

# Psychotropic Drug Prescription Practice in Psychiatric In-Patients in Saskatchewan, Canada

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## Abstract

**Background:** Psychotropic drugs play a huge role in providing care in psychiatric and mental health. The judicious and appropriate use of these medications goes a long way in providing improved quality of health among psychiatric inpatients in Canada.

**Objective:** To appraise the prevalence, pattern, and rational for psychotropic drugs prescription in different psychiatric inpatient settings in Saskatchewan, Canada.

**Material and methods:** We conducted a one-day cross-sectional study at three psychiatric treatment facilities in Saskatchewan, Canada. They were: a) Regional Psychiatric Centre in Saskatoon (RPC); b) Saskatchewan Hospital in North Battleford (SH); and c) Dubé Centre for Mental Health in Saskatoon (DC). Data were collected blindly from selected patients' records in these centres and analyzed using the Statistical Package for Social Science (SPSS) version 21.

**Results:** A total of 381 patients' records were retrieved and distributed in the three sites; RPC (47.5%), SH (36.5%) and DC (16%). The majority of in-patients were males (76.6%) and between the ages of 25 to 65 years. Schizophrenia was the most Axis 1 DSM-IV psychiatric diagnosis (46.2% counts for all patients) with Saskatchewan Hospital having the highest percentage (61.8%) of patients diagnosed. We calculated a total of 2275 regular prescriptions and 1322 pro re nata (PRN) prescriptions. The mean number of regular and PRN psychotropic medications per patient were 2.83 and 1.38 respectively. The most commonly prescribed drugs were benzodiazepines with Lorazepam being the most prescribed PRN psychotropic drug.

**Conclusions:** To ensure more judicious use of psychotropic medications, assessment, and management of patients' short and long-term outcomes, including clinical evaluation of the benefits and side effects of these drugs are vital.

**Keywords:** Psychotropic drugs; Psychotropic medications; Drug distribution; Drug prescription; Psychiatric inpatient; Saskatchewan

## Background

Psychotropic drug use is pivotal in psychiatric care. Widespread prescription of psychotropic medications calls for studies in understanding the factors responsible for the pattern and situational differences [1]. These include; the nature of psychiatric morbidity, the tolerability of the medicines with respect to age and susceptibility to its adverse effects. Other patient-related (e.g. social, historical, physical, and preferential), prescriber and health system factors and relevant and combine with significant side effects of varying severity to inform the judicious use of psychotropic drugs [2,3].

There is justifiable concern about widespread use of psychotropic drugs amongst the general population and much more so in special population groups particularly because of issues surrounding the benefits in comparison to the adverse effects. Side effects from the prescription of high doses of psychotropic drugs may be associated with common prescribers' attitudes in line with special patient populations (child, forensic or geriatrics) and types of hospitals [4]. These, therefore calls for prescribers to treat every patient uniquely because several documented side effects (Tardive dyskinesia, akathisia, neuroleptic malignant syndrome and other extrapyramidal syndrome disorders) could be very distressing, irreversible or fatal. Also, the potential for abuse of psychotropic drugs (benzodiazepines and stimulants) have medicolegal implications [5]. As health care practitioners, the decision to use these drugs should be on the premise that the benefit far outweighs the adverse effects.

Epidemiological data on psychotropic drug use from previous studies show widespread use of the various psychotropic drugs with rates between 2.1% and 29.6% (average 11.6%) [6]. Drugs are used extensively in general psychiatric outpatient clinics, with 30% to 70% of all prescriptions for antipsychotic medication [7]. Among inpatient psychiatric populations, up to 80% of prescriptions could be for psychotropic drugs [8]. We are not aware of studies comparing the distribution of psychotropic drug prescription among patients in different hospital (acute, rehabilitation and forensic) settings.

Given the differences in the types of patients in each of the three hospitals studied in Saskatchewan, Canada, we hypothesized that substantial differences would be found in prescription practices. The study is part of a larger program of research with the aims of identifying possible differences in prescription practices regarding different types

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of psychotropic medications, and comparing prescription patterns vis-a-vis dosage, rational and frequency of monitoring between the three sites. For the purpose of this study psychotropic drugs are defined as any chemical agent used primarily to relieve symptoms of mental or emotional origin without impairing consciousness [9]. The outcome of this study is expected to lead to improved clinical practices and possibly more judicious use of psychotropic medications.

## Methods

The study was a one-day cross-sectional study involving the collection of clinical and prescription data from patients' charts in 3 selected sites. They include:

- a) Regional Psychiatric Centre in Saskatoon (RPC-forensic)
- b) Saskatchewan Hospital in North Battleford (SH-rehabilitation and partly forensic)
- c) Dubé Centre for Mental Health in Saskatoon (DC-acute general) (include the description of these sites)

RPC is a multi-level security forensic psychiatry facility in Saskatoon, Saskatchewan. It has a capacity for 204 patients, a facility for male and female with a regional hospital located within the facility. SH is a provincial rehabilitation hospital with a forensic assessment unit based in North Battleford, Saskatchewan Canada. It has a capacity for 116 patients (with about 50 forensic psychiatric patients). Dube Centre is an acute 64-bed mental health unit located in the Royal University Hospital in Saskatoon, Saskatchewan Canada. The length of stay in the three hospitals is shortest in DC, followed by SH and RPC. We specifically selected these sites, because of the location and inflow of patients with mental health or psychiatric needs.

We obtained ethics approval for the study, from the Research Ethics Board of the University of Saskatchewan and the individual research review committees of the three health authorities that manage these hospitals. They included the Saskatoon Health Region Operational Research Approval (for Dube Centre), the Prairie North Regional Health Authority Ethics Research certificate (for Saskatchewan Hospital) and the Regional Psychiatric Centre research approval from the Correctional Services of Canada. Medical records of all patients, 18 years of age or older, in the three hospitals, were reviewed. Data were limited to prescriptions and relevant clinical information on November 15, 2011. Subjects were not contacted at all for the study and no drugs or interventions were delivered.

The study required access to subject's medical health information from the health records. Information on subjects' demographics (age, ethnicity, and level of education) were also collected. Information on drug prescription included regular medications, depot injections, PRN medications and stat medications. Data collected were charted and analyzed using the Statistical Package for Social Science (SPSS) version 21. We adopted three methods of antipsychotic dosage calculation for this study. They include, Chlorpromazine equivalents (CPZeq)<sup>1</sup>, Percentage of British National Formulary (BNF)<sup>2</sup> maximum and Defined Daily Dose (DDD)<sup>3</sup>.

<sup>1</sup>CPZeq is a measure of the relative antipsychotic potencies of antipsychotics. They are expressed as a ratio, relative to the arbitrary value of 1, which corresponds to the antipsychotic effects of chlorpromazine [10].

<sup>2</sup>The Percentage of BNF maximum is used to approximate the total daily prescribed antipsychotic dose as a percentage of the maximum BNF dose. This help to determine the percentage of BNF maximum dosage for each antipsychotic used, and then sum up the percentages [11].

<sup>3</sup>Defined Daily Dose (DDD) is a unit of measurement defined as the average maintenance daily dose of a drug, used for its main indication in adults. It is calculated by dividing the prescribed daily dose (PDD) by the DDD [12].

## Results

A total of 381 patients' records were retrieved and distributed in the three sites; RPC (47.5%), SH (36.5%) and DC (16%). The majority of the patients from all three sites were male (76.6%). RPC had a significantly higher number of males compared to the other two sites (n=170, 58.2%). Conversely, SH had more female patients (n=46, 51.7%) than the other sites. The majority of patients were between 26 and 65 years of age for all three sites. Dube centre had the highest percentage (32.8%) of patients less than 25 years old. On the other hand, Saskatchewan Hospital had the highest percentage (15.8%) of patients with ages greater than 66 years (Table 1).

## Diagnosis

Schizophrenia was the most frequent Axis 1 (clinical disorders) DSM-IV psychiatric diagnosis (46.2%) in the total patient population. Saskatchewan Hospital had the highest percentage (61.8%) of patients diagnosed with Schizophrenia. RPC had the largest number of patients diagnosed with Alcohol/Substance disorders (59.1%). This was significantly higher than Dube Centre and SH. DSM-IV Axis 2 diagnosis of Antisocial Personality Disorder among the RPC patients (60.8%) was statistically significantly higher than at the Dube Centre and Saskatchewan Hospital (p<0.05) (Table 1).

Table 2 shows the overall distribution of non-psychotropic and psychotropic drugs prescribed to all patients from all three facilities. A total of 2275 prescriptions and 1322 prescriptions were calculated for regular and pro re nata (PRN) prescriptions respectively. The mean number of regular and PRN psychotropic medications per patient was 2.83 and 1.38 respectively. PRN prescriptions in the Dube Center (53.5% of all PRNs) were higher than RPC and SH. Saskatchewan Hospital had the highest percentage (91.7%) for patient prescribed psychotropic depot injections.

The number of psychotropic drugs prescribed per diagnoses across all participating centres is displayed in Table 3. Saskatchewan hospital had the lowest percentage (37.3%) of patients prescribed 0-2 regular prescriptions and the highest percentage (67.4%) of patients having one depot psychotropic prescription. The percentage of patients prescribed 0-2 PRN medications in all groups (100%) was highest at RPC compared to Dube centre and Saskatchewan hospital. SH, however, had the highest rates of PRN psychotropic prescription.

The most commonly prescribed PRN drugs were Lorazepam, Haloperidol, and Quetiapine (Table 4). Doses above the Chlorpromazine equivalents (CPZeq) and British National Formulary Maximum Daily Dose (BNFMDD) were prescribed in 8% of the patient population. SH (76%) had higher than recommended maximum doses of medications than other two sites (Table 5).

## Discussion

Chronic mental disorders such as schizophrenia were frequent in the three sites. RPC, the more forensic of the two forensic hospitals, not surprisingly registered more alcohol and drug use disorders and also the highest rates of antisocial personality disorders. SH, on the other hand, recorded the most frequent use of PRN psychotropic medications and the highest frequency of use of higher than recommended doses of psychotropic medications. These findings stood out as one of the most important differences we discovered. SH also recorded the highest intramuscular injections prescribed of the three facilities studied. In practice, SH could be conceptualized as a combination of the other hospitals in patient profile. It admits from both RPC (rarely) and DC

	All Sites N=381	Regional Psychiatric Centre (RPC) n=181	Dube Centre (DC) n=61	Saskatchewan Hospital North Battleford (SHNB) n=139
Demographics	n (%)	n (%)	n (%)	n (%)
Male	292 (76.6)	170 (93.9)	29 (47.5)	93 (66.9)
Female	89 (23.4)	11 (6.1)	32 (52.5)*	46 (33.1)
Ages 15-25	56 (14.7)	26 (14.4)	20 (32.8)*	10 (7.2)
Ages 26-65	292 (76.6)	150 (82.9)	35 (57.4)	107 (77.0)
Ages 66-85	33 (8.7)	5 (2.8)	6 (9.8)	22 (15.8)*
DSM IV diagnoses - AXIS I				
Schizophrenia	176 (46.2)	70 (38.7)	20 (32.8)	86 (61.9)*
Depression	53 (13.9)	36 (19.9)	12 (19.7)	5 (3.6)*
Bipolar Disorder	20 (5.2)	11 (6.1)	7 (11.5)*	2 (1.4)
Alcohol/Substance Use disorder	146 (38.3)	107 (59.1)*	17 (27.9)	22 (15.8)
No Axis I	15 (3.9)	5 (2.8)	1 (1.6)	9 (6.5)
Deferred Axis I	7 (1.8)	5 (2.8)	1 (1.6)	1 (0.7)
DSM IV diagnoses - AXIS II				
Antisocial Personality disorder	124 (32.5)	110 (60.8)*	2 (3.3)	12 (8.6)
Borderline Personality disorder	13 (3.4)	7 (3.9)	4 (6.6)	2 (1.4)
No Axis II	71 (18.6)	11 (6.1)	0 (0)	60 (43.2)*
Deferred Axis II	83 (21.8)	30 (16.6)	44 (72.1)*	9 (6.5)

\*Dube had the highest percentage (52.5%) of female patients while RPC had the lowest percentage (6.1%) female patients. The percentages of the female or male patients among the three sites are all statistically significantly different (P<0.05).

\*Dube had the highest percentage (32.8%) of patients whose age is less than 25 years old. It is statistically significantly higher than other two sites (P<0.05).

\*RPC had the highest percentage (30.4%) of patients whose age is between 26 and 35 years old. It is statistically significantly higher than other two sites (P<0.05).

\*Sask Hospital had the highest percentage (24.5%) of patients whose age is between 56 and 65 years old. It is statistically significantly higher than the RPC (P<0.05).

\*Sask Hospital had the highest percentage (15.8%) of patients whose age is greater than 66 years old. It is statistically significantly higher than the RPC (P<0.05).

\*Sask Hospital had the highest percentage (61.8%) of patients who was diagnosed with Schizophrenia. It is statistically significantly higher than other two sites (P<0.05).

\*Dube had the highest percentage (11.5%) of patients who was diagnosed with Bipolar. It is statistically significantly higher than other two sites (P<0.05).

\*Sask Hospital had the lowest percentage (3.6%) of patients who was diagnosed with Depression. It is statistically significantly lower than other two sites (P<0.05).

\*RPC had the highest percentage (59.1%) of patients who was diagnosed with Alcohol/Substance use. It is statistically significantly higher than other two sites (P<0.05).

**Table 1:** Characteristics of patients who received psychotropic drugs from medical records.

	All Sites Patients # = 381			RPC Patients # = 181			Dube Centre Patients # = 61			Saskatchewan Hospital Patients # = 139		
	n	%	Mean	n	%	Mean	n	%	Mean	n	%	Mean
Regular Medications												
Total Medications	2275	100	5.97	955	100	5.28	336	100	5.51	984	100	7.08 <sup>^</sup>
Non-psychotropic	1195	52.5	3.14	547	57.3*	3.02	165	49.1	2.70	483	49.1	3.47
Psychotropic	1080	47.5	2.83	408	42.7*	2.25 <sup>^</sup>	171	50.9	2.80 <sup>^</sup>	501	50.9	3.60 <sup>^</sup>
Pro re Nata (PRN) Medications												
Total Medications	1322	100	3.47	198	100	1.09 <sup>^</sup>	273	100	4.48 <sup>^</sup>	851	100	6.12 <sup>^</sup>
Non-psychotropic	795	60.1	2.09	125	63.1	0.69 <sup>^</sup>	127	46.5*	2.08 <sup>^</sup>	543	63.8	3.91 <sup>^</sup>
Psychotropic	527	39.9	1.38	73	36.9	0.40 <sup>^</sup>	146	53.5*	2.39	308	36.2	2.22
Injections												
Total Medications	172	100	0.45	48	100	0.27	16	100	0.26	108	100	0.78 <sup>^</sup>
Non-psychotropic	33	19.2	0.09	19	39.6	0.10	5	31.3	0.08	9	8.3*	0.06
Psychotropic	139	80.8	0.36	29	60.4	0.16	11	68.7	0.18	99	91.7*	0.71 <sup>^</sup>

<sup>^</sup>The average number of medication given to patient at Sask Hospital is statistical significantly higher than other two sites (P<0.05).

<sup>^</sup>The average number of Psychotropic medication given to patient at Sask Hospital is the highest among the three sites, and the average numbers are statistical significantly different among the three sites (P<0.05).

\*RPC had the lowest percentage (42.7%) of having Psychotropic medication. It is statistical significantly lower than other two sites (P<0.05).

<sup>^</sup>The average number of PRN medication given to patient at Sask Hospital is the highest among the three sites, and the average numbers are statistical significantly different among the three sites (P<0.05).

<sup>^</sup>The average number of PRN Non-Psychotropic medication given to patient at Sask Hospital is the highest among the three sites, and the average numbers are statistical significantly different among the three sites (P<0.05).

<sup>^</sup>The average number of Psychotropic medication given to patient at RPC is statistical significantly lower than other two sites (P<0.05).

\*Dube had the highest percentage (53.5%) of having PRN Psychotropic medication. It is statistical significantly higher than other two sites (P<0.05).

<sup>^</sup>The average number of Injections given to patient at Sask Hospital is the highest among the three sites, and it is statistical significantly higher than other two sites (P<0.05).

<sup>^</sup>The average number of Psychotropic Injections given to patient at Sask Hospital is the highest among the three sites, and it is statistical significantly higher than other two sites (P<0.05).

\*Sask Hospital had the highest percentage (91.7%) of having Psychotropic injections. It is statistical significantly higher than other two sites (P<0.05).

**Table 2:** Overall distribution of medications across identified mental health centres.

All sites	Schizophrenia N=176		Bipolar N=20		Depression N=53		Substance Abuse N=146		No Axis I N=15		Deferred Axis I N=7		Borderline N=13		Antisocial PD N=124		No Axis II N=71		Deferred Axis II N=83	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
<b>Regular Medication</b>																				
0-2	82	46.6	11	55	22	41.5	73	50	6	40	3	42.9	5	38.5	68	54.8	30	42.3	51	61.4
3-4	60	34.1	9	45	22	41.5	51	34.9	5	33.3	2	28.6	5	38.5	46	37.1	27	38	15	18.1
≥5	34	19.3	0	0	9	17	22	15.1	4	26.7	2	28.6	3	23.1	10	8.1*	14	19.7	17	20.5
<b>PRN Psychotropic Prescriptions</b>																				
0-2	146	83	16	80	49	92.5	133	91.1	9	60	6	85.7	11	84.6	118	95.2*	58	81.7	60	72.3
3-4	28	15.9	4	20	3	5.7	11	7.5	5	33.3*	1	14.3	2	15.4	6	4.8	13	18.3	17	20.5
≥5	2	1.1	0	0	1	1.9	2	1.4	1	6.7	0	0	0	0	0	0	0	0	6	7.2
<b>Depot Psychotropic Prescriptions</b>																				
0	89	50.6	13	65	47	88.7*	113	77.4*	12	80	5	71.4	11	84.6	99	79.8	30	42.3	63	75.9
1	84	47.7	7	35	5	9.4	32	21.9	1	6.7	2	28.6	1	7.7	25	20.2	39	54.9*	20	24.1
2	3	1.7	0	0	1	1.9	1	0.7	2	13.3	0	0	1	7.7	0	0	2	2.8	0	0

\*The percentages of patients who had regular psychotropic prescriptions are not statistically different among the patients with various diagnoses.  
 \*The patients with No Axis I diagnoses had a statistically higher percentage (33.3%) of having 3-4 PRN psychotropic prescriptions than the patients with Depression or Substance Abuse diagnoses did, 5.7% and 7.5% respectively (P<0.05).  
 \*The patients with No Axis I diagnoses had a statistically higher percentage (33.3%) of having 3-4 PRN psychotropic prescriptions than the patients with Depression or Substance Abuse diagnoses did, 5.7% and 7.5% respectively (P<0.05).  
 \*The patients with Depression diagnoses had a statistically higher percentage (88.7%) of having 0 Depot psychotropic prescriptions than the patients with Schizophrenia or Bipolar diagnoses did, 50.6% and 65.0% respectively (P<0.05).  
 \*The patients with Substance Abuse diagnoses had a statistically higher percentage (77.4%) of having 0 Depot psychotropic prescriptions than the patients with Schizophrenia diagnoses did (50.6%) (P<0.05).

**Table 3:** Numbers and percentages of psychotropic drugs prescribed for several diagnoses at all sites.

	All Sites N=1080		RPC n=408		DC n=171		SH n=501	
	Medication	N (%)	Medication	n (%)	Medication	n (%)	Medication	n (%)
1	Lorazepam	155 (29.4)	Olanzapine	17 (23.3)	Lorazepam	34 (23.3)	Lorazepam	115 (37.3)
2	Haloperidol	100 (19.0)	Quetiapine	15 (20.5)	Quetiapine	28 (19.2)	Haloperidol	83 (26.9)
3	Quetiapine	47 (8.9)	Clonazepam	9 (12.3)	Zopiclone	21 (14.4)	Benzotropine	35 (11.4)
4	Olanzapine	46 (8.7)	Lorazepam	6 (8.2)	Haloperidol	17 (11.6)	Chlorpromazine	23 (7.5)
5	Benzotropine	45 (8.5)	Methotrimeperazine	6 (8.2)	Olanzapine	13 (8.9)	Olanzapine	16 (5.2)
6	Chlorpromazine	26 (4.9)	Risperidone	5 (6.8)	Benzotropine	6 (4.1)	Diazepam	9 (2.9)
7	Zopiclone	25 (4.7)	Benzotropine	4 (5.5)	Clonazepam	5 (3.4)	Zuclopenthixol	6 (1.9)
8	Clonazepam	15 (2.8)	Procyclidine	4 (5.5)	Diazepam	5 (3.4)	Quetiapine	4 (1.3)
9	Diazepam	14 (2.7)	Hydroxyzine	3 (4.1)	Atropine	4 (2.7)	Risperidone	4 (1.3)
10	Risperidone	11 (2.1)	Buspiron	1 (1.4)	Trazodone	3 (2.1)	Zopiclone	4 (1.3)

**Table 4:** Most prescribed PRN psychotropic drugs.

	All Sites		RPC		Dube		SHNB	
	n	%	n	%	n	%	n	%
<b>Above both CPZ and BNF MDD</b>								
Total patients	30	100	4	13.3	3	10	23	76.7
<b>Above 100% of BNF Maximum Daily Dose</b>								
Total patients	63	100	18	28.6	6	9.5	39	61.9

**Table 5:** Overall dosage methods used across centres.

(more frequently). In the latter, it will provide longer hospital stay for rehabilitation and stabilization. It is similar to RPC in assessing and treating those with a forensic psychiatric history. The patient profiles, however, are more helpful in explaining the prescription pattern as they reflect the variability in frequency counts across all three sites. For example, one would notice that the frequency of the female in-patients was spread more between the acute centres than forensic and antisocial personality disorder inclined more towards the forensic hospitals.

At the SH, injection use reflects chronicity of the types of patients

admitted for rehabilitation. There are those known to have resistance emanating from poor insight and lack of compliance [13]. Chronicity and resistance may be reflective of the use of above-recommended doses of psychotropic medications highest in SH. Prescribers may also be trying different medications that contribute to polypharmacy and high dose prescription. Presently, there is still no consensus on what constitutes high-dose prescriptions. However, a CPZeq more than 1000 mg/day is considered a high dose. Using the BNF, doses exceeding the maximum daily dose (MDD) or a combination of percentages of a maximum daily dose exceeding 100% for a patient prescribed more than one psychotropic drug is also considered high dosages. More recently, the Defined Daily Dose (DDD) has been found more useful in quantifying daily doses by comparing it with the CPZeq and the percentages of BNF maximum daily doses [14].

Other factors that can explain the differences are physician preferences, differences in hospital drug formularies, and costs. We were not able to examine these explicitly, however, patient factors such as gender and age may have also contributed to these prescription



patterns. For example, studies have revealed that women are more likely to seek medical help than men [15]. Also, age of the patient can influence the prescription as in the case of older patients requiring fewer medications. In this study, we found that most patients were between the ages of 25 and 65 years, but distributed equally in all the sites.

Also, the frequency of use of benzodiazepines across all three centres is worthy of mention as it was the most commonly prescribed drug from the study (Table 4). The choice of Lorazepam (Ativan) use among other commonly used benzodiazepines in this study (clonazepam and diazepam) could be because they are short-acting, very well recommended for use in a patient with liver disease, and could be administered through several routes, thus facilitating their use *pro re nata* (PRN). Commonly, PRN medications and prescriptions in practice are used to manage acute symptoms and challenging behaviours of inpatients [16]. Its primary advantages are that it allows for rapid administration of psychotropic medications in acute phases of illness, reduces the need for invasive or restrictive medical interventions such as physical restraints and reduces the need for contact with the attending psychiatrist [16,17]. It is then logical to assume that the forensic components of the sites should have recorded more PRN use but we found the reverse. In an acute hospital setting like with SHNB and DC, more new admissions are automatically prescribed a PRN, whether needed or not. Over-reliance on PRN methods have been shown to cause more harm than good in practice. Studies suggest that PRN orders may titrate down the doses of regular medications used to treat symptoms [16]. Other imminent risks associated may include biasing the assessment of the efficacy of regular medications, high dosing, polypharmacy, potential for substance use disorders and related issues, adverse drug interactions and increased morbidity associated with psychotropic prescriptions [16,18,19].

Our study showed that benzodiazepines were widely used in the treatment of conditions like depression, schizophrenia, anxiety, insomnia, substance withdrawal, and antipsychotic-induced adverse effects. The choice of benzodiazepines in these centres may also relate to their anxiolytic-sedative properties, which addresses the needs of most of the patients with complaints of insomnia, restlessness or adverse effects from other psychotropic drugs. Another reason could be because they are relatively safe and rarely result in death from overdose [20,21]. Nonetheless, benzodiazepines have notable adverse effects including potentially hazardous hang-over effects, and they can be misused and abused [22]. Furthermore, long-term use of benzodiazepines has been associated with psychomotor and cognitive dysfunctions as well as visuospatial disabilities [23,24]. In addition, abrupt discontinuation of benzodiazepine usage may cause rebound or abstinence symptoms which could compound patients' symptoms and other symptoms it was supposed to treat [22,24].

High-dose PRN prescriptions of psychotropic drugs may also be problematic. Our study results showed that over 50% of the prescriptions given were high dosages. Interestingly, this mostly occurred with PRN psychotropic medications. Possible reasons for this could have been treatment resistance, history of ailment, polypharmacy, and duration of illness. Although studies have suggested that high-dose prescriptions are commoner among in-patients compared to out-patients [14], there is the need for further studies on this issue. It appears that psychiatrists commonly prescribe high doses of PRN psychotropic medications even when more evidence points to the effectiveness of low to moderate doses [14,25].

Some of the patients in the study did not have a diagnosis. Hence we categorized them into deferred axis 1 or deferred axis 2 diagnoses.

The DSM allows for a deferred diagnosis when the information is not written down at the time of the study (in retrospective studies) or when there is missing data in the column of diagnosis. Also, the term is used when there is no diagnosis in a specific axis, as in the case of missing axis 1, in those with only personality disorders or mental retardation. In our study, we found 33% of those without an Axis 1 (clinical disorder) were prescribed an average of 0-2 PRN medications. Those with antisocial personality disorder (95.2%) were also prescribed 0-2 prescriptions. These may be an indication of diagnostic uncertainty or a product of the time to diagnosis, or in cases of delay before clarifying all diagnosis. Prescribers may use PRN as they wait to clarify diagnosis or to address concerns of violence by those with a disposition towards antisocial behaviors even when a clinical diagnosis is not yet made.

These call for an evaluation of the unattended use of PRN medication and the rational use of benzodiazepines. Prescribers will reduce side effects in their patients and increase compliance by regular peer review of prescription practice [26].

One of the strengths of this study was the relatively large number of subjects and the vast amount of information available to describe the variation of prescription in three entirely different patient populations. Consistent with the different patient profiles, psychiatrists in these centres prescribed higher doses and multiple medications when not sure of risk or diagnosis. We also had a large number of non-psychotropic medications to compare their use and interactions with psychotropic medications.

The data was limited by its location and one-point data analysis. We also found the need to address certain issues that may negate treatment goals prescribing these medications without due considerations given to their potential adverse effects among other relevant principles of therapeutics. Furthermore, the results of this study are not generalizable pending future replications by our team and others with larger, more divergent settings. Moreover, the patients' population in the three hospitals is not exclusive, and some patients may have been in the each of the hospitals at different times. The difference in prescription practice, therefore, reflects the different setting on the day the survey was taken based on patient and prescriber profiles and preferences. The data is also limited by the lack of exploration in the characteristics, training, qualifications and preferences of the prescribers. Prescribers might, among others, also have encountered limitations such as the presence or absence of medications in the provincial formulary, the hospital's pharmacy and coverage or otherwise for medications, not to mention overt and covert extraneous pressures and their abilities to deal with them.

## Conclusions

Prescription patterns vary between settings based on the prescribers, patients, and system factors. Clinical assessment of the benefits and adverse effects of psychotropic medications should be regularly conducted as a quality improvement factor. A focus on reducing side effects and rationalizing the use of PRNs, such a practice may inadvertently improve compliance. Possible recommendations for improvement in these areas may include, raising more awareness about the rationality and prudence in psychotropic drug prescriptions in psychiatric practice, having regular and occasional medication reviews to discuss case series and updates on issues relating to psychotropic drug usage among inpatients. The practice of having hospital pharmacists may help in this endeavor.

To safeguard patients' health, rights and well-being, it is important that mental health professionals create specific standard operating

procedures (SOP) for prescribing and administering PRN medications, one which may include obtaining patients consent before PRN medication administration [16,17] Therefore, it is recommended that the use of benzodiazepines PRN in psychiatric practice should be standardized to promote its judicious use.

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