously, admission to hospital is usually the result of clinical worsening that may, depending on diagnosis and symptom, benefit from the addition of an antipsychotic to the treatment regimen. However, we cannot exclude other variables that may include differences in prescribing behaviors between physicians practicing in the community and physicians practicing in a tertiary care psychiatric facility. In this regard, studies have reported that inpatient children and adolescents are consistently prescribed 4 to 18 times more antipsychotics than their outpatient counterparts.<sup>22,23</sup> Third, the reported results rely on the accuracy and completeness of the electronic and chart records. Fourth, underlying mental disorders were based on clinical diagnoses rather than research diagnostic interviews. However, clinical diagnoses formulated using physician judgment is the general standard that guides prescribing. Finally, clinical outcomes were not included in this study, and thus we do not know to what extent these children and adolescents benefited from or were harmed by the treatment with antipsychotics after they were discharged from inpatient care.

This study, along with others that examine patterns of antipsychotic use, is important as it allows for comparison of prescribing practices among clinicians, institutions, and jurisdictions. Common trends noted among drug use studies, in many instances, suggest acceptability in prescribing practices, even if the practice reflects clinical experience rather than scientific evidence. In this regard, it is tempting to argue that the common use and high prevalence of off-label prescribing seen in this study, as well as other studies, suggests a high degree of perceived need, indications, and benefits of these agents in this particular patient population. Despite these perceptions, there is genuine concern regarding a lack of rigorous systematic efficacy and safety data for a variety of child and adolescent psychiatric and behavior disorders. What is now needed is more evidence that could help substantiate or refute the actual risks and benefits of using these agents as they are currently being used in clinical practice. The lack of clinical data also makes it difficult, if not impossible, to assess the effects these agents on domains that include learning and cognition—an obvious concern in developing children and adolescents. With the growing use of antipsychotics in children and adolescents, it is clear that more controlled clinical trials with adequate sample size and duration are needed to provide further data on long-term efficacy and safety for various psychiatric and behavior disorders.

#### AUTHOR DISCLOSURE INFORMATION

*Dr Procyshyn is a paid consultant and is on the speaker's bureau for AstraZeneca, Bristol-Myers Squibb, Janssen, Otsuka, Pfizer, and Sunovion.*

*Dr Honer has received consulting fees or sat on paid advisory boards for MDH Consulting, In Silico (no honorarium), Novartis, Roche, Otsuka, and Lundbeck. He received honoraria from Rush University, the Korean Society for Schizophrenia*

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Johnny Su, Dean Elbe, Angela Y. Liu, William J. Panenka, and Jana Davidson declare no relevant conflicts of interest.

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