BMC Geriatrics

RESEARCH

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Deprescribing psychoactive drugs in older orthogeriatric patients: findings from the GIOG2.0 Italian survey

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Abstract

Background Psychoactive drugs represent a major contributor to falls in older people. This study aims to evaluate the prescribing practice of psychoactive drugs in older people hospitalized for hip fracture (HF) and to explore independent correlates of deprescribing.

Methods Multicenter prospective observational study including patients with HF admitted to 13 Orthogeriatric wards of the Italian Group of Orthogeriatrics (July 2019-August 2022). Patients underwent a comprehensive geriatric assessment. The use of psychoactive drugs associated with a higher risk of falls was assessed using a dedicated checklist. Deprescribing was defined as any reduction in the number of psychoactive drugs upon discharge, and independent correlates of deprescribing were explored using logistic regression analyses. Cluster analysis by Partitioning around Medoids was also performed in the hypothesis that selected clusters of characteristics could be associated with deprescribing.

Results One thousand eight hundred fifty-four older individuals (mean age 84 years, 77% females) were studied; 1190 (64%) were not prescribed any psychoactive drug, while 474 (26%), 129 (7%), and 61 (3%) took 1, 2, 3 or more psychoactive drugs, respectively.

Among 664 patients on psychoactive drugs on admission, 177 (27%) had fewer prescriptions at discharge, mainly anxiolytics from 89 to 10 (50–6%), antipsychotics from 49 to 12 (28–7%) and antidepressants from 98 to 28 (55–16%). On the other count, 51 (8%) were prescribed more psychoactive drugs, mostly antidepressants from 25 to 45 (49–88%) and antipsychotics from 7 to 17 (14–17%). Functional autonomy (ADL aOR 0.87 [95%CI 0.78–0.97] $p < 0.001$), polipharmacy (aOR 1.15 [95%CI 1.03–1.29] $p < 0.001$) and the occurrence of post-operative delirium (aOR 1.71 [95%CI 1.09–2.66] $p < 0.017$) were independent correlates of deprescribing. More specifically, the clustering procedure could not improve the characterization of deprescribing; conversely, the deprescribing propensity significantly depended upon the center-specific prescriptive practice, not explained by other clinical-epidemiological factors.

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Conclusion Only a small proportion of patients hospitalized for HF undergoes deprescribing of psychoactive drugs, with considerable heterogeneity among centers, suggesting that the physician's attitude rather than patient-related factors affects deprescribing.

Keywords Hip fracture, Psychoactive drugs, Deprescriptions, Accidental falls, Older adults

Introduction

Hip fracture (HF) is a burdensome health care issue in older population, resulting in increased mortality and worsened quality of life [1, 2]. In 2019, 94,643 HFs were registered in Italy, with a major impact on morbidity and mortality: up to 5% of patients died within a month, 19% within a year [3].

Falls have been identified as the most important events leading to HF [2, 4, 5]. In addition, 36–56% of people who experienced a fall-related HF will fall at least once within 6–12 months following the fracture [6, 7].

Although falls usually have a multifactorial etiology, medications have been implicated as a major contributor to falls in the older population. Psychoactive drugs acting on the central nervous system, such as narcotics, benzodiazepines, antipsychotics, antidepressants, and antiepileptics, are the most commonly involved because they might alter vigilance, leading to sedation, delirium, dizziness, and altered balance with the potential risk of falls [8–10]. In addition, older people are also more susceptible to acetylcholine blockage with central or peripheral neurological side effects, and psychoactive drugs with anticholinergic properties have been associated with an increased risk of cognitive and functional decline as well as an increased risk of falls [11, 12].

The association between psychoactive drugs and risk of falling has been well established over the years, and interventional studies investigated the effect of the deprescribing of such medications on fall occurrence. A systematic review by Iyer et al. suggested that psychotropic drugs' discontinuation may produce improvements in cognitive and psychomotor function, resulting in patients being more alert and with better working memory, reaction times, and balance performance [13]. In a more recent systematic review, the withdrawal of psychoactive drugs was also effective in reducing the rate of falls [14]. To this purpose, an effective collaboration between different healthcare specialists, with emphasis on the potential role of the clinical pharmacist, could optimize the deprescribing process of psychoactive drugs leading to lower anticholinergic burden and related risks in older patients hospitalized for hip fracture [15–18]. Given the risks associated with psychoactive drugs in older individuals, we aimed to investigate physicians' practices regarding deprescribing such medications upon discharge analysing independent correlates of the process. Additionally, we aimed to characterize the clinical profile of individuals experiencing first-time prescriptions or changes in the prescription of such medications.

Methods

Data source and settings

We used data from a multicenter, prospective, observational study collecting data from 13 Italian orthogeriatric wards belonging to the Gruppo Italiano di OrtoGeriatria (Italian Group of Orthogeriatrics, GIOG 2.0), which are actually orthopedic wards with geriatric co-management [19]. The methods and objectives of the GIOG 2.0 study have been previously described [20]. Briefly, the study was designed to collect data over 5 years on routine care and key performance indicators in patients aged 65 years or more admitted for HF to provide best care practices. Web meetings were performed to standardize data collection among all the participating centers, and the RedCap Cloud platform was used to store and share anonymized data. At admission, all patients underwent a Comprehensive Geriatric Assessment (CGA), including data on socio-demographics, comorbidities, pharmacological therapy, mobility, and cognitive status. Type of HF, occurrence of delirium, setting, and prescribed medications at discharge were also registered. Patients were followed up for 120 days from hospital discharge, and vital status and the occurrence of hospitalization were assessed. The study protocol was centrally approved by the Brianza Ethics Committees and then ratified at all participating institutions.

The total sample included 1976 older individuals with HF recruited from July 2019 to August 2022. Patients who died during hospitalization ($n=38$) were excluded, as well as those with distal femoral fractures ($n=30$) and those with metastatic cancer ($n=54$) who required palliative care. Therefore, the total analytical sample considered for the present study was composed of 1854 patients.

Study measures and outcomes

For each patient, we considered information on age, sex, and comorbidities through the Charlson comorbidity index (CCI) [21]. Premorbid physical function was evaluated through the ability to perform the basic activities of daily living (ADL): dressing, moving in and out of bed, using the toilet, washing, eating, and urine

and fecal continence [22]. Disability was defined as loss of 2 or more ADLs [23]. At admission, nutritional status was assessed with the mini nutritional assessment (MNA) [24]. The number of all the medications regularly taken at home was available at admission not considering the over the counter (OTC) medications. Polypharmacy was defined as the presence of 5 or more drugs [25] and geriatricians were involved in the reconciliation of medications both at admission and discharge. Specifically, we focused on psychoactive medications, prescribed at admission and discharge, using a checklist of psychotropic active ingredients most commonly involved in falls, among anxiolytics, antipsychotics, antidepressants and antiepileptics [8, 26]. The detailed list of specific medications available in the GIOG 2.0 is reported in "Additional file 1". In this study, we focused on deprescribing, i.e. discontinuation or reduction of the number of psychoactive drugs during the hospital stay.

Analytical approach and statistical analysis

We hypothesized that admission to orthogeriatric care might be the occasion for the caring geriatrician to revise the pharmacological therapy and to reduce the burden of psychoactive drugs. Indeed, orthogeriatric care guidelines recommend to weaken the burden of psychoactive drugs in these patients [5, 27]. Thus, we performed a three-step approach as follows:

1) *Descriptive*: the general socio-demographic and clinical characteristics, along with the prevalence of psychoactive drug prescription at hospital admission and discharge, were reported using descriptive statistics. In particular, continuous variables were reported as mean with standard deviation (SD) or median with interquartile range (IQR). Conversely, categorical variables were presented with numbers and percentages. Comparisons were carried out with Chi-squared test, ANOVA or Kruskal-Wallis test, as appropriate. Transitions of the number of prescribed psychoactive drugs from admission to discharge were reported in Table 1.
2) *Correlative analysis*: limited to participants admitted free from psychoactive drugs, we compared patients discharged with a first prescription to those who had no psychotropics prescribed at discharge. Similarly, among participants admitted with at least one psychoactive drug, we compared the main clinical characteristics of patients grouped according to whether the number of psychoactive drugs increased or remained unchanged or decreased from hospital admission to discharge. Independent correlates of deprescribing, the main outcome of this study, were assessed through logistic regression analysis testing variables univariately correlated with the reduction in psychoactive drugs. To this purpose, the variables "ADL disability" and "Polypharmacy at admission" were excluded from the analysis due to collinearity.
3) *Interpretative cluster analysis*: we tested the hypothesis that selected clusters of features could identify patients with a distinctive evolution in psychoactive drug prescription. A cluster analysis with partitioning around medoids (PAM) was performed, including the following variables: age, sex, dementia, basic activities of daily living (ADL), post-operative delirium, and polypharmacy. Since an optimal number of clusters maximizing the goodness of fit could not

Table 1 General characteristics of the study population

N	1854	
Age (years), mean(SD)	83.6 (7.2)	
Sex (Female), n (%)	1413 (77%)	
Hospitalization length, median (IQR)	9 (7–13)	
MNA, n(%)		
At risk	888 (53%)	
Malnourished	202 (12%)	
CCI, median(IQR)	5 (4–7)	
Diabetes Mellitus, n(%)	392 (22%)	
CKD (Moderate-severe), n(%)	231 (13%)	
CHF, n(%)	204 (12%)	
Myocardial Infarction, n(%)	305 (17%)	
COPD, n(%)	157 (9%)	
Peripheral vascular disease, n(%)	252 (14%)	
Dementia, n(%)	537 (30%)	
ADL, median(IQR)	5 (3–6)	
ADL disability, n(%)[a]	754 (43%)	
Setting at discharge, n(%)		
Home	532 (35%)	
Rehabilitation	1010 (65%)	
Delirium in 72h after surgery, n(%)	538 (29%)	
N drugs at admission, median(IQR)	4 (2–6)	
Polypharmacy >5 at admission, n(%)	587 (33%)	
	Admission	Discharge
Psychoactive drugs, n(%)		
0	1190(64%)	1160 (63%)
1	474 (26%)	498 (27%)
2	129 (7%)	145 (8%)
≥3	61 (3%)	51 (3%)
Antidepressants	316 (17%)	404 (21.8%)
Anxiolytics	300 (16.2%)	220 (11.9%)
Antipsychotics	198 (10.7%)	204 (11%)
Gabapentinoids	24 (1.3%)	13 (0.7%)
Antiepileptics	12 (0.6%)	15 (0.9%)

Abbreviations: MNA mini nutritional assessment, *CCI* Charlson comorbidity index

[a] defined as the pre-existing loss of at least 2 activities of daily living

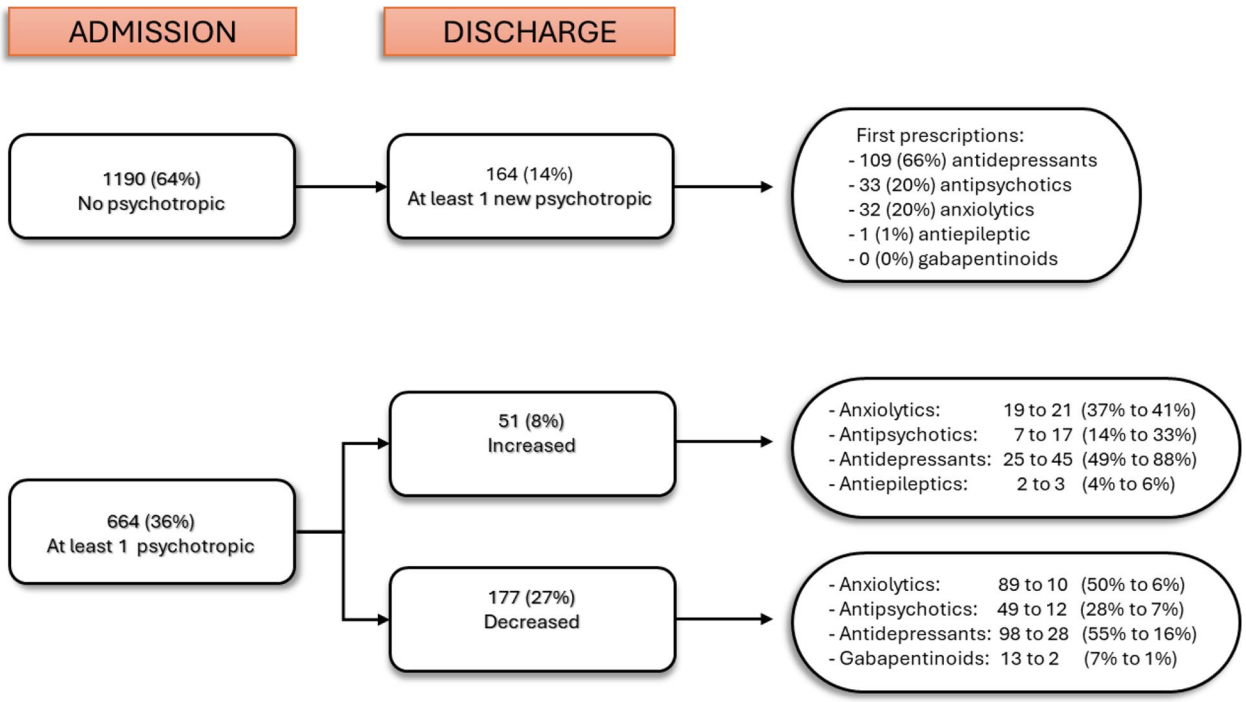

Fig. 1 Prescribing patterns of psychotropic drugs from admission to discharge

be identified, no more than 4 clusters were deemed adequate to avoid low numerosity given the overall sample size.

We further explored the potential impact of center-specific prescribing practices on the change of number of psychoactive drugs at discharge, by comparing the frequency of increase/stable/decrease prescriptions across the different study centers. To this purpose, centers enrolling less than 50 patients were not considered due to the limited sample size.

All analyses were carried out with R statistics 4.2.0 (R Foundation for Statistical Computing, Vienna, Austria, www.R-project.org).

Results

The study cohort comprised 1854 older individuals (women 77%, mean age 83.6 years) hospitalized for HF for a median of 9 days (Table 1). To note, the global burden of comorbidities was substantial, with a median CCI of 5 and high prevalence of diabetes mellitus (22%), peripheral vascular disease (14%), moderate-severe chronic kidney disease (CKD) (13%), congestive heart failure (12%) and COPD (9%). Nearly one-third (30%) of patients had dementia and almost half (43%) presented disability in at least two ADL before HF (median ADL pre-fracture score: 5). Polypharmacy was present in 587 individuals (33%) with a median of 4 prescribed drugs per patient.

Overall, at hospital admission 1190 (64%) patients were not prescribed any psychoactive drug, while 664 (36%) took at least 1 psychoactive drug. Out of these, 26%, 7% and 3% took 1, 2, 3 or more psychoactive drugs, respectively (Table 1). With regard to drug classes, 316 (17%) used antidepressants, 300 (16.3%) anxiolytics, 198 (10.7%) antipsychotics, 24 (1,3%) gabapentinoids and 12 (0.6%) antiepileptics.

In particular, 164 out of 1190 (14%) patients not taking any psychoactive drug received a first prescription, with 146 (89%), 15 (9%), 3 (2%) patients newly prescribed 1, 2, 3 or more psychoactive drugs, respectively. The most prescribed psychoactive drugs were antidepressants (66%, 109 out of 164), followed by anxiolytics (20%, 32 out of 164) and antipsychotics (20%, 33 out of 164) (Fig. 1). Individuals discharged with a first psychoactive drug prescription were more likely to be malnourished (19% vs. 9%, p 0.002) and disabled (47% vs. 34%, p 0.004) with an increased burden of comorbidities (median 5 [IQR 4–7] vs. 5 [IQR 4–6], p 0.012), dementia (42% vs. 18%, $p < 0.001$) and post-operative delirium (46% vs. 18%, $p < 0.001$) (Additional file 2).

Among 664 patients already taking a psychoactive drug at admission, 177 (27%) and 51 (8%) presented a reduction or an increase of such drugs at discharge, respectively (Table 2). In patients with a reduction in psychoactive drugs, anxiolytics prescriptions decreased from 89 to 10 (50–6%), antipsychotics from 49 to 12 (28–7%),

Table 2 Characteristics of patients admitted with at least one psychotropic drug, with an increased, decreased or stable number of psychotropic drugs at discharge (comparisons carried out with Chi-squared test for categorical variables, or with ANOVA or Kruskal-Wallis test for continuous variables, as appropriate)

	Number of psychotropic drugs at discharge (vs admission)						
	Increased		Stable		Decreased		*P* value
N	51		436		177		
Age (years), mean(SD)	85.1 (5.8)		84.2 (7.2)		83.7 (6.9)		0.459
Sex (Female), n (%)	40 (78%)		353 (81%)		147 (83%)		0.717
Hospitalization length, median (IQR)	9.5 (6–14)		9 (7–12)		10 (7–15)		0.091
MNA, n(%)							0.643
Well-nourished	12 (27%)		115 (28%)		44 (30%)		
At risk	24 (53%)		242 (59%)		80 (54%)		
Malnourished	9 (20%)		54 (13%)		24 (16%)		
CCI, median(IQR)	6 (4–7)		5 (4–7)		6 (4–7)		0.351
Diabetes Mellitus, n(%)	9 (18%)		86 (20%)		41 (24%)		0.522
CKD (Moderate-severe), n(%)	5 (10%)		51 (12%)		25 (15%)		0.558
CHF, n(%)	7 (14%)		43 (10%)		27 (16%)		0.128
Myocardial Infarction, n(%)	4 (8%)		65 (15%)		26 (15%)		0.372
COPD, n(%)	3 (6%)		42 (10%)		14 (8%)		0.586
Peripheral vascular disease, n(%)	13 (26%)		48 (11%)		35 (21%)		0.001
Dementia, n(%)	18 (36%)		207 (49%)		70 (42%)		0.088
ADL, median(IQR)	5 (2–6)		4 (2–6)		3.5 (1–6)		0.228
ADL disability, n(%)[a]	21 (43%)		234 (55%)		93 (54%)		0.253
Setting at discharge, n(%)							0.011
Home	7 (16%)		141 (38%)		43 (36%)		
Rehabilitation	38 (84%)		227 (62%)		76 (64%)		
Delirium in 72h after surgery, n(%)	26 (51%)		171 (39%)		79 (45%)		0.171
N Drugs at admission, median(IQR)	5 (3–8)		5 (3.5–7)		6 (3–8)		0.501
Polypharmacy >5 at admission, n(%)	24 (49%)		186 (44%)		87 (51%)		0.198
	Admission	Discharge	Admission	Discharge	Admission	Discharge	
Psychotropic drugs, n(%)							
No	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	134 (76%)	
1	45 (88%)	0 (0%)	321 (74%)	321(74%)	108 (61%)	31 (18%)	
2	6 (12%)	42 (82%)	76 (17%)	76 (17%)	47 (27%)	12 (7%)	
≥3	0 (0%)	9 (18%)	39 (9%)	39 (9%)	22 (12%)	0 (0%)	

Abbreviations: MNA mini nutritional assessment, *CCI* Charlson comorbidity index

[a] defined as the pre-existing loss of at least 2 activities of daily living

antidepressants from 98 to 28 (55–28%) and gabapentinoids from 13 to 2 (7–1%) (Fig. 1). On the other side, a small number of patients presented an increase in psychoactive drugs, mostly represented by antidepressants (from 25 [49%] to 45 [88%]) and antipsychotics (from 7 [14%] to 17 [33%]). The overall changes in psychotropic prescriptions were not associated with the presence of individual factors (Table 2).

Female sex (OR 1.54 [95%CI 1.04–2.36] p 0.038), number of preserved ADL (OR 0.84 [95%CI 0.78–0.91] $p<0.001$), increased burden of comorbidities (CCI OR 1.15 [95%CI 1.07–1.24] $p<0.001$), the presence of peripherical vascular disease (OR 1.64 [95%CI 1.09–2.42] p 0.015) and dementia (OR 1.72 [95%CI 1.24–2.38] p 0.001), the occurrence of post-operative delirium (OR 2.14 [95%CI 1.56–2.93] $p<0.001$) and the overall number of drugs at admission (OR 1.15 [95%CI 1.09–1.21] $p<0.001$) were associated with deprescribing at univariate analysis (Table 3). When adjusting for potential confounders, only preserved number of ADL (aOR 0.87 [95%CI 0.78–0.97] p 0.014), post-operative delirium (aOR 1.71 [95%CI 1.09–2.66] p 0.017) and the number of drugs at admission (aOR 1.15 [95%CI 1.03–1.29] $p<0.001$) remained significantly and independently

Table 3 Associated factors of deprescribing

Reduction in psychoactive drugs at discharge		
	OR	**aOR**
N	177	
Age (years), mean(SD)	1 (0.98–1.02), 0.821	
Sex (Female), n (%)	1.54 (1.04–2.36), 0.038	1.55 (0.96–2.59), 0.081
MNA, n(%)		
At risk	1.22 (0.84–1.81), 0.306	
Malnourished	1.66 (0.97–2.79), 0.057	0.9 (0.51–1.54), 0.681
ADL, median(IQR)	0.84 (0.78–0.91), 0	0.87 (0.78–0.97), 0.014
CCI, median(IQR)	1.15 (1.07–1.24), 0	0.99 (0.87–1.13), 0.906
Diabetes Mellitus, n(%)	1.12 (0.76–1.6), 0.563	
CKD (Moderate-severe), n(%)	1.17 (0.73–1.81), 0.485	
CHF, n(%)	1.53 (0.96–2.33), 0.06	0.91 (0.5–1.63), 0.733
Myocardial Infarction, n(%)	0.85 (0.54–1.29), 0.459	
COPD, n(%)	0.91 (0.49–1.56), 0.751	
Peripheral vascular disease, n(%)	1.64 (1.09–2.42), 0.015	1.47 (0.83–2.55), 0.16
Dementia, n(%)	1.72 (1.24–2.38), 0.001	1.18 (0.72–1.93), 0.499
Setting at discharge, n(%)		
Rehabilitation	0.93 (0.63–1.38), 0.696	
Delirium in 72h after surgery, n(%)	2.14 (1.56–2.93), 0	1.71 (1.09–2.66), 0.017
N Drugs at admission, median(IQR)	1.15 (1.09–1.21), 0	1.15 (1.03–1.29), 0
Polypharmacy >5 at admission, n(%)	2.32 (1.69–3.2), 0	
Enrolling centers[a]		
01	ref	ref
02	1.67 (0.95–2.87), 0.069	2.65 (1.19–5.74), 0.013
04	1.45 (0.9–2.33), 0.123	1.12 (0.62–1.97), 0.716
06	0.99 (0.42–2.1), 0.984	0.94 (0.38–2.07), 0.881
08	0.7 (0.44–1.12), 0.133	0.6 (0.34–1.04), 0.052
10	0.2 (0.06–0.51), 0.003	0.15 (0.04–0.41), 0.001
13	0.69 (0.2–1.78), 0.487	1.18 (0.33–3.34), 0.767

Abbreviations: MNA mini nutritional assessment, *CCI* Charlson comorbidity index

[a] Centers recruiting at least 50 patients

associated with the reduction of psychotropic drugs upon discharge (Table 3). With regard to the impact of the enrolling center on deprescribing, logistic regression models disclosed discordant associations across centers (e.g. OR 1.67 [95%CI 2.95–2.87] p 0.069 for center 2 and OR 0.20 [95%CI 0.06–0.51] p 0.003 for center 10 compared to center 1 taken as reference) which were confirmed also after correction for potential confounders (aOR 2.65 [95%CI 1.19–5.74] p 0.013 for center 2; aOR 0.15 [95%CI 0.04–0.41] p 0.001 for center 10 compared to center 1 taken as reference). This underlined the importance of center-specific prescriptive practice on the deprescribing propensity, not explained by other clinical-epidemiological factors.

The cluster analysis identified four clinical clusters of older patients admitted for HF (Table 4). The first one (Polypharmacy) included 155 individuals characterized by polypharmacy (100%), elevated burden of comorbidities (median CCI of 5), but partially preserved physical function (median ADL of 5, ADL disability 30%). The second one (Dementia) comprised 149 individuals with older age (mean 86.7, SD 6.4 years) with a burden of comorbidities (median CCI of 6) similar to Cluster 1, a high prevalence of dementia (87%) and post-operative delirium (77%), but not of polypharmacy. The third phenotype (Fit) consisted of 176 younger individuals (mean 82.1, SD 7.5 years) with a low burden of comorbidities (median CCI of 4) and preserved physical function (median ADL of 6, ADL disability 14%). Finally, the last phenotype (Very severe) consisted of 121 individuals with a high burden of comorbidities (median CCI of 6), dementia (89%), ADL disability (93% with median ADL

Table 4 Clinical phenotypes of older patients with psychotropic prescriptions admitted for hip fracture (comparisons carried out with Chi-squared test for categorical variables, or with ANOVA or Kruskal-Wallis test for continuous variables, as appropriate)

Cluster N	Polypharmacy 1	Dementia 2	Fit 3	Very severe 4	p
N	155	149	176	121	
Age (years), mean(SD)	83.2 (6.6)	86.7 (6.4)	82.1 (7.5)	85.2 (6.2)	0.859
Sex (Female), n (%)	120 (77%)	125 (84%)	147 (84%)	98 (81%)	0.427
Dementia, n(%)	21 (14%)	129 (87%)	22 (12%)	108 (89%)	< 0.001
ADL, median(IQR)	5 (4–6)	2 (1–3)	6 (5–6)	1 (1–2)	< 0.001
Delirium in 72h after surgery, n(%)	22 (14%)	114 (77%)	21 (12%)	98 (81%)	< 0.001
Polypharmacy >5 at admission, n(%)	155 (100%)	0 (0%)	0 (0%)	121 (100%)	< 0.001
Hospitalization length, median (IQR)	11 (8–14)	9 (7–12)	9 (7–12)	10 (7–14)	< 0.001
MNA, n(%)					< 0.001
Well-nourished	58 (40%)	14 (10%)	72 (43%)	15 (13%)	
At risk	73 (50%)	96 (70%)	80 (48%)	76 (68%)	
Malnourished	15 (10%)	28 (20%)	16 (10%)	21 (19%)	
CCI, median(IQR)	5 (4–7)	6 (5–7)	4 (4–6)	6 (5–8)	< 0.001
Diabetes Mellitus, n(%)	42 (27%)	31 (21%)	17 (10%)	32 (27%)	< 0.001
CKD (Moderate-severe), n(%)	20 (13%)	19 (13%)	9 (5%)	26 (22%)	< 0.001
CHF, n(%)	20 (13%)	16 (11%)	14 (8%)	19 (16%)	0.2
Myocardial Infarction, n(%)	29 (19%)	22 (15%)	7 (4%)	30 (25%)	< 0.001
COPD, n(%)	18 (12%)	11 (7%)	13 (7%)	10 (8%)	0.472
Peripheral vascular disease, n(%)	29 (19%)	22 (15%)	21 (12%)	15 (12%)	0.274
ADL disability[a], n(%)	47 (30%)	138 (93%)	24 (14%)	112 (93%)	< 0.001
Setting at discharge, n(%)					0.125
Home	56 (43%)	43 (38%)	46 (30%)	36 (43%)	
Rehabilitation	75 (57%)	70 (62%)	105 (70%)	48 (57%)	
N Drugs at admission, median(IQR)	8 (7–9)	4 (2–5)	3 (2–4)	7 (6–9)	< 0.001

Abbreviations: MNA mini nutritional assessment, *CCI* Charlson comorbidity index

[a] defined as the pre-existing loss of at least 2 activities of daily living

of 1), and polypharmacy (100%). These clusters were not different concerning psychoactive drug prescriptions. Conversely, when analyzing the change in psychoactive drug prescriptions across centers, deprescribing intervention significantly differed ($p < 0.001$) across different enrolling centers (Fig. 2).

Discussion

By analyzing a wide multicenter and prospective cohort of older Italian HF patients, we showed that around one out of three individuals was taking psychoactive drugs. Deprescription, defined as the discontinuation or reduction of the number of psychoactive drugs, occurred in around a quarter of patients at discharge, while 8% experienced an increase in psychoactive drug prescriptions. Of note, 14% of admitted patients without psychoactive drugs received a first prescription at discharge. Interestingly, no clinical characteristics, except for the peripheral vascular disease, possibly a chance finding, distinguished patients with increased/stable/decreased number of psychoactive drugs; more specifically, deprescribing seemed to depend mostly upon the practice of the individual centers.

Our study adds to the literature by providing data on psychotropic drug use among HF Italian patients. It has been estimated that psychoactive drug prevalence ranges between 20.5 and 29.8% among community-dwelling older people in Europe [28–30]. Our study found a higher prevalence (36%) in the use of such drugs, which could be influenced by the COVID-19 pandemic since the study was conducted between 2019 and 2022 when an increasing epidemiological burden of depression, anxiety disorders, stress, and other mental health problems was registered [31]. According to several authors, anxiolytics and antidepressants are the most frequently prescribed psychotropics among older outpatients and hospitalized patients [32–35]. Indeed, we found that anxiolytics and antidepressants were the most prescribed psychoactive drugs at admission, followed by antipsychotics, gabapentinoids and antiepileptics.

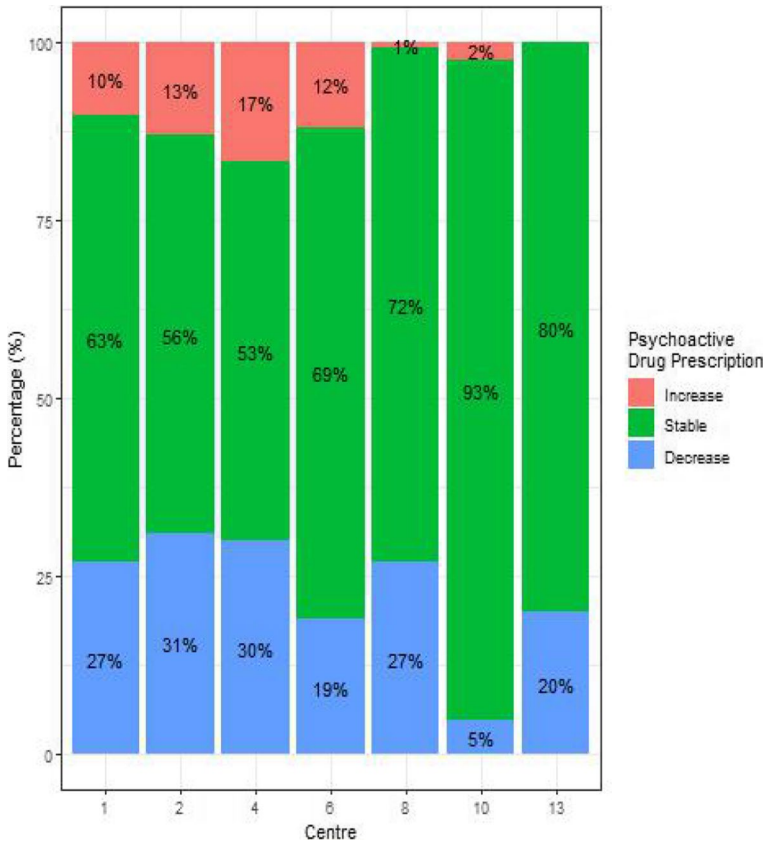

Fig. 2 Variation of psychoactive drug prescription across the enrolling centres with ≥ 50 recruited patients

Available studies among the geriatric HF population had inconsistent results concerning the in-hospital reduction of psychoactive drugs. Sjoberg et al. showed that a medication review performed by geriatricians did not significantly decrease the number of fall-risk-increasing drugs (FRIDs) prescriptions in older patients admitted for HF [36]. Similarly, Kragh et al. compared changes in medications before and after six months from the fracture event, finding an increased use of FRIDs from 67.7% at admission to 97.7% after discharge [37]. On the other hand, Munson et al. found that one-quarter of patients taking FRIDs, including psychoactive drugs, discontinued their use after the fracture, but new prescriptions exceeded deprescriptions, underlying that the fracture event did not consistently lead to a reduction of psychotropic drugs [38].

A similar pattern was observed in our study, suggesting that hospitalization is a missed opportunity for de-escalation of psychoactive drug therapy among older patients in whom the risks of these drugs likely outweigh the benefits [39]. The reasons are multifactorial and may depend on the complexity and severity of the clinical conditions of older inpatients. Facing acute medical problems may cause a lower level of attention toward deprescribing. Thus, it is likely that long-term therapies are more easily reassessed at a further post-discharge evaluation.

A multidisciplinary intervention may facilitate the implementation of deprescriptions improving patient safety and the quality of the pharmacologic therapy [40]. Hospitalization represents an opportunity to perform multidisciplinary pharmaceutical review with hospital pharmacists and other healthcare professionals. Actually, studies have shown that also a comprehensive medication reconciliation provided by clinical pharmacists significantly reduces the number of PIMs and medication-related problems in primary care and mental health settings, thus resulting in greater adherence to treatment guidelines [41, 42]. However, there's a need for further research on pharmacist-focused collaborative care approach and its role in the transition of care from admission to discharge in acute settings.

A related issue concerns the higher risk of psychotropic prescriptions due to hospitalization. Indeed, a small but not negligible proportion of individuals (14%) were newly prescribed and, in this group, around one out of ten individuals was taking two or more new psychoactive

drugs at discharge. Overall, emerging evidence showed an increased number of medications and polypharmacy from hospital admission to discharge with a consistent stable or increased prevalence of potentially inappropriate medications (PIMs) [43, 44]. In particular, older trauma patients are commonly frail and prone to post-operative complications, firstly delirium onset, and thus at increased risk of newly prescribed PIMs [45]. In addition, fall-related psychological problems due to functional decline and mobility limitations have been associated with both the increasing risk of falls and psychotropic prescriptions as a vicious circle [46–48]. Similarly, in the present study antidepressants were the most commonly increased and newly prescribed psychoactive drugs followed by antipsychotics.

To address the observed prescription pattern and medical behavior, we noticed that an increased odds of first psychotropic drug use was associated with functional and cognitive decline, increased burden of comorbidities, malnutrition, and post-operative delirium in line with previous studies [32, 35, 49].

On the other hand, by analyzing patients admitted with at least one psychoactive prescription, we found that changes in psychotropic drugs use from admission to discharge were associated to functional and clinical variables but not to specific clinical clusters. Moreover, deprescribing interventions were heterogeneous across the enrolling centers, which probably depend on interacting clinical, social and cultural factors relating to both patient and prescriber influencing therapeutical decisions [50, 51]. Indeed, the deprescribing intervention may be considered a holistic process that needs patient and clinician involvement in shared decision-making to improve clinical outcomes [52].

With a specific focus on prescribers, studies have associated therapeutic decisions and attitudes towards deprescribing to intrinsic factors such as medical awareness, cultural inertia, and self-confidence, which likely underlie the heterogeneous results we described across the different centres [50, 51, 53]. Properly designed studies are needed to identify the reasons for starting, decreasing, or changing psychotropic drugs in hospitalized patients. Available data do not allow us to assess whether actively deprescribing centres are characterized by distinctive organizational or structural characteristics.

Study limitations and strengths

The present study has some limitations. Firstly, the dosing regimen and indications of prescribed medications were not available. Thus, we considered only the reduction in the number of psychoactive drugs, but deprescribing stems from a slow and gradual tapering process occurring in several days or weeks to reduce the risk of early rebound symptoms and early risks of relapse [54]. It is possible that the median hospitalization length of 9 days was too short to detect all the deprescribing efforts, underestimating the process of deprescribing. In addition, we assessed delirium only in the three days following the surgical intervention and not throughout the entire hospitalization period. This prevented us from verifying whether the prescription of psychotropic drugs occurred as a result of the onset of incident delirium shortly before discharge.

The main strength of our study is that we used real-world data with a sample representative of the Italian geriatric patients admitted to acute wards after HF. Furthermore, the availability of a wide array of variables allowed us to comprehensively define the characteristics of our participants.

Conclusion

Deprescribing of psychoactive drugs occurs in a relatively small proportion of patients during hospitalization for HF, with substantial heterogeneity between centers suggesting that physician-related more than patient-related issues have a substantial role in the deprescribing practice.

Abbreviations

HF	Hip fracture
CGA	Comprehensive geriatric assessment
CCI	Charlson comorbidity index
ADL	Activity of daily living
MNA	Mini nutritional assessment
CKD	Chronic kidney disease
FRIDs	Fall-risk-increasing drugs
PIMs	Potentially inappropriate medications

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12877-025-05695-1.

Additional file 1. Drugs available in the GIOG2.0 by ATC classification.

Additional file 2. Characteristics of patients firstly prescribed with Psychotropics at discharge.

Acknowledgements

We are grateful to the investigators of the GIOG study group and all the personnel who contributed to collect data used for the present study: Emanuela Rossi, Maria Lia Lunardelli, Enrico Benvenuti, Stefania Maggi, Alberto Pilotto, Antonella Barone, Amedeo Zurlo, Monica Pizzonia, Luigi Residori, Paola Cena, Maurizio Corsi, Chiara Gandossi, Alessio Greco, Luca Tinelli, Alice Rivolta, Luca Molteni, Cristina Simonato, Francesca Colombo, Andrea Poli, Chiara Bendini, Alice Ceccofiglio, Gaia Rubbieri, Giulio Mannarino, Alessandro Cartei, Eleonora Barghini, Ilaria Del Lungo, Silvia Tognelli, Chiara Bandinelli, Emilio Martini, Giulia Venturelli, Alberto Cella, Chiara Ceolin, Labjona Haxhiaj, Martina Bonetto, Pier Federico Scaroni, Francesca Remelli, Elisa Crocetti, Elena Sperti, Luca Tagliafico, Stefano Cacciatore, Anna Masserdotti, Gianluca Bianco.

Authors' contributions

AC, ADV and RAI designed the study. AC, ADV performed the statistical analyses. All of the authors reviewed or contributed to the analysis and interpretation of the data, and preparation of the manuscript. Everyone who contributed significantly to the article has been included as an author providing final approval of the manuscript for publication.

Funding
Open access funding provided by Università degli Studi di Milano - Bicocca within the CRUI-CARE Agreement. The authors did not receive support from any organization for the submitted work.

Data availability
The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The study protocol was approved by the Brianza Institutional Review Board. The study was compliant with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards and no identifiable personal data were used for this study. Informed consent for participation in clinical studies was obtained from all patients.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Received: 6 October 2024 Accepted: 9 January 2025
Published: 1 March 2025

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