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Analysis of Antipsychotic Drug Utilization Patterns in Schizophrenia Patients at the Regional Psychiatric Hospital Kolonel H. M. Syukur Jambi

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Abstract

Schizophrenia is a severe mental disorder marked by psychotic symptoms such as delusions, hallucinations, and disorganized behavior, significantly affecting daily functioning. Antipsychotic medications are the mainstay of treatment, aiming to manage symptoms and prevent relapse. This study aimed to analyze the comprehensive utilization pattern of antipsychotic medications including quantification via the ATC/DDD method, identification of core prescriptions (DU 90% method), and description of patient characteristics among outpatients with schizophrenia at the Regional Psychiatric Hospital Kolonel H. M. Syukur Jambi in 2024. A retrospective descriptive study was conducted using secondary data from medical records, utilizing total sampling. A total of 2,088 patients met the inclusion criteria and were analyzed using the WHO's ATC/DDD and DU 90% methods. The results showed total antipsychotic consumption of 5.87 DDD/patient/day. Atypical antipsychotics were used more frequently (3.34 DDD; 56.94%) than typical antipsychotics (2.53 DDD; 43.06%). The DU 90% segment included seven antipsychotics accounting for 90.52% of total use, led by olanzapine, fluphenazine decanoate, and risperidone/haloperidol. This prescribing pattern, combined with the finding that the majority of patients were young adult males diagnosed most often with Unspecified Schizophrenia (F20.9), indicates a rational approach to pharmacotherapy that aligns with current clinical guidelines.
Keywords: ATC/DDD, DU 90%, Outpatient.

Introduction

Mental health disorders remain a major global concern, with Schizophrenia representing one of the most severe and disabling psychiatric conditions. According to the World Health Organization (WHO), one in four individuals worldwide is expected to experience mental or neurological disorders at some point in life, and over 450 million people currently live with

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such conditions, making them among the leading causes of disability globally (Trishna & Muhdi, 2020).

Schizophrenia is characterized by significant distortions in thinking, perception, and behavior, including delusions and hallucinations, which can severely impair social, occupational, and personal functioning. Furthermore, people with schizophrenia frequently face stigma, discrimination, and violations of human rights. Despite its burden, WHO reports that over two-thirds of people with schizophrenia do not receive specialized mental health services, and only one-third have the potential for full recovery (Kemenkes RI, 2024).

In Indonesia, the 2023 National Health Survey reported that 4 out of every 1000 households have members exhibiting symptoms of psychosis or schizophrenia, with 3 per 1000 having been diagnosed. Jambi Province recorded a prevalence of 2.8 per 1000 households, slightly below the national average (Kemenkes RI, 2024). The Regional Mental Hospital Kolonel Haji Muhammad Syukur in Jambi is the only specialized psychiatric hospital in the province and provides outpatient services for mental illness. In recent years, outpatient visits by patients with schizophrenia dominated the service load, with over 30% of total outpatient visits from 2022 to 2024 attributed to this diagnosis. The hospital data from 2023 showed that schizophrenia (including unspecified types) was the most frequent diagnosis in the top ten mental health conditions treated on an outpatient basis.

Antipsychotics are the mainstay in the management of schizophrenia, aimed at alleviating psychotic symptoms and preventing relapse. Optimal use of antipsychotic medications requires proper drug selection and utilization, guided by evidence-based standards. To evaluate and monitor drug consumption, the Anatomical Therapeutic Chemical/Defined Daily Dose (ATC/DDD) methodology developed by the WHO is widely used. This method quantifies drug use in comparable units, allowing for benchmarking across different settings and time periods. Additionally, the Drug Utilization 90% (DU 90%) method allows the identification of the most frequently used medications, covering 90% of total drug use, thereby highlighting prescribing patterns and potential areas for optimization (WHO & NIPH, 2024).

Numerous drug utilization studies worldwide have employed methods such as the WHO Prescribing Indicators and analysis of Antipsychotic Utilization (AU) to assess prescribing patterns in schizophrenia. Studies have consistently demonstrated a global trend toward the preferential use of atypical antipsychotics due to their improved side-effect profiles. For instance, a retrospective study conducted in a tertiary care teaching hospital in India (Mogali & Kotinatot, 2020) found that atypical antipsychotics accounted for 85.7% of all

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prescriptions. In this study, olanzapine was the most commonly prescribed drug (75%), followed by risperidone (10.7%), with an average of 3.26 drugs per prescription. Similarly, research in another tertiary care center in Kerala, India (Munjely et al., 2019) also showed a higher prescription rate for newer antipsychotics (55.2%) compared to older agents. In this setting, olanzapine was the most frequently prescribed atypical agent (20.9%), while haloperidol was the most common typical agent (22.9%). These international findings collectively underscore the critical need for periodic drug utilization reviews particularly in a regional setting like Jambi, Indonesia to monitor prescribing trends, assess the extent of polypharmacy, and ensure prescribing practices align with rational and cost-effective pharmacotherapy guidelines.

Previous research at at the Regional Psychiatric Hospital Kolonel Haji Muhammad Syukur covering the period (2018–2021) reported higher usage of atypical antipsychotics compared to typical ones, with risperidone and olanzapine being the most commonly used agents (Fatihah et al., 2023). This prior analysis, utilizing the DDD/Patient/Day metric, found that atypical antipsychotic use was higher than typical ones, ranging from 7.15–9.16 vs. 1.69–3.91 DDD/Patient/Day, respectively. Similar findings were observed in a study from Gujarat, India, where the DU 90% segment was dominated by olanzapine, risperidone, clozapine, and trifluoperazine (Shah et al., 2019).

While prior research by (Fatihah et al., 2023) provided a valuable longitudinal drug utilization analysis covering 2018 to October 2021 using DDD/Patient/Day , a crucial update is warranted. The previous study focused on aggregated trends over a four-year period and was limited by the available data on patients with chronic unstable conditions from BPJS claims, without specific diagnosis data for schizophrenia. The healthcare landscape, national formulary, and clinical practices have likely evolved significantly since 2021. Therefore, this study is essential to provide a timely and focused assessment of current prescribing quality by analyzing the utilization patterns over the most recent one-year period of 2024. Crucially, this study will integrate the Drug Utilization 90% (DU 90%) method a standard tool for identifying core prescribing practices with the ATC/DDD quantification specifically within the current context of outpatients diagnosed with schizophrenia at at the Regional Psychiatric Hospital Jambi. This updated and targeted analysis is vital for identifying contemporary trends, evaluating drug rationality against current standards, and providing actionable insights for hospital management and formulary decision-making.

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This study, therefore, aims to analyze the current utilization pattern of antipsychotic medications among outpatients with schizophrenia at at the Regional Psychiatric Hospital Kolonel Haji Muhammad Syukur in 2024. Specifically, it seeks to: (1) quantify antipsychotic use in DDD/patient/day using the ATC/DDD method, (2) identify drugs included in the DU 90% segment, and (3) describe the characteristics of patients with schizophrenia treated in the outpatient setting.

Material and Methods

Research Design

This study employed a retrospective descriptive design, analyzing secondary data sourced from the hospital's medical records. Ethical clearance was obtained from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Jambi, with approval number 834/UN21.8/PT.01.04/2025. The sampling technique used was total sampling, ensuring all eligible patients meeting the defined inclusion criteria were included in the analysis.

Study Location and Period

The study was conducted at the Regional Mental Hospital Kolonel Haji Muhammad Syukur, Jambi Province. The research period was from January to April 2025.

Population and Sample

The study population comprised all outpatients formally diagnosed with schizophrenia (ICD-10 code F20.x) who received antipsychotic medication services at the Regional Mental Hospital Kolonel H. M. Syukur, Jambi Province, throughout the entire year of 2024. Hospital records indicated that the total population of schizophrenia patients recorded during this period was 2,270 patients. A total sampling technique (or saturated sample) was employed, including all eligible subjects from the population as the sample. No separate sample size calculation formula was utilized, as this technique ensured the analysis of the entire eligible population.

The selection of the final sample was governed by strict inclusion and exclusion criteria. Inclusion criteria stipulated patients aged 18 to 65 years, diagnosed with schizophrenia (F20.x), who had received at least one antipsychotic prescription, and possessed complete medical records. Conversely, patients were subjected to exclusion criteria if their prescribed antipsychotics lacked Defined Daily Dose (DDD) codes as defined by the WHO Collaborating Centre for Drug Statistics Methodology, or if their medical records were incomplete or

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illegible. Following the application of these criteria, the final study sample size analyzed was 2,088 patients.

Variables

The variables obtained from medical records included drug name, dosage strength, quantity of drug, duration of use, dosage form, and patient characteristics (gender, age, occupation, diagnosis, highest education level, and marital status). Derived variables based on this data included antipsychotic classification and Defined Daily Dose (DDD)/Patient/Day. The DDD/Patient/Day variable was calculated for each antipsychotic using the following formula:

$$\text{DDD/patient/day} = \frac{\text{Number of Drugs} \times \text{Strength of Dosage Form}}{DDD\ Value \times \text{Total Days of Treatment}}$$

DDD values were obtained from the website *https://www.whocc.no/atc_ddd_index* based on the drug name and route of administration.

Data Processing

Data processing was conducted using Microsoft® Excel. The DDD/Patient/Day for each formulation was summed based on the generic name of the antipsychotic. Patient characteristics were analyzed univariately to describe the distribution of patients by gender, age, occupation, diagnosis, highest education level, and marital status.

Results and Discussion

Demographic and Socioeconomic Profile

Out of 2,270 outpatients with schizophrenia recorded during the study period, 2,088 met the inclusion and exclusion criteria and were included in further analysis. The demographic and clinical characteristics of these patients are presented in Table 1.

Table 1. Demographic and Socioeconomic Profile

Variable	Frequency	
	N	%
Gender		
Male	1398	**66.95**
Female	690	**33.05**
Age		
18-39 years	1131	**54.17**
40-60 years	856	**41.00**
>60 years	101	**4,84**
Occupation		
Civil Servant	117	**5.60**
Self-employed	226	**10.82**

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Variable	Frequency	
	N	%
Private Employee	268	**12.84**
Unemployed	979	**46.89**
Others	498	**23.85**
Education Level		
No formal education	342	**16.38**
Elementary School	468	**22.41**
Junior High School	394	**18.87**
Senior High School	692	**33.14**
Diploma I/II	4	**0.19**
Academy/Diploma Iii/Associate Degree	31	**1.48**
Bachelor's Degree	144	**6.90**
Master's Degree	5	**0.24**
Doctoral Degree	8	**0.38**
Marital Status		
Married	759	**36.35**
Single	1072	**51.34**
Divorced	257	**12.31**

The majority of patients were male (66.95%), indicating that schizophrenia is more prevalent in men than in women. This aligns with previous studies reporting male dominance in schizophrenia cases, with one study showing male patients outnumbering females by a 2:1 ratio (Putri & Evi, 2023). Biologically, men are more vulnerable due to the absence of protective effects from hormones such as estrogen and oxytocin, which are present in females and play roles in modulating stress and psychotic symptoms (Hawari, 2021; Wulandari & Febriana, 2023). Moreover, women tend to seek help earlier and possess stronger social support, while men are more likely to delay treatment, increasing the risk of chronicity (Luo et al., 2020).

The analysis showed that the highest proportion of schizophrenia cases occurred in the 18–39 years age group, accounting for 54.17% of all patients. This finding supports the understanding that young adulthood is the most vulnerable phase for the onset of schizophrenia. An earlier age of illness onset has consistently been reported in males compared to females, with a difference ranging from 1 to 10 years. A peak of onset has been described in males in their early- to mid-twenties, while in females it has been reported in their late-twenties (Giordano et al., 2021). The 18–39 age range is a critical transitional period, often marked by demands such as building a career, forming a family, and facing social and economic pressures. These psychosocial stressors can act as triggers for psychiatric disorders, including

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schizophrenia, especially in individuals with biological vulnerability or a high level of psychological stress (Buhar et al., 2023).

The study found that 46.89% of patients with schizophrenia were unemployed. This reflects the common impact of schizophrenia on social and occupational functioning, as cognitive impairments, low motivation, and poor interpersonal skills hinder the ability to maintain employment. Unemployment may also worsen mental health by disrupting daily structure and reducing social and economic support (Hawari, 2021). Previous studies have similarly reported high unemployment rates among schizophrenia patients (Ginting et al., 2024; Wulandari & Febriana, 2023), with extended unemployment linked to poor psychological adjustment (Hasanah & Rozali, 2021). These findings highlight the importance of psychosocial rehabilitation to support patients' return to productive roles.

Most patients were senior high school graduates (33.11%). This reflects the typical onset age of schizophrenia, which often interrupts educational attainment during adolescence or early adulthood. Cognitive impairment and motivational decline in the prodromal phase may also hinder academic achievement. Previous reports similarly found that the majority of patients with schizophrenia had secondary-level education (Ginting et al., 2024). This underlines the importance of targeted mental health literacy interventions for populations with middle to low educational backgrounds.

More than half of the patients were unmarried (51.34%). Schizophrenia can severely disrupt social functioning, making it difficult to establish or maintain intimate relationships. Communication difficulties, flattened affect, and delusional thinking reduce relationship quality and stability (Hawari, 2021). Studies have shown that being unmarried is associated with a higher risk of developing schizophrenia and a poorer prognosis (Buhar et al., 2023; Wulandari & Febriana, 2023). Marital status may serve as a protective factor by providing emotional support and facilitating better adherence to treatment.

Clinical Diagnosis

The distribution of clinical diagnoses among the 2,088 study patients is comprehensively presented in Table 2.

Table 2. Clinical Diagnosis

Diagnosis	Frequency	
	N	%
Paranoid Schizophrenia	490	**19.27**
Hebephrenic Schizophrenia	17	**0.67**

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Catatonic Schizophrenia	29	**1.14**
Undifferentiated Schizophrenia	11	**0.43**
Post-schizophrenic Depression	4	**0.16**
Residual Schizophrenia	3	**0.12**
Other Schizophrenia	0	**0.00**
Unspecified Schizophrenia	1989	**78.21**

The most common diagnosis was undifferentiated schizophrenia (F20.9), comprising 78.22% of cases. This diagnosis is applied when a patient's symptoms do not clearly fit any specific subtype, or when multiple subtype features coexist. It is also used when diagnostic information is incomplete, often due to communication barriers or severe cognitive disorganization in psychotic episodes (Hawari, 2021). Similar findings were reported by Soeharto Heerdjan Mental Hospital, where more than half of patients were classified under F20.9 (Putri & Evi, 2023). The high prevalence of this diagnosis highlights the complexity of clinical presentations and the challenges in precise subtype classification in routine care.

Defined Daily Dose (DDD) per Patient per Day

Defined Daily Dose (DDD) represents the assumed average maintenance dose per day for a drug used for its main indication in adults. It is a technical unit to standardize drug utilization at the population level, not intended for assessing individual therapeutic adequacy (WHO & NIPH, 2024). In this study, the DDD was calculated using prescription data from each patient's most recent outpatient visit in 2024 to minimize bias from repeat prescriptions.

The results (Table 2) show that the total antipsychotic use reached 5.87 DDD/patient/day, with atypical antipsychotics accounting for 3.34 DDD/patient/day (56.94%), while typical antipsychotics constituted 2.53 DDD/patient/day (43.06%). These findings are consistent with previous data from the Regional Psychiatric Hospital Kol. H.M. Syukur Jambi (2018–2021), where atypical antipsychotics were also predominant, with a DDD range of 7.15–9.16 compared to 1.69–3.91 for typical antipsychotics (Fatihah et al., 2023).

Table 3. Defined Daily Dose (DDD) per Patient per Day

Antipsychotic Agent	DDD/Patient/Day	Percentage
Typical Antipsychotics		
Fluphenazine decanoate	0.82	**14.05%**
Haloperidol	0.76	**12.92%**
Chlorpromazine	0.50	**8.52%**
Trifluoperazine	0.44	**7.57%**
Total	**2.53**	**43.06%**
Atypical Antipsychotics		

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Olanzapine	1.18	**20.05%**
Risperidone	0.76	**12.93%**
Aripiprazole	0.67	**11.37%**
Quetiapine	0.63	**10.68%**
Clozapine	0.11	**1.91%**
Total	**3.34**	**56.94%**

The dominance of atypical antipsychotics reflects the evolving paradigm in schizophrenia management, emphasizing improved tolerability and broader efficacy, especially for negative and cognitive symptoms. These agents, such as risperidone and olanzapine, act on both dopaminergic (D2) and serotonergic (5-HT2A) pathways, which may contribute to cognitive improvement and reduced extrapyramidal symptoms (Surbakti et al., 2022). Some atypical agents also interact with 5-HT1A, 5-HT7 receptors and enhance brain-derived neurotrophic factor (BDNF), supporting neuroplasticity and recovery (Meltzer & Gadaleta, 2021).

Nonetheless, the use of typical antipsychotics remains relevant, particularly for acute psychotic episodes requiring rapid control of positive symptoms. Haloperidol, for instance, provides fast-acting relief for agitation, hallucinations, and delusions (Cahaya et al., 2021). Intramuscular formulations are often employed during psychiatric emergencies due to their prompt onset of action.

However, typical antipsychotics are associated with a higher risk of adverse effects, including extrapyramidal symptoms, tardive dyskinesia, and cardiovascular complications, thereby limiting their long-term use (Cahaya et al., 2021). These results are in line with global prescribing trends that favor atypical antipsychotics for long-term management, especially in patients with poor adherence, functional impairment, or vulnerability to motor side effects.

These findings support the continued shift toward atypical antipsychotics as the preferred option for maintenance treatment in schizophrenia, highlighting their favorable side effect profile and improved patient adherence compared to typical antipsychotics.

Drug Utilization 90% (DU 90%) Segment

Drug Utilization 90% (DU 90%) is a method used to identify the most frequently used medications based on Defined Daily Dose (DDD) volume. It represents the core drugs used in clinical practice and serves as a focus for evaluating the rationality of drug use in healthcare settings. In this study, seven out of nine antipsychotics accounted for 90.52% of total use,

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indicating a therapeutic focus on a select group of medications deemed effective, tolerable, and widely used.

Table 4. Drug Utilization 90% (DU90%) Segment

Antipsychotic Agent	DDD/Patient/Day	% DDD	% Cumulative
Olanzapine	1.18	**20.10**	20.10
Fluphenazine decanoate	0.82	**13.97**	34.07
Haloperidol	0.76	**12.95**	47.02
Risperidone	0.76	**12.95**	59.96
Aripiprazole	0.67	**11.41**	71.38
Quetiapine	0.63	**10.73**	82.11
Chlorpromazine	0.50	**8.52**	90.63
Trifluoperazine	0.44	**7.50**	98.12
Clozapine	0.11	**1.87**	100.00

Olanzapine was the most frequently used antipsychotic, with a utilization of 1.18 DDD/patient/day (20.10%). As an atypical antipsychotic, olanzapine acts on both dopaminergic (D2) and serotonergic (5-HT2A and 5-HT1A) systems, allowing it to treat both positive and negative symptoms while also improving cognitive function (Cahaya et al., 2021). Its relatively mild side effect profile and higher metabolic tolerance, especially among patients aged 18–39 years, support its role as a first-line therapy (Huhn et al., 2019). Furthermore, olanzapine's broad efficacy is well-suited for patients with undifferentiated schizophrenia (F20.9), a common diagnosis in this population, due to its ability to manage diverse and overlapping symptoms (Cahaya et al., 2021).

Fluphenazine decanoate, a typical depot antipsychotic, was the second most used, with 0.82 DDD/patient/day (13.97%). It is typically preferred in outpatient care for patients with low adherence to oral medication. Depot formulations have been shown to lower relapse and rehospitalization rates compared to oral agents (Correll et al., 2021; Indriani et al., 2020). However, due to its long-acting nature, fluphenazine decanoate is generally preceded by an oral stabilization phase to confirm tolerability and determine an effective dose before transitioning to the injectable form (Krishna et al., 2024).

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Risperidone and haloperidol followed, each contributing 0.76 DDD/patient/day (12.95%). Risperidone, an atypical antipsychotic, is widely used due to its balanced efficacy in treating positive and negative symptoms and its relatively mild extrapyramidal side effects. In addition, long-term clinical use has demonstrated that the risk and severity of extrapyramidal symptoms associated with risperidone tend to diminish over time in adult patients, indicating a more favorable tolerability profile in chronic management (Sánchez et al., 2023). This is consistent with usage trends in previous studies conducted at the Regional Psychiatric Hospital Kol. H. M. Syukur Jambi during 2018–2021 (Fatihah et al., 2023). Meanwhile, haloperidol, a typical antipsychotic, continues to play a critical role in the management of acute psychotic symptoms, especially agitation, due to its rapid symptom control (Cahaya et al., 2021). In patients with undifferentiated schizophrenia (F20.9) presenting prominent positive symptoms such as hallucinations or delusions, haloperidol is often used for initial stabilization.

Aripiprazole ranked fifth, with a usage rate of 0.67 DDD/patient/day (11.41%). It has a favorable metabolic profile, making it suitable for patients with comorbidities like diabetes or metabolic syndrome (Cahaya et al., 2021). Aripiprazole functions as a partial agonist at dopamine D2 and serotonin 5-HT1A receptors, and as an antagonist at 5-HT2A receptors, offering flexible therapeutic potential, especially for patients with mood-related symptoms. This flexibility is particularly relevant in undifferentiated schizophrenia (F20.9), which often presents a mix of mood and psychotic features (Orzelska-Gorka et al., 2022).

Quetiapine, at 0.63 DDD/patient/day (10.73%), is another atypical antipsychotic included in the DU 90% segment. Known for its sedative effects, quetiapine is often selected for patients experiencing insomnia or significant affective symptoms (Lin et al., 2023). However, its use should be carefully monitored due to the risk of metabolic side effects such as weight gain and increased lipid levels.

Chlorpromazine was the seventh drug in the DU 90% group, with a utilization of 0.50 DDD/patient/day (8.52%). Although it is a typical antipsychotic, it remains in use due to its sedative properties, which are helpful in managing acute agitation. However, its frequent dosing schedule and higher risk of extrapyramidal side effects limit its practicality, especially in outpatient settings. Its use in undifferentiated schizophrenia tends to be restricted to acute phases due to limited efficacy for negative or cognitive symptoms (Mancini et al., 2025).

Outside of the DU 90% segment, trifluoperazine (0.44 DDD/patient/day, 7.50%) and clozapine (0.11 DDD/patient/day, 1.87%) remain clinically relevant. Trifluoperazine's use is limited due to a high risk of extrapyramidal side effects and a complex dosing schedule

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(Hutagaol et al., 2023). Meanwhile, clozapine is reserved for treatment-resistant schizophrenia. Its low utilization is primarily attributed to the need for regular hematologic monitoring due to the risk of agranulocytosis. Despite these limitations, clozapine remains an essential therapeutic option for patients who fail to respond to at least two other antipsychotics, offering significant benefits in reducing severe symptoms and suicide risk (American Psychiatric Association, 2020; Meltzer & Gadaleta, 2021).

These results align with evidence-based guidelines recommending second-generation antipsychotics (SGAs) such as olanzapine, risperidone, aripiprazole, and quetiapine as preferred agents in outpatient schizophrenia management due to their lower risk of extrapyramidal symptoms (American Psychiatric Association, 2020; Kemenkes RI, 2021). The continued use of selected first-generation agents like haloperidol and fluphenazine decanoate highlights their role in acute or adherence-challenged cases.

In summary, the DU90% analysis at the Regional Psychiatric Hospital Kol. H. M. Syukur Jambi in 2024 highlights a therapeutic preference toward antipsychotics with a balance of efficacy, tolerability, and patient adherence potential. This pattern supports rational prescribing practices consistent with current international treatment standards.

Conclusion

Based on the analysis of antipsychotic utilization patterns among 2,088 outpatients with schizophrenia at the Regional Psychiatric Hospital Kolonel Haji Muhammad Syukur Jambi in 2024, the total antipsychotic consumption was 5.87 DDD/patient/day, with atypical agents dominating (56.94%) total use. The DU 90% segment was concentrated on seven core drugs, led by Olanzapine and long-acting Fluphenazine Decanoate, affirming a rational prescribing trend aligned with clinical guidelines. Patient data described a vulnerable profile of predominantly male young adults diagnosed most often with Unspecified Schizophrenia (F20.9), who displayed high rates of unemployment and unmarried status. Furthermore, further research is necessary to evaluate the rationality of polypharmacy and link drug utilization patterns to long-term clinical outcomes via comprehensive database integration.

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