

PSYCHOTROPIC POLYPHARMACY AT PSYCHIATRIC DISCHARGE – PATTERNS OF BENZODIAZEPINE, Z-HYPNOTIC AND ANTIPSYCHOTIC CO-PRESCRIPTION

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Abstract

Psychotropic polypharmacy at discharge from Romanian psychiatric wards has rarely been quantified. We analysed pseudonymised discharge documents from an adult psychiatric ward in Timișoara, Romania. Medications were extracted with a large language model-assisted pipeline, completed by a dictionary search of the discharge text, mapped to international non-proprietary names and grouped by class. Of 1,391 adult eligible episodes, 1,245 (89.5%) listed at least one psychotropic. The median number of distinct psychotropic substances was 5 (interquartile range 4 - 6); 92.1% of episodes listed three or more. Benzodiazepines appeared in 86.4% of regimens, Z-hypnotics in 75.0% and both together in 69.8%. Antipsychotic polypharmacy affected 41.7% of antipsychotic-treated episodes and was associated with long-acting injectable formulations, mood stabiliser co-prescription and male sex. Antipsychotics appeared in 65.1% of non-psychotic depressive episodes. Extraction was not validated against source documents; indication, dose and duration were unavailable, so the estimates describe listed regimens, not their appropriateness.

Rezumat

Polifarmacia psihotropă la externare a fost rar cuantificată în România. Am analizat documente de externare pseudonimizate dintr-o secție de psihiatrie a adultului din Timișoara. Medicația a fost extrasă automat, cu un model lingvistic și o căutare pe dicționar în text, transpusă în denumiri comune internaționale și grupată pe clase. Dintre 1.391 episoade eligibile, 1.245 (89,5%) aveau cel puțin un psihotrop. Mediana substanțelor distincte a fost 5 (interval intercuartil 4 - 6); 92,1% dintre episoade aveau cel puțin trei. Benzodiazepinele au apărut în 86,4% dintre scheme, hipnoticele Z în 75,0%, ambele împreună în 69,8%. Polifarmacia antipsihotică a afectat 41,7% dintre episoadele tratate cu antipsihotice și s-a asociat cu formulările injectabile cu acțiune prelungită, coprescrierea stabilizatoarelor dispoziției și sexul masculin. Antipsihoticele apăreau în 65,1% dintre episoadele depresive fără simptome psihotice. Extracția nu a fost validată pe documentele sursă; indicația, doza și durata au lipsit; estimările descriu schemele consemnate, nu adecvarea lor.

Keywords: psychotropic polypharmacy, benzodiazepines, z-hypnotics, antipsychotic polypharmacy, discharge prescribing

Introduction

Psychiatric polypharmacy, the concurrent prescription of two or more psychotropic medications, has grown steadily over the past three decades and now characterises many inpatient regimens (1, 2). In office-based psychiatry in the United States, the proportion of visits

with three or more psychotropics doubled between 1996 and 2006 (2). Inpatient treatment may involve several agents to address acute symptoms, including anxiety, agitation and insomnia, as well as maintenance treatment (1). The discharge prescription is therefore an important transition record that communicates the

planned pharmacotherapy to clinicians and services providing subsequent care.

Antipsychotic polypharmacy is the best studied form. A meta-regression of 147 studies found a median prevalence of 19.6%, higher in Europe and Asia than in North America and strongly linked to inpatient status, first-generation agents and anticholinergic use (3). Combined antipsychotics contribute to high-dose prescribing and adverse effect burden, and guidelines recommend them only after clozapine has been tried (4-7). Randomised evidence for augmentation with a second antipsychotic is weak once open-label and low-quality trials are removed (8), although nationwide registry data suggest that specific combinations, in particular clozapine with aripiprazole, may reduce rehospitalisation (9, 10). Second-generation antipsychotics are also widely prescribed outside their licensed indications, in depression, anxiety and insomnia, where the evidence of benefit is limited and the metabolic burden is not (11, 12).

Benzodiazepines and Z-hypnotics require benefits and risks to be considered in relation to indication, patient characteristics and intended duration. Cumulative benzodiazepine exposure was associated with mortality in an observational cohort of people with schizophrenia (13). European guidance on cognitive impairment in schizophrenia recommends minimising benzodiazepine and anticholinergic burdens because of potential negative cognitive effects (14-18), and a systematic review in psychosis found that higher anticholinergic burden was associated with poorer cognition, while noting the need for randomised trials of burden reduction (18). A recent meta-analysis of 25 studies estimated that half of adults left acute psychiatric units with a benzodiazepine prescription, with substantial between-study heterogeneity and very low certainty of evidence (19). In South-Eastern Europe the figure reached 81.9% across nine university hospitals in Croatia, North Macedonia and Serbia (20), and misuse criteria were met by almost one third of benzodiazepine treatments in a French inpatient cohort (21). Among adults aged 65 years or older with insomnia, short-term studies found Z-hypnotics effective, whereas longer-term observational evidence indicated increased risks of falls and fractures, although the evidence base was limited (22, 23). A separate clinical guideline addresses the recognised potential for Z-drug abuse, dependence and withdrawal, particularly with use beyond recommended short durations (24). National drug utilisation studies have documented substantial use of anxiolytics and hypnotics across the region, from Croatia and Serbia to the Baltic states (25-28).

Data from Romania are sparse. A single-department study in Bucharest reported antipsychotic polypharmacy in schizophrenia inpatients (29), a Timișoara group described augmentation strategies in outpatients on long-acting injectable antipsychotics (29), and a

Cluj-Napoca cohort characterised patients with repeated schizophrenia admissions (30). None of these quantified the full psychotropic regimen at discharge across diagnostic groups, and none addressed benzodiazepine and Z-hypnotic co-prescription. Discharge summaries are stored as free-text documents in most Romanian hospitals, which has limited pharmacoepidemiological work. Natural language processing now allows structured extraction of medications and diagnoses from such documents at scale, provided the limits of automated extraction are reported (25, 31-36). The aims of this study were: (i) to describe the number and class composition of psychotropic substances listed at discharge from an adult psychiatric ward in western Romania; (ii) to estimate the prevalence of antipsychotic polypharmacy and of benzodiazepine and Z-hypnotic co-prescription; and (iii) to identify clinical correlates of antipsychotic polypharmacy and to test whether prescribing patterns differed between the main ICD-10 diagnostic families.

Materials and Methods

Study design and setting

This was a retrospective, cross-sectional analysis of routinely produced discharge documents, reported according to the STROBE statement and its RECORD extension for routinely collected health data (34, 35). The setting was Psychiatry Clinic II, an adult psychiatric inpatient ward of the County Emergency Clinical Hospital in Timișoara, Romania. The ward admits adults only and provides mixed care (both acute and chronic); patients who need prolonged hospitalisation are transferred to a chronic-care psychiatric ward, and the transfer is documented by a summary in the same format as a discharge summary. The unit of analysis was the clinical episode, defined as one admission documented by a discharge summary or a clinical case summary.

This retrospective study analysed psychiatric discharge documents from Psychiatry Clinic II of the County Emergency Clinical Hospital in Timișoara, Romania, covering the period from 1 February 2017 to 7 July 2026.

Data source, document processing and structuring

The source corpus comprised 6,333 files stored in the ward archive (.docx, .doc, .pdf and image files). Processing began with the conversion of the inventoried files to text according to format: 1,683 .docx files were parsed from their document XML, 982 legacy .doc files were converted with antiword, 285 text-based PDF files with pdftotext, 155 scanned PDF or image files with Tesseract optical character recognition, 32 files with LibreOffice and 17 .rtf files with unrtf. Binary and text hashes were computed for every file, identical copies were grouped, and each document was classified by type (discharge summary, clinical case summary, treatment scheme, care plan,

academic or administrative material) and by relevance. Of the files tracked as candidates, 1,736 were included as clinical episode documents (1,454 discharge summaries, 276 clinical case summaries and 6 treatment schemes), 1,259 were excluded as non-clinical and the remainder were not processed. In the adult eligible set, the 1,476 source documents comprised 1,042 .docx files (70.6%), 424 .doc files (28.7%), 8 text-based and 2 scanned PDF files. Names and identifiers were replaced by pseudonymous episode and patient codes; the correspondence key was kept in a separate, access-restricted file and was not used for analysis.

The clinical content was structured into a relational registry using EuLLM-v0.6.13. The registry comprised linked tables of episodes (demographic data, dates, clinical summaries and confidence scores), diagnoses (ICD-10 codes, diagnostic roles, certainty and supporting text), medications (treatment phase, brand name, active substance, formulation, long-acting indicator, dose, route and as-needed status) and data-quality flags. Treatment phase was classified as pre-admission, inpatient, discharge, recommendation or unclear; only discharge and recommendation records were included in the analysis.

The eligibility criteria were applied, and missing age and discharge-date information was retrieved from the source text where possible. Medication names were standardised to active substances using a curated brand-to-substance dictionary, correcting errors in the initial extraction. In this stage the eligibility criteria were applied, age and dates were recovered from the source text where possible, and substance names were rebuilt from brand names, active substances and raw strings with a curated brand-to-substance dictionary, because the normalised substance field produced in the previous stage was corrupted in about 27% of medicated episodes. During the present revision, a comparison of the medication rows with the discharge text stored in the registry (discharge recommendations, follow-up plan and the source quotations of the medication rows) showed that the language model had not produced rows for several brands marketed in Romania, among them donepezil (Davia), carbamazepine (Timonil, Neurotop, Carbepsil), sulpiride (Eglonyl), cinolazepam (Gerodorm), quetiapine (Uniquet), olanzapine (Bloonis, Zypadhera) and tianeptine (Nobixal). A dictionary-based search of these texts, therefore added a substance to an episode when a brand or substance name of the extended dictionary appeared in the discharge text, was not followed by a discontinuation term (removed, stopped, replaced, discontinued) and was not already recorded for that episode; 466 substance records were added in 401 eligible episodes, 92 of them mood stabilisers, 103 antipsychotics, 55 antidepressants, 48 benzodiazepines, 162 cognitive enhancers and 6 Z-hypnotics, and 27 mentions were skipped as discontinued.

Every addition is logged with its text snippet. Seven brands absent from the original dictionary were attributed to their substances from the leaflets and summaries of product characteristics authorised by the Romanian medicines agency: Davia (donepezil; named in 150 analysed episodes), Astoret (aripiprazole), Serodeps (escitalopram), Dozzex and Zatinex (duloxetine), Zulin (mirtazapine) and Temelor (lorazepam). Because the stored texts are truncated, the search cannot recover every omitted medication, and the structured rows themselves were not validated row by row by a clinician; the consequences are discussed in Section 3.8.

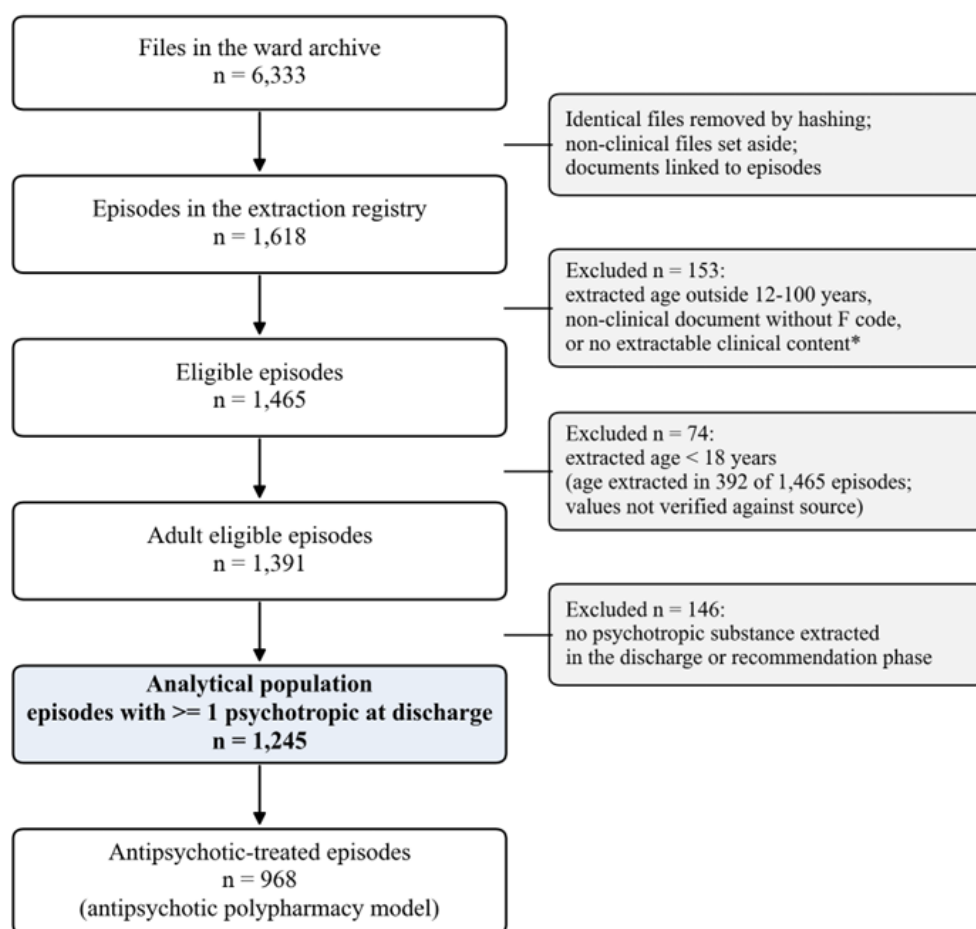
Documents were linked into episodes in two steps. Patients were identified from normalised, sorted name tokens and received a pseudonymous code; 272 of the 986 identity links were classified as having a low degree of certainty. Files of the same patient were then merged into one episode when their extracted text was identical (text hash) or when they referred to the same admission by date. In the adult eligible set, 1,322 episodes were documented by a single file and 69 by two to four files; 86 of the 92 multi-document episodes of the full registry are groups of identical copies of one letter filed in several folders. A revised version of a letter with different text was consequently not merged and formed a separate episode, undated documents may have produced separate episodes for the same admission, and this residual duplication cannot be quantified. When several files were linked to one episode, medication rows from all of them were pooled and deduplicated by substance; because the merged files were almost always identical copies, the pooling of successive versions with different content, which could retain a treatment later withdrawn, affected at most the 6 episodes merged by date. The primary document of an episode was the one with the longest text, and the document type reported in the tables is that of the primary document. An episode documented by both a discharge summary and a clinical case summary was counted once. Fifty-four documents, linked to 41 analysed episodes, were summaries written at transfer to the chronic-care ward, identified by their file names, and record the regimen at transfer; they were retained in the main analysis and removed in a sensitivity analysis.

Eligibility

Episodes were excluded from the initial registry when the extracted age fell outside 12 - 100 years, when the source document was clearly non-clinical and carried no F-chapter code, or when no diagnosis, medication or clinical summary could be extracted. Of the 1,618 registry episodes, 153 were excluded, all of them under the age criterion: the extracted age was between 2 and 11 years (31 episodes at 2 years, 25 at 3, 14 at 4, 14 at 5, 19 at 6, 3 at 7, 23 at 8, 9 at 9, 14 at 10 and 1 at 11 years), values that correspond

to no patient of an adult ward and reflect numbers captured from the text; no episode was excluded under the other two criteria, leaving 1,465 episodes. Because the ward admits adults only, the age criterion was then tightened to 18 years or older; the 12-year lower bound of the first version was inconsistent with the setting. Age was extractable in 392 of the 1,465 episodes (26.8%), and in 74 of them the extracted value was below 18 years (10 at 12, 12 at 13, 14 at 14, 19 at 15, 7 at 16 and 12 at 17 years; 20 of the 74 values came from the text-enrichment step rather than from the structured field). These implausible age values resulted from extraction errors when

processing the source Word documents. The 74 episodes (62 of them with a psychotropic at discharge) were excluded as a conservative measure. The adult eligible set comprised 1,391 episodes from 848 identifiable pseudonymised patients (patient linkage was missing in 212 episodes), and the analytical population for pharmacotherapy indicators comprised the 1,245 episodes with at least one psychotropic substance in the discharge or recommendation phase (Figure 1). Episodes without an extractable age (1,073) were retained because the ward does not admit minors.



* The per-criterion breakdown of the 153 initial exclusions is reported in the text.

Figure 1.

Flow of files and episodes from the ward archive to the analytical population. All 153 initial exclusions were made under the age criterion (extracted age 2 - 11 years); no episode was excluded as a non-clinical document or for absent clinical content

Definitions

Psychotropic polypharmacy was defined by the number of distinct psychotropic substances at discharge, with thresholds of two or more, three or more and four or more, the latter two being commonly used to denote complex polypharmacy (1). Substances were grouped into six psychotropic classes broadly following the Anatomical Therapeutic Chemical (ATC) classification

(41): antipsychotics (first and second generation, including long-acting injectable formulations), antidepressants, mood stabilisers, benzodiazepines, Z-hypnotics (zolpidem, zopiclone) and cognitive enhancers (memantine, galantamine, rivastigmine, donepezil). The mood stabiliser class comprised lithium and the antiepileptics valproate, carbamazepine and lamotrigine, grouped by their shared psychiatric use rather than by

ATC group, in which the three antiepileptics belong to N03; the documents did not state the indication of each prescription, so no indication is attributed to individual records, and the class label should be read in this sense. Anticholinergic antiparkinsonian agents (trihexyphenidyl) were recorded but not counted as psychotropics. Substances outside the class definition were not counted: in the discharge texts of the analytical population, gabapentin was mentioned in 21 episodes, levetiracetam in 14, etifoxine in 13, racetam nootropics in 12, phenobarbital in 9, pregabalin in 3, buspirone in 3 and topiramate in 2; hydroxyzine, melatonin, promethazine and other sedating antihistamines were not mentioned.

Antipsychotic polypharmacy was defined as two or more distinct antipsychotic substances, in line with earlier surveys (3); a long-acting injectable and an oral formulation of the same substance counted once. A long-acting injectable antipsychotic was identified at medication level from the discharge texts of each episode by a text rule that matched the long-acting brand names marketed in Romania (paliperidone palmitate as Xeplion or Trevicta, aripiprazole as Abilify Maintena, risperidone as Rispolet Consta, olanzapine pamoate as Zypadhera, haloperidol decanoate, flupentixol decanoate as Fluaxol depot or 20 mg/mL, zuclopenthixol decanoate as Clopixol depot) or an injectable formulation with a dosing interval of two weeks or longer; the substance of the matched brand was attributed to the episode and the episode-level indicator was derived from it. When an injectable brand was named but its substance had no medication row of its own, the substance was added to the episode by the dictionary search described above. The long-acting field produced by the extractor was not used, because it had been propagated to every medication row of an excerpt, including benzodiazepines and hypnotics; it flagged 136 analysed episodes, of which 118 were confirmed by the text rule, while the rule identified 125 further episodes. An explicit formulation term (tablet, oral solution, drops, vial, injection, depot or similar) was present in 1,053 of the 1,454 antipsychotic records of the analytical population (72.4%) and absent in 401 (27.6%); for the latter the formulation is unknown, and such a record counts as long-acting only when the text rule matched. Secondary indicators were the presence of any benzodiazepine, any Z-hypnotic, both a benzodiazepine and a Z-hypnotic, a long-acting injectable antipsychotic, clozapine, a cognitive enhancer, trihexyphenidyl, and within-class duplication for antidepressants, mood stabilisers and benzodiazepines.

The reference diagnosis of each episode was the ICD-10 code recorded with the role principal. When no principal code was recorded, the F-chapter code with the highest extraction confidence was used, giving precedence to codes recorded as secondary over codes with an unspecified role and, for ties, to the first code

listed. Episodes with no F-chapter code but another ICD-10 code were classified as other. Codes were grouped into families: organic and neurocognitive disorders (F00 - F09), substance-related disorders (F10 - F19), schizophrenia and other psychoses (F20 - F29), affective disorders (F30 - F39), anxiety, stress-related and somatoform disorders (F40 - F48) and other categories.

Statistical analysis

Continuous variables are reported as median and interquartile range (IQR) or mean and standard deviation (SD); categorical variables as counts and percentages with Wilson 95% confidence intervals (CI). Comparisons between the four main diagnostic families (affective, psychotic, organic and anxiety-related disorders) used the chi-square test for proportions and the Kruskal-Wallis test for the number of substances; sex comparisons used the chi-square and Mann-Whitney U tests. The number of psychotropic substances was modelled with Poisson regression, and antipsychotic polypharmacy among antipsychotic-treated episodes and benzodiazepine presence among all treated episodes with logistic regression. Because 158 patients contributed more than one episode, all models used cluster-robust standard errors grouped by patient identifier; the 180 episodes without a patient link were treated as singleton clusters, which understates the standard errors if some of them belong to patients already in the data (Section 3.8). Covariates were diagnostic family, sex, long-acting injectable use and mood stabiliser co-prescription; age was not modelled because it was extractable in only 272 of 1,245 episodes. Four sensitivity analyses were performed: one episode per linked patient (the first episode in registry order; unlinked episodes excluded), exclusion of Z-hypnotics from the substance count, exclusion of both Z-hypnotics and benzodiazepines, and exclusion of episodes documented by a transfer summary; the indicators were also recomputed for the episodes of the first version, including those with an extracted age below 18 years. Two-sided $p < 0.05$ was considered statistically significant. Analyses were carried out in Python 3.11 with pandas 2.3, SciPy 1.17 and statsmodels 0.14; the analysis scripts and the correction log are available from the corresponding author.

Ethics and data protection

The study used pseudonymised routine clinical documents without patient contact. It was conducted in accordance with the Declaration of Helsinki. Approval of the institutional ethics committee and a waiver of individual informed consent were obtained (approval No. 69/24 September 2026). The archive was inventoried on 13 September 2026 and the documents were converted, structured and pseudonymised on 25 - 26 September 2026, these steps were carried out by the treating clinicians on ward documents to which they had access as authors of the records, and

the statistical analysis and the manuscript were completed after the approval. Personal data were processed in accordance with the General Data Protection Regulation (GDPR) and institutional data-protection requirements.

Results and Discussion

Study population and extraction yield

Figure 1 shows the flow of files and episodes. Of the 1,391 adult eligible episodes, 1,188 (85.4%) derived from discharge summaries and 203 (14.6%) from clinical case summaries. The proportion of episodes in which a field was recovered differed by field: sex in 98.8%, a reference diagnosis in 90.3%, age in

22.9% and a discharge date in 16.2%; these are recovery rates, not measures of accuracy. Recovery also differed by source format: age was recovered in 28.1% of episodes documented by .docx files but in 9.5% of those documented by legacy .doc files, and a discharge date in 19.3% *versus* 8.8%. One possible explanation, which remains a hypothesis until the extraction is validated, is that the demographic header of older documents is a table whose cells are lost in the conversion to plain text, whereas the medication and diagnosis sections are narrative paragraphs. Among the 318 adult episodes with an extracted age, the median was 44.5 years (IQR 26.2 - 60.0; mean 44.7, SD 20.2; range 18 - 100); 70 (22.0%) were aged 18 - 24 years and 61 (19.2%) 65 years or older.

Table I

Characteristics of the episodes with at least one psychotropic substance at discharge (n = 1,245)

Characteristic	n	%
Sex		
Female	695	55.8
Male	539	43.3
Not documented	11	0.9
Age (years)		
Extracted	272	21.8
Median (IQR) among extracted	44 (26.8 - 60.2)	
65 years or older, among extracted	52	19.1
Source document		
Discharge summary	1,093	87.8
Clinical case summary	152	12.2
Reference diagnostic family (ICD-10)		
Affective disorders (F30-F39)	697	56.0
Schizophrenia and other psychoses (F20-F29)	241	19.4
Organic and neurocognitive disorders (F00-F09)	93	7.5
Anxiety, stress-related and somatoform disorders (F40-F48)	70	5.6
Substance-related disorders (F10-F19)	12	1.0
Other F-chapter or non-psychiatric code	18	1.4
No extractable diagnosis	114	9.2
Patient linkage		
Episodes without a patient link	180	14.5
Number of distinct psychotropic substances		
1	26	2.1
2	72	5.8
3	183	14.7
4	298	23.9
5	304	24.4
6	200	16.1
7 or more	162	13.0
Number of psychotropic classes		
1	31	2.5
2	112	9.0
3	295	23.7
4	508	40.8
5 or 6	299	24.0

ICD-10: International Classification of Diseases, 10th revision; IQR: interquartile range. Percentages are computed on the 1,245 episodes unless stated otherwise

A reference ICD-10 diagnosis was available for 1,256 episodes (90.3%): affective disorders accounted for 760 (54.6%), schizophrenia and other psychoses for 269 (19.3%), organic and neurocognitive disorders for

102 (7.3%), anxiety, stress-related and somatoform disorders for 82 (5.9%), substance-related disorders for 13 (0.9%) and other codes for 30 (2.2%). The most frequent individual codes were paranoid schizophrenia

F20.0 (145 episodes, 10.4%), recurrent depressive disorder with a severe non-psychotic episode F33.2 (123, 8.8%) and recurrent depressive disorder with a moderate episode F33.1 (103, 7.4%).

At least one psychotropic substance was listed at discharge in 1,245 episodes (89.5%); their characteristics are summarised in Table I. Women contributed 695 episodes (55.8%) and men 539 (43.3%). The episodes came from 791 identifiable patients, 158 of whom contributed two or more episodes (maximum 9); 180 episodes (14.5%) had no patient link.

Number of psychotropic substances

The distribution of the number of distinct psychotropic substances is shown in Figure 2. The median was 5 (IQR 4 - 6; mean 4.71, SD 1.65; range 1 - 11). Only 26 episodes (2.1%) were discharged on a single psychotropic substance, whereas 298 (23.9%) carried four, 304 (24.4%) five and 362 (29.1%) six or more. Two or more substances were present in 97.9% (95% CI 97.0 - 98.6), three or more in 92.1% (95% CI 90.5 - 93.5) and four or more in 77.4% (95% CI 75.0 - 79.7). Counting classes rather than substances, 1,102 episodes (88.5%) combined three or more psychotropic classes and 807 (64.8%) four or more.

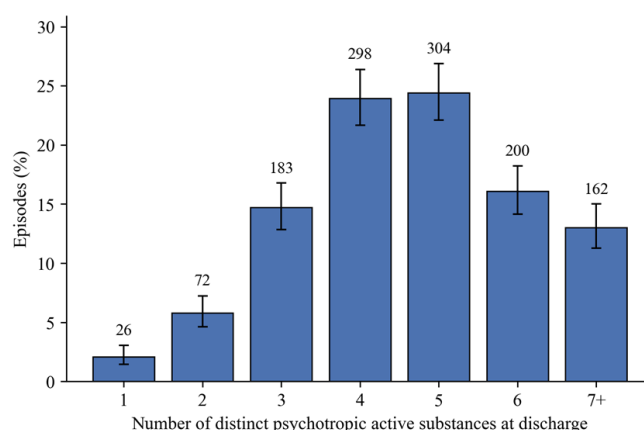


Figure 2.

Distribution of the number of distinct psychotropic active substances listed at discharge (n = 1,245 episodes)
Numbers above the bars are episode counts; error bars are Wilson 95% confidence intervals of the percentages

Class composition and most frequent substances

Table II lists class prevalence, aggregate indicators and the most frequent substances. Benzodiazepines were the most prevalent class (86.4%), followed by antipsychotics (77.8%), Z-hypnotics (75.0%), antidepressants (66.9%), mood stabilisers (54.2%) and cognitive enhancers (17.6%). Clozapine was listed in 96 episodes (7.7%). A benzodiazepine and a Z-hypnotic were listed together in 869 episodes (69.8%). The two most frequently listed substances in the entire cohort were lorazepam (56.2%) and zolpidem (55.7%), ahead of valproate (39.8%), zopiclone (30.9%) and risperidone (28.4%). Trihexyphenidyl appeared in 22.2% of regimens, and a long-acting injectable antipsychotic in 19.5% of all episodes and 25.1% of antipsychotic-treated episodes.

The most frequent class combination was antidepressant plus second-generation antipsychotic plus benzodiazepine plus Z-hypnotic (114 episodes, 9.2%), followed by the same combination with a mood stabiliser added (107, 8.6%) and by antidepressant plus benzodiazepine plus Z-hypnotic (75, 6.0%). A benzodiazepine was part of each of the twelve most frequent combinations, and a Z-hypnotic of 11 of them. Within-class duplication was less common: two or more antidepressants in 212 episodes (17.0%), two or more benzodiazepines in 87 (7.0%) and two or more mood stabilisers in 65 (5.2%). The most frequent antidepressant pair was escitalopram with trazodone (56 episodes), followed by sertraline with trazodone (30) and escitalopram with mirtazapine (20).

Table II

Prevalence of psychotropic classes, aggregate prescribing indicators and most frequent substances at discharge
(n = 1,245)

Indicator	n	% (95% CI)
Psychotropic class		
Benzodiazepine	1,076	86.4 (84.4 - 88.2)
Z-hypnotic	934	75.0 (72.5 - 77.3)
Antipsychotic	968	77.8 (75.4 - 80.0)
Antidepressant	833	66.9 (64.2 - 69.5)
Mood stabiliser (lithium and antiepileptic mood stabilisers)	675	54.2 (51.4 - 57.0)
Cognitive enhancer	219	17.6 (15.6 - 19.8)

Indicator	n	% (95% CI)
Aggregate indicators		
≥ 2 psychotropic substances	1,219	97.9 (97.0 - 98.6)
≥ 3 psychotropic substances	1,147	92.1 (90.5 - 93.5)
≥ 4 psychotropic substances	964	77.4 (75.0 - 79.7)
Benzodiazepine and Z-hypnotic together	869	69.8 (67.2 - 72.3)
≥ 2 antipsychotics (all treated episodes)	404	32.4 (29.9 - 35.1)
≥ 2 antipsychotics (antipsychotic-treated, n = 968)	404	41.7 (38.7 - 44.9)
≥ 2 antidepressants	212	17.0 (15.0 - 19.2)
≥ 2 benzodiazepines	87	7.0 (5.7 - 8.5)
≥ 2 mood stabilisers	65	5.2 (4.1 - 6.6)
Long-acting injectable antipsychotic (all episodes)	243	19.5 (17.4 - 21.8)
Long-acting injectable antipsychotic (antipsychotic-treated, n = 968)	243	25.1 (22.5 - 27.9)
Clozapine	96	7.7 (6.4 - 9.3)
Trihexyphenidyl	276	22.2 (19.9 - 24.6)
Most frequent substances		
lorazepam	700	56.2
zolpidem	694	55.7
valproate	496	39.8
zopiclone	385	30.9
risperidone	353	28.4
alprazolam	258	20.7
escitalopram	244	19.6
trazodone	228	18.3
olanzapine	227	18.2
haloperidol	211	16.9
quetiapine	167	13.4
sertraline	166	13.3
levomepromazine	165	13.3
tianeptine	159	12.8
donepezil	158	12.7

CI: confidence interval (Wilson method). Percentages are computed on the 1,245 episodes unless stated otherwise

Antipsychotic polypharmacy

Among the 968 antipsychotic-treated episodes, 404 (41.7%; 95% CI 38.7 - 44.9) listed two or more antipsychotics, corresponding to 32.4% (95% CI 29.9 - 35.1) of all treated episodes. Table III shows the most frequent antipsychotic pairs. The most frequent pairs were haloperidol with levomepromazine (82), levomepromazine with risperidone (67), haloperidol with risperidone (65) and paliperidone with risperidone (62) episodes. Of the twelve most frequent pairs,

5 combined a first- with a second-generation agent, 5 two second-generation agents and 2 two first-generation agents. Clozapine appeared with risperidone in 25 episodes and with paliperidone in 24 episodes. This pairing of paliperidone with risperidone is compatible with, but does not establish, concurrent long-acting injectable paliperidone and oral risperidone, because a formulation term was missing from about one antipsychotic record in four.

Table III

Most frequent antipsychotic pairs among the 404 episodes with antipsychotic polypharmacy

Antipsychotic pair	Generation	Episodes (n)
haloperidol + levomepromazine	FGA + FGA	82
levomepromazine + risperidone	FGA + SGA	67
haloperidol + risperidone	FGA + SGA	65
paliperidone + risperidone	SGA + SGA	62
haloperidol + olanzapine	FGA + SGA	41
flupentixol + haloperidol	FGA + FGA	33
levomepromazine + paliperidone	FGA + SGA	33
haloperidol + paliperidone	FGA + SGA	29
olanzapine + risperidone	SGA + SGA	28
quetiapine + risperidone	SGA + SGA	27
clozapine + risperidone	SGA + SGA	25
clozapine + paliperidone	SGA + SGA	24

FGA: first-generation antipsychotic; SGA: second-generation antipsychotic. An episode with three antipsychotics contributes to more than one pair

Antipsychotic polypharmacy was more frequent in men than in women (50.4% versus 36.1% of antipsychotic-treated episodes; chi-square 19.54, $p < 0.001$) and in episodes with a co-prescribed mood stabiliser (49.3% versus 32.0%; chi-square 29.22, $p < 0.001$). Among the 243 episodes with a long-acting injectable antipsychotic, 179 (73.7%) listed at least two distinct antipsychotic substances, compared with 225 of 725 episodes without an identified long-acting injectable (31.0%; chi-square 136.0, $p < 0.001$). These groups accounted for all 404 episodes with antipsychotic polypharmacy. The definition was based on distinct active substances, irrespective of formulation; oral and long-acting formulations of the same substance were counted once. The long-acting substances

were paliperidone (105 episodes), flupentixol (48), olanzapine (35), haloperidol (27), aripiprazole (27) and risperidone (10). In the multivariable logistic model with cluster-robust standard errors ($n = 850$ episodes with complete covariates; Figure 3), a long-acting injectable (adjusted odds ratio 4.82, 3.40 - 6.85), a mood stabiliser (adjusted odds ratio 1.66, 1.20 - 2.29) and male sex (adjusted odds ratio 1.73, 1.24 - 2.41) were independently associated with antipsychotic polypharmacy. Compared with affective disorders, organic disorders carried lower odds (0.27, 0.12 - 0.65), whereas psychotic disorders (1.14, 0.79 - 1.64) and anxiety-related disorders (0.78, 0.36 - 1.69) did not differ significantly once formulation and co-prescription were accounted for.

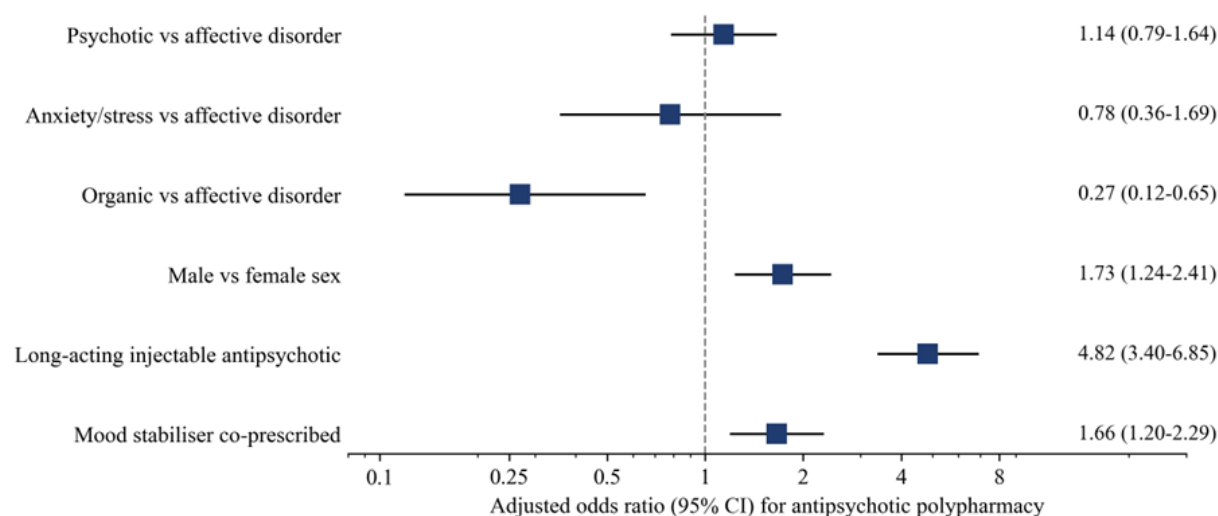


Figure 3.

Adjusted odds ratios for antipsychotic polypharmacy among antipsychotic-treated episodes ($n = 850$), from a logistic regression model with cluster-robust standard errors grouped by patient

CI: confidence interval

Benzodiazepines and Z-hypnotics

A benzodiazepine was listed in 1,076 episodes (86.4%; 95% CI 84.4 - 88.2), most often lorazepam (56.2%), alprazolam (20.7%) and diazepam (10.0%); clonazepam (2.8%), cinolazepam (1.7%), bromazepam (1.2%) and nitrazepam (1.1%) were uncommon. Z-hypnotics were present in 934 episodes (75.0%; 95% CI 72.5 - 77.3), zolpidem in 55.7% and zopiclone in 30.9%. Benzodiazepine presence did not differ by sex (87.6% in women, 85.2% in men; $p = 0.21$). In the logistic model ($n = 1,092$), psychotic disorders had lower odds of a benzodiazepine at discharge than affective disorders (adjusted odds ratio 0.50, 0.32 - 0.79), whereas organic (0.54, 0.29 - 1.01) and anxiety-related disorders (0.65, 0.29 - 1.45) did not differ significantly; a long-acting injectable was associated with higher odds (2.54, 1.37 - 4.73).

Prescribing patterns by diagnostic family

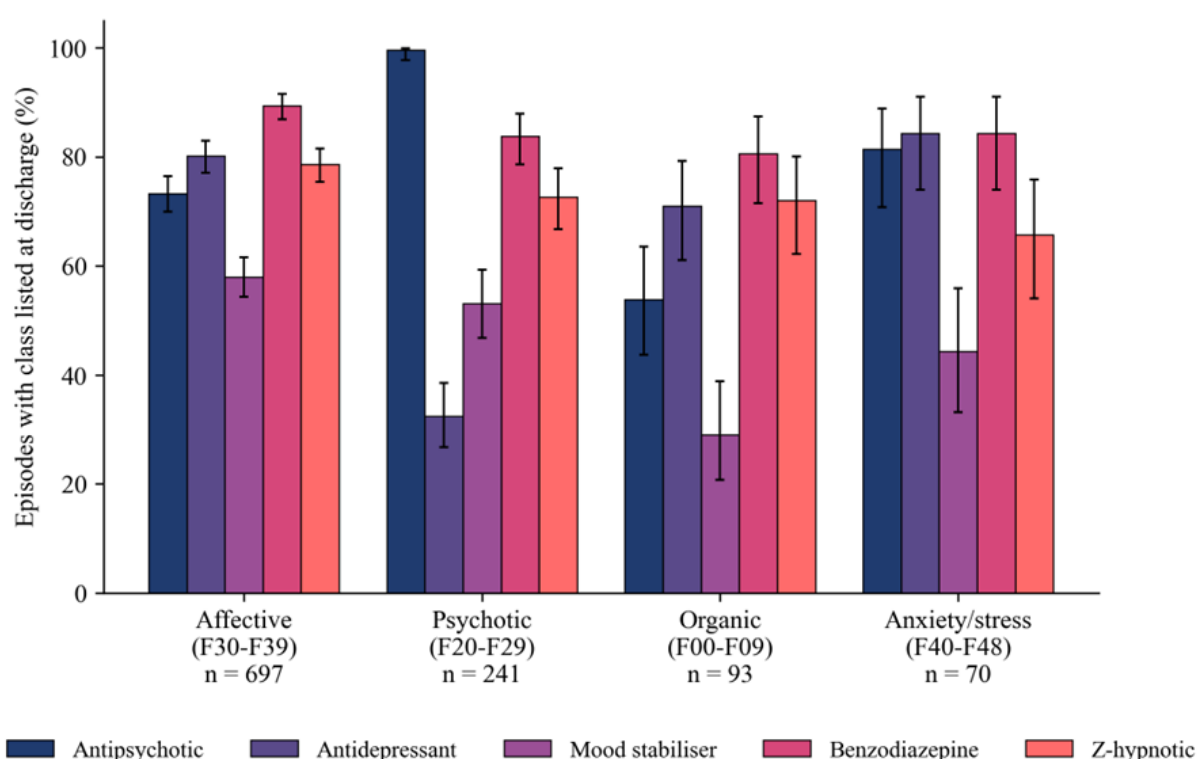
Prescribing indicators by diagnostic family are given in Table IV and Figure 4. The number of substances differed between families (Kruskal-Wallis $p = 0.002$): the median was 5 in affective disorders, 5 in psychotic, 4 in organic and 4 in anxiety-related disorders. In the Poisson model with family and sex as covariates, the incidence rate ratios relative to affective disorders were psychotic disorders 0.93, 0.87 - 0.98, organic disorders 0.91, 0.83 - 0.99, anxiety-related disorders 0.90, 0.82 - 0.98; the confidence interval excluded 1 for psychotic and organic and anxiety-related. Sex had no effect (1.00, 0.95 - 1.05). Three or more substances were listed in 95.7% of affective, 88.4% of psychotic, 94.3% of anxiety-related and 82.8% of organic episodes (chi-square 30.38, $p < 0.001$).

Table IV

Psychotropic prescribing indicators at discharge by reference diagnostic family (four main families, n = 1,101)

Indicator	Affective (F30-F39) n = 697	Psychotic (F20-F29) n = 241	Organic (F00-F09) n = 93	Anxiety-related (F40-F48) n = 70	p
Substances, median (IQR)	5 (4-6)	5 (3-6)	4 (3-6)	4 (4-5)	0.002 a
≥ 3 substances, %	95.7	88.4	82.8	94.3	< 0.001 b
≥ 4 substances, %	81.9	73.0	74.2	78.6	0.018 b
Antipsychotic, %	73.3	99.6	53.8	81.4	< 0.001 b
≥ 2 antipsychotics among antipsychotic-treated, % (n treated)	41.3 (511)	52.1 (240)	16.0 (50)	33.3 (57)	< 0.001 b
Long-acting injectable, %	14.9	40.2	5.4	11.4	< 0.001 b
Antidepressant, %	80.2	32.4	71.0	84.3	< 0.001 b
Mood stabiliser, %	58.0	53.1	29.0	44.3	< 0.001 b
Benzodiazepine, %	89.4	83.8	80.6	84.3	0.023 b
Z-hypnotic, %	78.6	72.6	72.0	65.7	0.030 b
Benzodiazepine and Z-hypnotic, %	73.7	68.5	63.4	62.9	0.043 b

IQR: interquartile range. a Kruskal-Wallis test; b chi-square test. Percentages are computed within each diagnostic family. The 144 episodes with a substance-related, other or unknown reference diagnosis are not shown

**Figure 4.**

Prevalence of psychotropic classes at discharge by reference diagnostic family (ICD-10), with Wilson 95% confidence intervals. ICD-10: International Classification of Diseases, 10th revision

Class profiles differed by diagnosis in expected directions: antipsychotics were present in 99.6% of psychotic episodes and antidepressants in 80.2% of affective episodes. Antipsychotics were also listed in 73.3% of affective and 81.4% of anxiety-related episodes, and antipsychotic polypharmacy affected 41.3% of antipsychotic-treated affective episodes. Table V breaks the affective family down by reference diagnosis: an antipsychotic was listed in 92.4% of bipolar episodes and 95.2% of depressive episodes with psychotic symptoms, and in 65.1% of the 367 depressive episodes coded as mild, moderate or severe

without psychotic symptoms, most often risperidone (82 episodes), olanzapine (62), quetiapine (52), levomepromazine (27), paliperidone (25) and clozapine (25); depressive episodes coded as unspecified or in remission were few (4) and are shown separately. In the anxiety-related family, 35 of the 70 episodes carried an obsessive-compulsive disorder code (F42.2), and the antipsychotics listed were mainly risperidone (23), olanzapine (15), quetiapine (13) and haloperidol (10). Long-acting injectables were concentrated in psychotic disorders (40.2% versus 5.4 - 14.9% elsewhere; chi-square 90.35, $p < 0.001$). Benzodiazepine

prevalence ranged from 80.6% to 89.4% across the four families (chi-square 9.49, $p = 0.023$) and Z-hypnotic prevalence from 65.7% to 78.6% ($p = 0.03$).

Both classes were therefore common in every diagnostic family, and the between-family differences were small relative to the overall prevalence.

Table V

Antipsychotic listing at discharge within the affective and anxiety-related families, by reference diagnosis

Reference diagnosis	Episodes (n)	Antipsychotic listed, % (95% CI)	≥ 2 antipsychotics among antipsychotic-treated, % (n treated)
Bipolar affective disorder and mania (F30-F31)	184	92.4 (87.6 - 95.4)	59.4 (170)
Depressive episode with psychotic symptoms (F32.3, F33.3)	84	95.2 (88.4 - 98.1)	27.5 (80)
Depressive episode without psychotic symptoms (other F32, F33)	367	65.1 (60.1 - 69.8)	34.3 (239)
Depressive disorder, unspecified or in remission (F32.8, F32.9, F33.4, F33.8, F33.9)	4	75.0 (30.1 - 95.4)	0.0 (3)
Other affective disorders (F34-F39)	58	32.8 (22.1 - 45.6)	31.6 (19)
Anxiety, stress-related and somatoform disorders (F40-F48)	70	81.4 (70.8 - 88.8)	33.3 (57)

CI: confidence interval (Wilson method). Depressive episodes without psychotic symptoms comprise the codes F32.0 - F32.2 and F33.0 - F33.2. Obsessive-compulsive disorder (F42.2) accounted for 35 of the 70 anxiety-related episodes. The reference diagnosis is the extracted principal or best documented ICD-10 code and was not verified against the source documents

Sensitivity analyses

Restricting the analysis to one episode per linked patient ($n = 791$) produced similar descriptive estimates: median 4 substances, three or more in 90.1%, four or more in 74.8%, antipsychotic polypharmacy in 38.9% of antipsychotic-treated episodes and a benzodiazepine in 86.3%. Excluding Z-hypnotics from the count reduced the median to 4 (IQR 3 - 5) and the prevalence of three or more substances to 84.5%. Excluding both Z-hypnotics and benzodiazepines reduced the median to 3 (IQR 2 - 4), the prevalence of two or more substances to 88.0% and that of three or more

to 57.8%; 10 episodes then had no remaining psychotropic. Excluding the 41 episodes documented by a transfer summary left the estimates essentially unchanged (three or more substances in 92.0%, antipsychotic polypharmacy in 41.5%), as did the inclusion of the episodes with an extracted age below 18 years (three or more in 92.3%). (Table VI). The alternative counts that exclude sedative classes describe the numerical contribution of those classes to the polypharmacy threshold; they do not estimate the clinical effect of removing either class from treatment.

Table VI

Sensitivity analyses of psychotropic polypharmacy indicators

Analysis	Episodes (n)	Substances, median (IQR)	≥ 2 substances, %	≥ 3 substances, %	≥ 4 substances, %	≥ 2 antipsychotics among antipsychotic-treated, %	Benzodiazepine, %
Main analysis (≥ 18 years or age not extracted)	1,245	5 (4 - 6)	97.9	92.1	77.4	41.7	86.4
One episode per linked patient	791	4 (3 - 5)	97.5	90.1	74.8	38.9	86.3
Episodes documented by a transfer summary to the chronic-care ward excluded	1,204	5 (4 - 6)	97.8	92.0	77.2	41.5	86.4
All 1,307 episodes, including extracted age < 18 years	1,307	5 (4 - 6)	98.0	92.3	78.0	42.5	86.6
Z-hypnotics excluded from the count	1,245	4 (3 - 5)	96.9	84.5	55.7	41.7	86.4
Z-hypnotics and benzodiazepines excluded	1,245	3 (2 - 4)	88.0	57.8	29.0	41.7	86.4

IQR: interquartile range. In the two analyses that exclude sedative classes from the count, the antipsychotic and benzodiazepine indicators are unchanged by construction

In this cohort of 1,245 discharge regimens from a Romanian adult psychiatric ward, the median regimen listed 5 psychotropic substances, and 92.1% listed three or more. Published estimates provide context but are not directly interchangeable. The German-Austrian AMSP surveillance programme reported complex polypharmacy with three or more psychotropics in 66.1% of inpatients with bipolar depression (37), a Bavarian project found four or more

agents in 34% of patients with bipolar depression (38), and mean counts of 2.9 to 3.3 agents were described in acute mania (39). Polypharmacy exceeding 80% was reported as the initial strategy in Korean bipolar cohorts (40), and psychotropic polypharmacy was more prevalent in late-life than in younger inpatients with major depression in the AMSP programme (41). These studies differed in diagnosis, age, hospital context and whether medication was measured during

admission or at discharge; such differences limit direct ranking of prescribing intensity.

A prominent finding was the frequent listing of sedative-hypnotics: a benzodiazepine in 86.4% of regimens, a Z-hypnotic in 75.0%, and both in 69.8%. A recent meta-analysis estimated a pooled benzodiazepine discharge prevalence of 50% in acute adult units, but found substantial heterogeneity, very low certainty of evidence and divergent admission-to-discharge trajectories across settings (19). Individual estimates included 37.6% in a Dutch university hospital (42) and 81.9% in nine South-Eastern European university hospitals (20). The present estimate is high relative to the pooled value but remains within the wide variation reported between hospitals. Benzodiazepine prevalence varied little across the four main diagnostic families (80.6% to 89.4%), and Z-hypnotic prevalence somewhat more (65.7% to 78.6%). One hypothesis, which this study could not test because indication, timing and as-needed status were not recorded consistently, is that these agents were prescribed for symptoms that cut across diagnoses, such as anxiety, agitation and insomnia; an alternative, equally untested, is a ward-level prescribing habit carried from admission to discharge. The co-listing of lorazepam and zolpidem in the same regimen likewise cannot be classified as duplication or as complementary treatment from the documents alone. The systematic review also notes that, in some patients, temporary continuation after inpatient stabilisation may support transition to community care, while post-discharge patient-centred outcomes remain insufficiently known (19).

These observations have to be read against risks identified in other populations, none of which were measured as outcomes here. Cumulative benzodiazepine exposure was associated with mortality in an observational study of people with schizophrenia (13). Guidance for cognitive impairment in schizophrenia recommends minimising benzodiazepine and anticholinergic burdens (17), and a meta-analysis in psychosis found associations between anticholinergic burden and poorer cognition (18). In adults aged 65 years or older with insomnia, longer-term observational studies associated Z-hypnotics with falls and fractures (22); Z-drug abuse, dependence and withdrawal are also recognised clinical concerns (24). A cross-sectional study of psychiatric inpatients aged 65 years or older found an association between potentially inappropriate psychotropic prescriptions, defined using age-specific criteria, and lower functioning, without establishing causality (43). In the present cohort, 61 of the 318 adult episodes with an extracted age (19.2%) concerned patients aged 65 years or older, and benzodiazepines and Z-hypnotics were listed in 80.6% and 72.0% of organic episodes, a group in which these agents carry the highest risk of falls and cognitive worsening. The discharge documents

did not establish indication, dose, timing, as-needed status, planned duration, pre-admission treatment, actual administration or subsequent outcomes. For patients who meet its eligibility criteria, guidance on benzodiazepine receptor agonists used for insomnia supports shared, gradual and supervised tapering; it does not apply without qualification when anxiety, depression or other contributing conditions are untreated (44). Recording the indication and intended duration of each sedative at discharge, and distinguishing scheduled from as-needed use, would make future audits of this kind interpretable and would give the receiving clinician the information needed for reassessment. The reduction from 92.1% to 57.8% after excluding benzodiazepines and Z-hypnotics from the substance count remains a descriptive recalculation rather than an estimate of what would happen if treatment were changed.

Antipsychotic polypharmacy affected 41.7% of antipsychotic-treated episodes, above the global median of 19.6% (3), the 18% adjusted rate among antipsychotic-treated patients discharged from state hospitals in the United States (45) and the 26% found in New Zealand mental health services (46), but below the 55.5% reported at discharge from nine German hospitals (24). It is close to the 35.8% documented at discharge in a Bucharest schizophrenia department (30), and antipsychotic polypharmacy remained prevalent in Serbian first-episode patients after a national guideline was introduced (47). A large US discharge study recorded several reasons for antipsychotic polypharmacy, including symptom reduction, admission on multiple antipsychotics, clozapine augmentation and a plan to taper to monotherapy (45). In the present cohort, combinations of first- and second-generation agents could similarly represent augmentation for persistent symptoms, management of agitation, gradual switching or continuation of a regimen established before admission; none of these explanations was documented at patient level, so they remain possibilities. The meta-regression by Gallego and colleagues linked antipsychotic polypharmacy statistically with inpatient status, first-generation antipsychotic use and anticholinergic use across heterogeneous studies, but those correlates do not establish the rationale for an individual combination (3). Trihexyphenidyl, listed in 22.2% of regimens, could reflect active or preventive management of extrapyramidal symptoms; literature on stopping anticholinergic medication when it is no longer needed emphasises careful patient selection, shared decision-making and monitoring (48).

Antipsychotics were also listed in 73.3% of affective and 81.4% of anxiety-related episodes. Part of this use falls within licensed indications: 92.4% of bipolar episodes and 95.2% of depressive episodes with psychotic symptoms carried an antipsychotic, and 35 of the 70 anxiety-related episodes concerned obsessive-

compulsive disorder, for which antipsychotic augmentation of serotonergic antidepressants is a recognised second-line option in treatment guidelines. For the 367 depressive episodes without psychotic symptoms, in which an antipsychotic was listed in 65.1% and two antipsychotics in 34.3% of the antipsychotic-treated episodes, the licensing status depends on the substance, the formulation and the indication recorded in the summary of product characteristics: prolonged-release quetiapine is authorised as add-on treatment of major depressive episodes, whereas risperidone, olanzapine, levomepromazine, paliperidone and clozapine have no licensed indication in non-psychotic depression. Because the documents did not record the indication, the proportion of prescriptions that was off-label cannot be computed from the diagnosis alone. A systematic review of off-label use of second-generation antipsychotics in adults found small benefits for some agents in depression and generalised anxiety, offset by weight gain, sedation and other adverse effects (11), and a network meta-analysis of 18 antipsychotics documented clinically relevant differences in weight, glucose and lipid effects, with olanzapine and clozapine among the least favourable (12). Olanzapine was the second most frequent antipsychotic in non-psychotic depression here, and clozapine was listed in 25 such episodes; this may reflect comorbid psychotic symptoms not captured by the reference diagnosis, prior treatment resistance or misclassification of the reference diagnosis by the extractor, and it cannot be resolved without chart review. Metabolic monitoring, which these agents require, is not recorded in discharge lists and was not assessed.

The strongest adjusted association with antipsychotic polypharmacy was the listing of a long-acting injectable formulation; 179 of the 243 episodes with a long-acting injectable (73.7%) listed at least two distinct antipsychotic substances. This indicator describes combinations of distinct active substances and does not establish concurrent oral and injectable prescribing. Concurrent oral and injectable prescribing has been documented in 46% of long-acting injectable-treated patients in a US community mental health centre (50) and in 75.9% of Medicaid patients during the six months after discharge (50). In the latter study, an oral formulation of the same agent was frequent and overlap often extended beyond 30 days, illustrating that oral-injectable combinations occur in routine care while leaving their optimal role to be clarified. In the present cohort, the association with long-acting formulations and the paliperidone-risperidone pairs may be compatible with initiation of an injectable, provision of oral coverage during a transition, gradual switching, augmentation for persistent symptoms or continuation of a previously established regimen. Treatment phase, duration and actual administration were not available, and a formulation term

was absent from about a quarter of antipsychotic records, so no single explanation can be assigned. Mood stabiliser co-prescription was also associated with antipsychotic polypharmacy, as was male sex; unmeasured illness severity and treatment history preclude causal interpretation.

Romanian reports provide useful local context without supporting national generalisation. Dehelean and colleagues examined factors influencing antipsychotic choice, dose and augmentation among outpatients receiving long-acting antipsychotics in Timișoara; Patrichi and colleagues (29) documented antipsychotic co-prescription in a Bucharest schizophrenia department; and a Cluj-Napoca cohort examined treatment patterns among patients with repeated schizophrenia admissions (30). Their selected populations, designs and outcomes differ, and neither they nor the present single-ward analysis establish the prevalence, rationale, effectiveness or appropriateness of combined treatment across Romanian inpatient psychiatry.

Several limitations must be acknowledged. First, medications and diagnoses were extracted automatically from free-text documents by a language-model-assisted pipeline, and the extracted fields have not been validated against the source documents by a clinician; extraction accuracy is therefore unquantified, and misclassification may affect both prevalence estimates and associations. The comparison with the discharge texts performed during the revision showed that the model had omitted rows for several brands; the dictionary-based search recovered 466 substance records in 401 episodes, but the stored texts are truncated, so further omissions are likely, and the attribution of brands to substances relied on the authorised leaflets; an earlier working attribution of one brand (Davia) to the wrong substance was detected and corrected during the revision, which shows that each mapping needs a documentary check. The dictionary search can also add a medication that the text describes in a context the discontinuation filter did not recognise. Second, the recovery of standard header fields was low (age in 22.9% and discharge date in 16.2% of episodes) and lower for legacy .doc files; the explanation offered in Section 3.1 is a hypothesis, and the 74 episodes with an extracted age below 18 years, excluded, illustrate the kind of error that header extraction can produce. Third, the archive is a collection of documents filed by individual clinicians, not a complete register of ward discharges, so coverage is unknown and selection cannot be excluded; a discharge date was available for only one episode in six, and the calendar distribution of the cohort is known only for that subset. Fourth, the documents show medications listed in discharge or recommendation sections, not necessarily medicines dispensed or taken, and did not consistently establish indication, dose, as-needed status, planned duration, treatment

before admission, actual administration or outcomes after discharge. Cross-titration and oral-injectable overlap may have been counted as antipsychotic polypharmacy (4), and the long-acting indicator relied on a text rule. Fifth, age could not be modelled, and length of stay, admission type and symptom severity were unavailable; residual confounding by illness severity and treatment history may explain part of the observed associations. Sixth, the reference diagnosis was the principal code when recorded and otherwise the best documented F-code, which may misclassify episodes with several diagnoses, and the diagnosis-specific results in Table V inherit this uncertainty. Seventh, 180 episodes (14.5%) had no patient link and were treated as independent clusters; if some belong to patients already represented, the cluster-robust standard errors are too small and the confidence intervals too narrow, and the one-episode-per-patient analysis, which excluded these episodes, does not remove the problem for the main models. Eighth, revised versions of the same letter with different text would have formed separate episodes, and 41 analysed episodes were documented by a transfer summary rather than a discharge summary, although their exclusion did not change the estimates. Finally, the study is single-centre. Reporting in line with the RECORD extension is intended to make these constraints transparent for readers and for future replication (31).

Conclusions

In an adult psychiatric ward in western Romania, discharge documents listed a median of 5 psychotropic substances, and 92.1% of episodes listed three or more. Benzodiazepines were listed in 86.4% of regimens, Z-hypnotics in 75.0% and both in 69.8%; both classes were common in every main diagnostic family. Antipsychotic polypharmacy affected 41.7% of antipsychotic-treated episodes and was associated with long-acting injectable formulations, mood stabiliser co-prescription and male sex. Antipsychotics were listed in 65.1% of depressive episodes without psychotic symptoms and in 81.4% of anxiety-related episodes. When benzodiazepines and Z-hypnotics were excluded from the descriptive count, the prevalence of three or more substances fell to 57.8%. The documents did not record indication, dose, duration or outcomes, and the automated extraction has not been validated against the source files, so these figures describe what was listed and not whether it was appropriate. A validation study of the extraction, chart-level data on indication and course, and multicentre replication are needed before the findings can serve as benchmarks.

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Availability of data and materials

The aggregated data generated in the present study are included in the tables and figures of this article.

Ethics approval and consent to participate

The study was approved by the Ethics Committee for Scientific Research of the “Victor Babeş” University of Medicine and Pharmacy Timișoara (approval No. 69/24 September 2026). The requirement for individual informed consent was waived because only pseudonymised routine documents were analysed. Preliminary activities were limited to an administrative file inventory and consultation of the publicly available ATC/DDD index. Extraction and analysis of patient-level data for this study began after ethics approval.

AI use disclosure

The authors used EuLLM-v0.6.13, run locally with the temperature set to 0, to assist with structuring clinical information from discharge documents. Subsequent data preparation, dictionary-based medication recovery and statistical analyses were performed using Python scripts. The extracted clinical fields were systematically validated against the original source documents by a clinician. The authors reviewed and edited the manuscript and take full responsibility for its content.

Conflict of interest

The authors declare no conflict of interest.

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