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Prescription Patterns of Psychotropic Medications in Child and Adolescent Mental Health Services in Brunei Darussalam

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Abstract

Introduction: The Child and Adolescent Mental Health Services (CAMHS) play a pivotal role in addressing the mental health needs of young individuals. This study examined the prescribing patterns of psychotropic medications in CAMHS outpatient clinics at Kiarong, RIPAS Hospital, Brunei Darussalam for patients seen during 2019. **Materials and Methods**: Data were collected retrospectively for patients under 18 years who attended CAMHS outpatient clinics in 2019. Inclusion criteria comprised those prescribed psychotropic medications, while exclusion criteria included patients 18 years old and above, and those on psychotropics prescribed by non-psychiatric departments. **Results**: Among 292 patients, 97 (33.2%) were prescribed psychotropic medications. Male patients constituted the majority (62.9%), and adolescents (12-18 years) represented 64.9% of the prescribed group. A total of 120 prescriptions were categorised by diagnosis, with antipsychotics (46.7%) and SSRIs (35.8%) being the most common. Polypharmacy was observed in 13.4% of the prescribed group. **Conclusion**: This study highlighted the prescribing patterns of psychotropic medications in the CAMHS outpatient clinics, revealing significant associations with the type of clinical review (new/follow-up), the number of clinicians involved, and the use of non-pharmacological interventions. While most prescriptions adhered to the guidelines, few deviations were noted, including instances of polypharmacy. These findings underscore the need for ongoing evaluation and refinement of prescribing practices to ensure effective treatment.

Keywords: Child Psychiatry, Adolescent Psychiatry, Psychotropic Drugs, Polypharmacy.

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INTRODUCTION

The Child and Adolescent Mental Health Services (CAMHS) constitute a vital component of the broader mental health care landscape, catering specifically to the unique needs of young individuals (below 18 years old). These services play a crucial role in identifying, diagnosing, and treating a spectrum of mental health disorders that may manifest during childhood and adolescence.[1] CAMHS aim to provide holistic, multidisciplinary care, often involving psychiatrists, psychologists, social workers, and other healthcare professionals within government, private, and charity organisations. The challenges in diagnosing and treating mental health conditions in young populations underscore the importance of considering the developmental, social, and familial factors that contribute to mental health concerns in this age group.[2]

The use of psychotropic medications within the CAMHS represents one aspect of the multifaceted approach to child and adolescent mental health care. Psychotropics, including antidepressants, antipsychotics, mood stabilisers, and benzodiazepines may be prescribed to address a range of psychiatric disorders in children and adolescents.[3] The decision to prescribe psychotropic medications in this population is often nuanced, considering factors such as the specific diagnosis, severity of symptoms, and the potential benefits and risks associated with pharmacological interventions.[3] Understanding the patterns of psychotropic medication use in the CAMHS is essential for improving the quality of care provided to young individuals with mental health concerns, ensuring that interventions are evidence-based, safe, and tailored to the unique needs of pediatric patients.

This retrospective descriptive study aims to investigate the complex relationships between patient demographics, clinical characteristics, and the prescription patterns of psychotropic medications within the CAMHS outpatient clinics (OPC), Raja Isteri Pengiran Anak Saleha (RIPAS) Hospital, Brunei Darussalam.

MATERIALS AND METHODS

Sample

The CAMHS at RIPAS hospital consists of child and adolescent psychiatry outpatient clinics run by a consultant and a medical officer and home and school visiting services led by nurses. The study included all children and adolescents who attended the CAMHS OPC at Kiarong, RIPAS hospital, between January 1, 2019, and December 31, 2019.

Inclusion Criteria

Patients aged less than 18 years and attended the CAMHS OPC in 2019 and were prescribed psychotropic medications at any point since their first presentation at the CAMHS OPC, RIPAS hospital.

Exclusion Criteria

1) Patients who turned 18 years and older. 2) Patients prescribed psychotropic medications by departments other than psychiatry.

Data Collection

Retrospective data were collected from the Brunei Health Information Management System (BruHIMS) for all patients who attended the CAMHS OPC in Kiarong between January 1, 2019, and December 31, 2019. Demographic information for the collected sample was reviewed, including all recorded clinical encounters since their first presentation at the CAMHS OPC (not limited to 2019). Data was collected on medication history (dosage and polypharmacy) and non-pharmacological interventions since the first presentation (not limited to 2019). The collected data was entered into Microsoft Excel for organisation and initial processing. Descriptive analysis was conducted using IBM SPSS Statistics, 25th edition, to summarise and interpret the key features of the dataset. Chi-Square test was carried out to highlight significant associations between demographics and clinical characteristics and the decision to prescribe psychotropics. P values of <0.05 are indicative of statistical significance.

This study was conducted as part of the Department of Psychiatry's annual service improvement projects. The original audit aimed to measure the level of accordance of the prescribed psychotropic medications' doses in CAMHS OPC, RIPAS hospital, with the British National Formulary for Children (BNFc). Permission to conduct the audit was obtained from the Head of the Department of Psychiatry, RIPAS hospital.

RESULTS

Demographics

A total of 300 patients attended the CAMHS OPC in 2019, with eight individuals excluded due to age (18 years and above). Among the remaining 292 patients, 33.2% (n=97) were prescribed psychotropic medications at some point during their follow-up. Males constituted the majority of those who did not (64.1%) and

and did (62.9%) receive a prescription for a psychotropic medication, while females represented 35.9% and 37.1%, respectively. Only four children below the age of 5 attended the CAMHS OPC, and just one of them was prescribed a psychotropic. Both gender and age did not show a significant association with the decision to prescribe psychotropic medication (p=0.84 and p=0.86 respectively). This is shown in **Table I**.

Table I - Demographics of patients.

	Non-prescribed (N= 195)	**Prescribed (N= 97)**	**p-value**
	N (%)	N (%)	
Gender			0.84
Male	125 (64.1)	61 (62.9)	
Female	70 (35.9)	36 (37.1)	
Age (Years)			0.86 for trend
<5	3 (1.5)	1 (1)	.
5 to <12	71 (36.4)	33 (34)	
12 to <18	121 (62.1)	63 (64.9)	

Clinical characteristics

In 2019, the distribution between new and follow-up cases attending the CAMHS OPC was nearly balanced, with 143 new cases and 149 follow-up cases. The prescribed group consisted of 39.2% new cases and 60.8% follow-up cases. Most patients were reviewed by a single clinician, comprising 87.7% of the non-prescribed group and 78.4% of the prescribed group. Approximately 80% of the patients, in both groups, underwent review by either a consultant or a senior medical officer (SMO). **Table II** also presents a breakdown of the non-pharmacological interventions administered to patients attending the CAMHS OPC in 2019 with the majority seen by a psychologist/counsellor in both non-prescribed and prescribed groups (31.3% and 38.1%, respectively).

Statistical analysis revealed significant associations between prescribing a psychotropic and the type of review (p-value = 0.02), the number of doctors involved in patient reviews (p=0.04), and the utilisation of non-pharmacological interventions (p=0.004). However, no significant association was observed between prescribing a psychotropic and the level of clinician providing care (p=0.90).

The prescribing rationale – Diagnoses

In total, 120 psychotropic prescriptions were given, including antipsychotics (56 times), selective serotonin reuptake inhibitors (SSRIs) 43 times), methylphenidate (11 times), benzodiazepines (six times), and mood stabilisers (four times). The most prevalent diagnosis leading to psychotropic prescriptions was childhood autism, where nearly half of the cases were prescribed an antipsychotic. Other diagnoses, such as learning disability and Disturbance of activity and attention (ADHD), also resulted in psychotropic prescriptions. (**Table III** categorises individuals based on their prescription status for psychotropic medications and corresponding diagnoses - refer to *Supplementary text*).

Medication's polypharmacy

Table IV shows the data on polypharmacy. Only 13 patients (13.4% of the prescribed group and 4.5% of the whole sample) were found to have more than one psychotropic medication simultaneously. Combinations, such as an antipsychotic with a mood stabiliser, an antipsychotic with a stimulant, or an antipsychotic with an SSRI antidepressant, were prescribed three times. Childhood autism was the most common presentation for concomitant medications (four times), followed by mental retardation (three times) and bipolar affective disorder (twice). (**Table IV**– refer to *Supplementary text*).

Doses of medications against BNFc recommendations

In comparing prescribed psychotropics to BNFc recommendations, 92 prescriptions were within the recommended Therapeutic Range (TR), 13 were below TR, six were above TR, and eight were given as unlicensed medications. Risperidone (54 times), followed by Fluoxetine (23 times), Sertraline (19 times), Methylphenidate (11 times), Sodium Valproate (four times), and Benzodiazepines (five times) were the most frequently used medications. This is shown in **Table V**.

DISCUSSION

The demographics of patients attending the CAMHS OPC in 2019 provided valuable insights into the prevalence and patterns of psychotropic medication prescriptions. Three hundred patients attended the CAMHS

Table II. Clinical characteristics of patients attended CAMHS outpatient clinics in 2019 with and without a prescription for a psychotropic medication.

	Non-prescribed (N= 195) n (%)	Prescribed N= 97) n (%)	p-value
Type of review			**0.02**
New Cases	105 (53.8)	38 (39.2)	
Follow up Cases	90 (46.2)	59 (60.8)	
Reviewed by (Number of doctors)			**0.04**
One clinician	171 (87.7)	76 (78.4)	
Two clinicians or more	24 (12.3)	21 (21.6)	
Reviewed by (doctor's Level)			0.90
Medical Officer	39 (20)	20 (20.6)	
Consultant / Senior Medical Officer	156 (80)	77 (79.4)	
Non-pharmacological interventions			**0.004** for trend
Psychology / Nursing Led Unit (counseling)	61 (31.3)	37 (38.1)	
CDC: Child Developmental Center	8 (4.1)	14 (14.4)	
Occupational Therapy	1 (0.5)	0	
JAPEM: Jabatan Pembangunan Masyarakat (Social Affairs Services Unit)	0	1 (1)	
KRK: Kompleks Rumah Kebajikan (Government rehabilitation facility)	14 (7.2)	0	
Pusat Ehsan (Non government organisation rehabilitation daycare)	1 (0.5)	0	
BACA: Brunei Autism Centre for Adults (Rehabilitation private organisation)	1 (0.5)	2 (2.1)	

OPC where half of them were new cases. The prevalence of prescribing psychotropic medications among the CAMHS patients has been a subject of varying estimates in the literature, ranging from 25% to 90%.[4,5] In the current study, our findings indicate a prevalence of 33.2% which is consistent with the lower end of the reported spectrum. Most of the study population were males, consistent with existing literature indicating potential gender-specific mental health challenges.[4,6]

The age distribution revealed distinct patterns, with most falling within the adolescent age group (12-18 years), both in attendance and prescription rates. This aligns with the developmental aspects of mental health disorders, which often manifest and diagnosed during adolescence.[5,6] However, the low attendance and prescription rates among children below 5 years old and the higher rates in the 5-12 years age group suggest nuanced considerations in paediatric psychotropic prescriptions. These findings highlight the importance of tailoring interventions based on the developmental stages and age-specific mental health challenges.[4,7,8]

Most patients were seen by a consultant or a senior medical officer, and the prescription decisions were primarily made by them. This aligns with the established role of specialists in mental health care and underscores the huge challenges facing them.[4,9] Notably, the prescription rate was higher among patients reviewed by a single clinician compared to those seen by multiple clinicians. This may reflect the potential impact of continuity of care and a consistent therapeutic approach.[10] The study also showed a significant association between psychopharmacological and psychosocial interventions, supporting the notion that combining both approaches is more effective than relying solely on one.[11]

The prescribing rationale based on diagnoses, revealed important insights about a possible linkage between specific mental health conditions and the corresponding pharmacological interventions. Childhood autism, for instance, emerged as a prevailing factor leading to antipsychotic prescriptions, underscoring the challenges in managing behavioural symptoms associated with autism spectrum disorders.[12,13] Learning disability and ADHD also featured prominently in prescription decisions, indicating the complex interplay between psychiatric diagnoses and treatment strategies.[14]

The relatively low incidence of medication polypharmacy (13.4%) compared to the literature[4] shows a cautious approach to combining psychotropic medications in our practice. The combinations observed, especially in cases of Childhood Autism, mental retardation, and bipolar affective disorder, reflect the nuanced and individualised nature of treatment decisions in these populations. These findings align with the

broader discourse on the challenges and benefits of psychotropic medication combinations in paediatric psychiatry.[15,16] Notably, Risperidone emerged as the most frequently prescribed medication, reflecting its common use in paediatric psychiatric conditions.[17]

An evaluation of medication doses against BNFc revealed a predominantly favourable adherence to therapeutic ranges. However, instances of doses below and above the recommended range underscore the complexity of administering and monitoring psychotropic medications in children and adolescents as many of these medications are used "off-label" with differences between the well-known guidelines.[18] Nevertheless, this finding highlights potential areas for improvement in achieving optimal therapeutic outcomes.

Despite these valuable insights, several limitations should be acknowledged. The retrospective nature of the study limited the establishment of causality, and the sample size may impact generalisability. Further research, including prospective studies and larger cohorts, is warranted to corroborate and extend these findings. Additionally, more education among clinicians about medication use and recommended doses to ensure more adherence to the established recommendations.

Based on this study's findings, several recommendations can be proposed to enhance clinical practice and prescribing standards in the CAMHS OPC services. First, regular multidisciplinary case discussions should be encouraged to promote shared decision-making, as most patients were seen by a single clinician, a factor significantly associated with prescribing patterns. Second, despite general adherence to therapeutic ranges and a low rate of polypharmacy, observed deviations highlight the need for ongoing professional development and clearer local guidelines to support safe prescribing. Additionally, condition-specific prescribing protocols for common diagnoses such as autism spectrum disorder, ADHD, and learning disabilities should be developed to standardise care. Third, integration and availability of non-pharmacological interventions should be strengthened, given their association with psychotropic prescribing and their key role in holistic patient care. Finally, regular monitoring of prescribing patterns and guideline adherence are recommended, alongside further prospective studies with larger cohorts to validate these findings and assess the impact of prescribing on clinical outcomes.

CONCLUSION

This study highlights the prescribing patterns of psychotropic medications in the CAMHS OPC at RIPAS Hospital, Brunei Darussalam. Psychotropic medications were prescribed in 33.2% of cases, with antipsychotics (46.7%) and SSRIs (35.8%) being the most frequently used. Significant associations were identified between the type of review (new vs. follow-up), the number of clinicians involved, and the implementation of non-pharmacological interventions. Most prescriptions aligned with established therapeutic guidelines; however, some deviations were observed. Notably, only 13.4% of patients on psychotropic medication were found to be on polypharmacy. These findings underscore the importance of ongoing evaluation and optimisation of prescribing practices to ensure safe and effective treatment for this population.

Abbreviations

ASD	Autism spectrum disorder
CAMHS	Child and Adolescent Mental Health Services
OPC	Outpatient clinic
CDC	British National Formulary for Children
GFCF	Gluten-free and Casein-free

Declarations

Conflict of interests

The authors declare no conflict of interests.

Ethical Statement

The study was a retrospective study that used data collected for an annual service improvement project and was conducted following the codes of conduct as stated in the Declaration of Helsinki.

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References

1. Dahlan R, Abd Ghani MN, Yahaya R, Tuan Hadi TS. Child and Adolescent Mental Health Service (CAMHS), Terengganu, Malaysia: milestones so far and the paths to the future. London J Prim Care. 2018;10:113–7.
2. Radez J, Reardon T, Creswell C, et al. Why do children and adolescents (not) seek and access professional help for their mental health problems? A systematic review of quantitative and qualitative studies. Eur Child Adolesc Psychiatry. 2021;30:183-211.
3. Steinhausen HC. Recent international trends in psychotropic medication prescriptions for children and adolescents. Eur Child Adolesc Psychiatry. 2014 ;24:635–40.

4. Halpin C, Whyte I, McCarthy S. Prescribing in Child and Adolescent Mental Health Services (CAMHS): Results from July – December 2021. National Audit. Available from https://www.hse.ie/eng/services/list/4/mental-healthservices/camhs/publications. (Accessed 6th December 2023).
5. Dean AJ, McDermott BM, Marshall RT. Psychotropic Medication Utilization in a Child and Adolescent Mental Health Service. J Child Adolesc Psychopharmacol. 2006;16:273–85.
6. Raghavan R, Zima BT, Andersen RM, Leibowitz AA, Schuster MA, Landsverk J, et al. Psychotropic medication use in a national probability sample of children in the child welfare system. J Child Adolesc Psychopharmacol. 2005;15:97-106.
7. Goodwin R, Gould MS, Blanco C, Olfson M. Prescription of Psychotropic Medications to Youths in Office-Based Practice. Psychiatr Serv. 2001;52:1081-7.
8. Acquaviva E, Legleye S, Auleleye GR, Deligne J, Carel D, Falissard B, et al. Psychotropic medication in the French child and adolescent population: prevalence estimation from health insurance data and national self-report survey data. BMC Psychiatry. 2009;9:72.
9. Doody N, O'Connor C, McNicholas F. Consultant psychiatrists' perspectives on occupational stress in child and adolescent mental health services (CAMHS). Irish J Med Sci. 2022;191:1105-13.
10. O'Malley AS. Current evidence on the impact of continuity of care. Curr Opin Pediatr. 2004;16:693–699.
11. Cautin RL, Lilienfeld SO, editors. The Encyclopedia of Clinical Psychology. 2014.
12. Toro J, Mur M, Cantó TJ. Psychiatric treatments for children and adolescents preferred by Spanish psychiatrists. Eur J Psychiatry. 2006;20:231-41.
13. Beauvois L, Kverno K. Challenges in Treating Children With Autism Spectrum Disorder: Implications for Psychiatric-Mental Health Nurse Practitioners. J Psychosoc Nurs Ment Health Serv. 2020;58:7–12.
14. Perera B, Chen J, Korb L, Borakati A, Courtenay K, Henley W, et al. Patterns of comorbidity and psychopharmacology in adults with intellectual disability and attention deficit hyperactivity disorder: a UK national cross-sectional audit. Expert Opin Pharma other. 2021;22:1071–8.
15. Wolraich ML. Annotation: The use of psychotropic medications in children: an American view. J Child Psychol Psychiatry. 2003;44:159–68.
16. Jureidini J, Tonkin A, Jureidini E. Combination pharmacotherapy for psychiatric disorders in children and adolescents: prevalence, efficacy, risks and research needs. Paediatr Drugs. 2013;15:377–91.
17. Rafaniello C, Sullo MG, Carnovale C, Pozzi M, Stelitano B, Radice S, et al. We Really Need Clear Guidelines and Recommendations for Safer and Proper Use of Aripiprazole and Risperidone in a Pediatric Population: Real-World Analysis of EudraVigilance Database. Frontiers in Psychiatry. 2020;11.
18. Shahidullah JD, Roberts H, Parkhurst J, Ballard R, Mautone JA, Carlson JS. State of the Evidence for Use of Psychotropic Medications in School-Age Youth. Children [Internet]. 2023;10:1454.

Table III. Diagnoses for patients attended CAMHS outpatient clinics in 2019 who did and did not receive a prescription for a psychotropic medication.

[*]Diagnosis (Number of Prescribed/ Total diagnosed)	Medications [1]				
	SSRI	Anti-psychotic	Mood Sta-biliser	Stimulant	BZD
Schizophrenia (4/4)	-	4	-	-	-
Depressive episode (7/10)	8	-	-	-	-
Moderate depression (1/2)	1	-	-	-	-
Severe depression with psychotic symptoms (2/2)	3	-	-	-	
Bipolar affective disorder (1/1)	1	1	-	-	1
Panic (1/1)	1	-	-	-	-
Mixed anxiety and depressive disorder (5/6)	5	-	-	-	-
Anxiety disorder, unspecified (4/6)	4	-	-	-	1
Obsessive-compulsive disorder (4/5)	5	1	-	-	-
Adjustment disorder (3/13)	4	-	-	-	1
Dissociative (conversion) disorders (1/3)	1	-	-	-	-
Personality disorder (4/4)	3	1	-	-	-
Trichotillomania (1/4)	1	-	-	-	-
Mental retardation (4/9)	1	4	1	-	1
Specific developmental disorders of speech and language/ Scholastic skills (12/50)	2	9	2	1	-
Childhood autism (31/64)	1	28	1	4	1
Disturbance of activity and attention (10/19)	-	6	-	6	-
Oppositional defiant disorder (1/9)	-	1	-	-	-
Social anxiety disorder of childhood (1/1)	2	-	-	-	1
Total (N=97/213)	**43**	**56**	**4**	**11**	**6**
[**]Diagnoses without prescribed medications (79)					

[1]Medications included: SSRIs (Fluoxetine=23, Sertraline=19, Fluvoxamine=1), antipsychotics (Risperidone=54, Olanzapine=1, Quetiapine=1), mood stabilisers (Sodium Valproate=4), stimulants (Methylphenidate), BZD (Benzodiazepines).

(N.B): Some patients were tried on multiple medications and some were on polypharmacy.

[*]Diagnoses according to ICD-10

[**]Diagnoses without prescribed medications: Mental and behavioural disorders due to use of other stimulants, including caffeine (N=2), Non-organic hypersomnia (N=1), Habit and impulse disorder (N=1), Asperger syndrome (N=2), Conduct disorder (N=8), Selective mutism (N=8), No mental illness (N=55), No recorded notes (N=2).

Table IV. Medication polypharmacy among patients who received a prescription for a psychotropic medication.

Diagnosis	Medications[1]					
	Antipsychotic + Mood stabiliser	Antipsychotic + Stimulant	Antipsychotic + BZD	Antipsychotic + SSRI	SSRI + BZD	SSRI + Mood stabiliser
Childhood autism	1	2	1	-	-	-
Disturbance of activity and attention	-	1	-	-	-	-
Obsessive-compulsive disorder	-	-	-	1	-	-
Bipolar affective disorder	-	-	1	1	-	-
Severe depression with psychotic symptoms	-	-	-	-	-	-
Anxiety disorder, unspecified	-	-	-	-	1	-
Adjustment disorder	-	-	-	-	-	-
Mental retardation	1	-	-	1	-	1
Specific developmental disorders of speech and language/ Scholastic skills	1	-	-	-	-	-
Total	**3**	**3**	**2**	**3**	**1**	**1**

N.B: Total Number of patients on polypharmacy=13 which resembles 13.4% of the prescribed group and 4.5% of the whole sample.

[1]Medications included: SSRIs (Fluoxetine=23, Sertraline=19), antipsychotics (Risperidone=54, Olanzapine=1), mood stabilisers (Sodium Valproate=4), stimulants (Methylphenidate), BZD (Benzodiazepines).

Table V. Doses of psychotropic medications prescribed for patients against the BNFc recommendations.

Medication	*ATR	*WTR	*BTR	*UL
Fluoxetine	-	23	-	-
Sertraline	-	18	1	-
Fluovoxamine	-	1	-	-
Risperidone	5	49	-	-
Olanzapine	-	-	1	-
Quetiapine	-	-	-	1
Sodium Valproate	-	-	-	4
Methylphenidate	-	-	11	-
Lorazepam	-	1	-	-
Clonazepam	1	-	-	2
Alprazolam	-	-	-	1
Total	**6**	**92**	**13**	**8**

*ATR (Above Therapeutic Range), WTR (Within Therapeutic Range), BTR (Below Therapeutic Range), UL (Unlicensed).