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Does hospitalization in the geriatric ward significantly change the burden of polypharmacy of the elderly in primary care?

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Abstract

Background. Polypharmacy is a common phenomenon in medicine, especially in the care of the elderly. Often required for proper treatment, can lead to many interactions and adverse events. It is not always nedded and possible to reduce the number of medications used by patients, especially the oldest ones. However, it is important to conduct a systematic review of the drugs they use. ***Aim.*** The possibility of reducing polypharmacy among patients referred to the acute geriatric ward by their GPs. ***Design and Setting.*** Number and type of medications used by patients before and ordered after hospitalization in the geriatric ward. ***Methods.*** Retrospective cohort study among patients aged 60 or over referred by GPs to the Geriatric Ward of the Specialist Hospital in southern Poland. ***Results.*** The study included 912 patients aged 60 or older, referred over 2 years to the geriatric ward (mean [SD] age 79.6 [7.8] years, female 65.2%). Before admission, the mean (SD) number of the medications used by the patients was 5.9 (3.1), after discharge 7.5 (2.6). During hospitalization the mean (SD) 2.7 (1.8) medications were added, 0.9 (1.2) was withdrawn. Medications changes were significantly more frequent in patients 80 years of age and older. The mean (SD), a patient aged 90 and more years was added 3.3 (2.0) and withdrawn 1.1 (1.4) medications, aged 80-89 years was added 2.9 (1.8) and withdrawn 1.1 (1.3) (p = 0.000). Compared to 60-years-olds the odds ratio for including at least one drug was 2.32 (95% CI 0.92-5.87) for 90-years-olds, 1,1 (95% CI 0,61-1,98) for 80-years-olds, 1.1 (95% CI 0.60-2.01) for 70-years-olds, for withdrawal it was 2,16 (95% CI 1,23-3,80), 2,64 (95% CI 1,70-4,11), 1.52 (95% CL 0.97-2.41) respectively. The medications that have been added include vitamin D (51.0%, n = 438) and calcium preparations (22.9%, n = 197), medications that improve cognitive functions (24.4%, n = 210), painkillers (14.8%, n = 127), statins / fibrates (11.6%, n = 100), diuretics (9.0%, n = 77), VKAs / DOACs (8.8%, n = 76), ACEIs /ARBs (8.1%, n = 70) and beta-blockers (8.0%, n = 69). The medications that have been withdrawn include ASA (8.5%, n = 73), aldosterone antagonists (7.1%, n = 61), ACEIs / ARBs (6.1%, n = 52), PPIs (6.1%, n = 52), digitalis preparations (4.5%, n = 39), diuretics (5.6%, n = 48), neuroleptics, benzodiazepines, sleepings pillss and anticonvulsants (8.4%, n = 72). ***Conclusions.*** Medications withdrawal in the case of polypharmacy in the elderly is not an easy process and should not be an end in itself. Hospitalization of patients referred to the acute Geriatric Ward by GPs was associated to a greater extent with the introduce new medications, (mean [SD] 2.7 [1.8]) than with the discontinuation (mean [SD] 0.9 [1.2]) unnecesary ones. It is important to actively approach the treatment of our patients with withdrawing unnecessary medications and adding only necessary of new ones according to the current medical knowledge. *Geriatria 2022;16:125-133. doi: 10.53139/G.20221624*

Keywords: polypharmacy, older people, medications withdrawal

Introduction

Polypharmacy is usually defined as taking multiple medications on a regular basis. The most common cut-off point is the use five or more medications daily. Rarely had been defined appropriate or rational polypharmacy, or recognised the distinction between appropriate and inappropriate medications (46.4%, n = 51 v. 6.4%, n = 7 systematic review of 111 articles) [1]. However, the awareness that polypharmacy has a qualitative dimension in addition to the quantitative one, is growing [2]. An important factor contributing to polypharmacy is the steady growth of the aging and

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increasingly frail population and, consequently, the increasing prevalence of multimorbidity associated with disability and mortality [3,4]. Most physicians, especially GPs, appreciate the ease with which they can prescribe next medication to elderly and how much more difficult is to give up certain medications („*deprescribe*") [5]. However, it is always worthwhile to systematically review medications, make attempts to eliminate potentially inappropriate and look for safe alternatives [6,7].

The aim of the study was to evaluate the possibility of reducing the number of medications taken by elderly patients referred to the geriatric ward by primary care physicians.

Methods

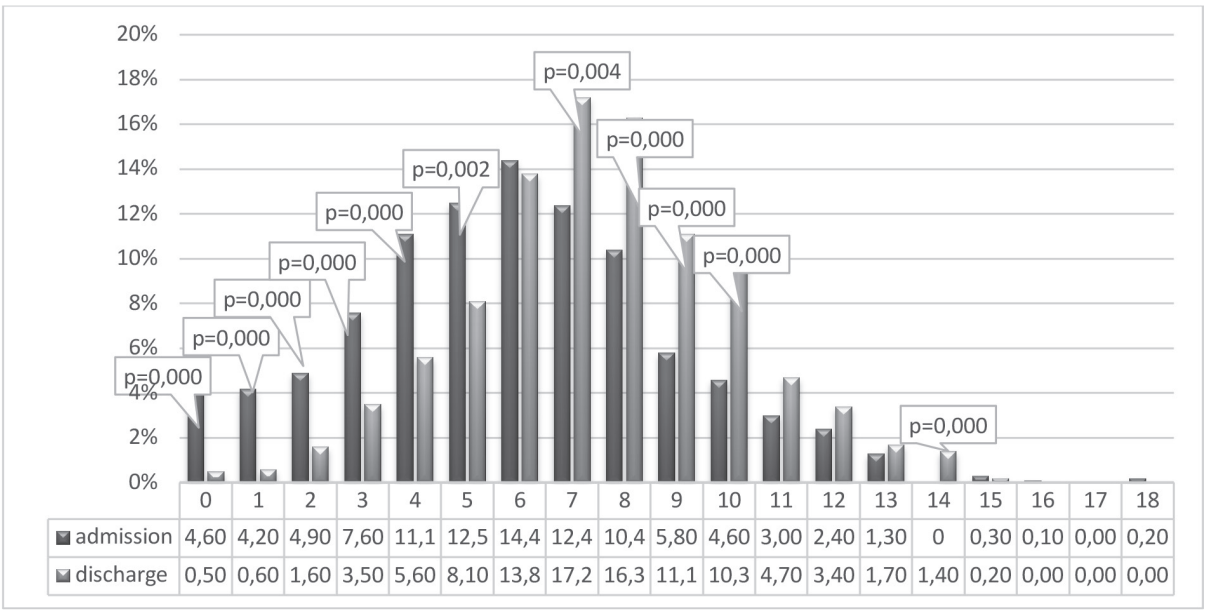
The study included 912 patients aged 60 years and older (mean [SD] age 79,6 [7,8] years, 65,2% female, n = 595) hospitalized in the period from 01/01/2016 to 31/12/2017 at the Geriatric Department of the Specialistic Hospital in Jasło. All of them were referred to the acute geriatric ward by their GPs, including 42.5% (n = 388) that were urgently admission. The largest group of 44.2% (n = 403) were patients aged 80-89 years. The oldest aged at least 90 years accounted for 10.4% (n = 95), the youngest aged 60-69 years 12.0% (n = 109) of the population. Rural residents dominated 62.4% (n = 569). Almost every third patient was hospitalized within the previous 6 months (27.4%, n = 250). Patients who died during their stay (3.8%, n = 35) were excluded from the study.

Results

Before admission to the geriatric ward, patients significantly more often did not use any medications or used from one to five. After hospitalization, statistically more often they were prescribed more, from seven to ten, and fourteen medications (figure 1).

Before hospitalization, at least 5 medications were used by 55.0% (n = 60) of patients aged 60-69 years, 66.6% (n = 201) aged 70-79 years, 72.8% (n = 286) aged 80-89 years and 62.8% (n = 54) aged 90 years and older ones (p = 0,003). After hospitalization, it was 79.6% (n = 86), 85.7% (n = 258), 93.9% (n = 355) and 83.3% (n = 75) drugs, respectively (p = 0,000) (figure 2,3).

Before admission to the geriatric ward, the youngest patients aged 60-69 years significantly more often didn't take medications (10.1%, n = 11, p = 0,007) or took only one (9.2%, n = 10, p = 0,023), aged 80-89 years more often took eleven (5.1%, n = 20, p = 0,011) (figure 2)



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
admission	4,60	4,20	4,90	7,60	11,1	12,5	14,4	12,4	10,4	5,80	4,60	3,00	2,40	1,30	0	0,30	0,10	0,00	0,20
discharge	0,50	0,60	1,60	3,50	5,60	8,10	13,8	17,2	16,3	11,1	10,3	4,70	3,40	1,70	1,40	0,20	0,00	0,00	0,00

Figure 1. Number of medications taken by patients before and after hospitalization in the geriatric ward

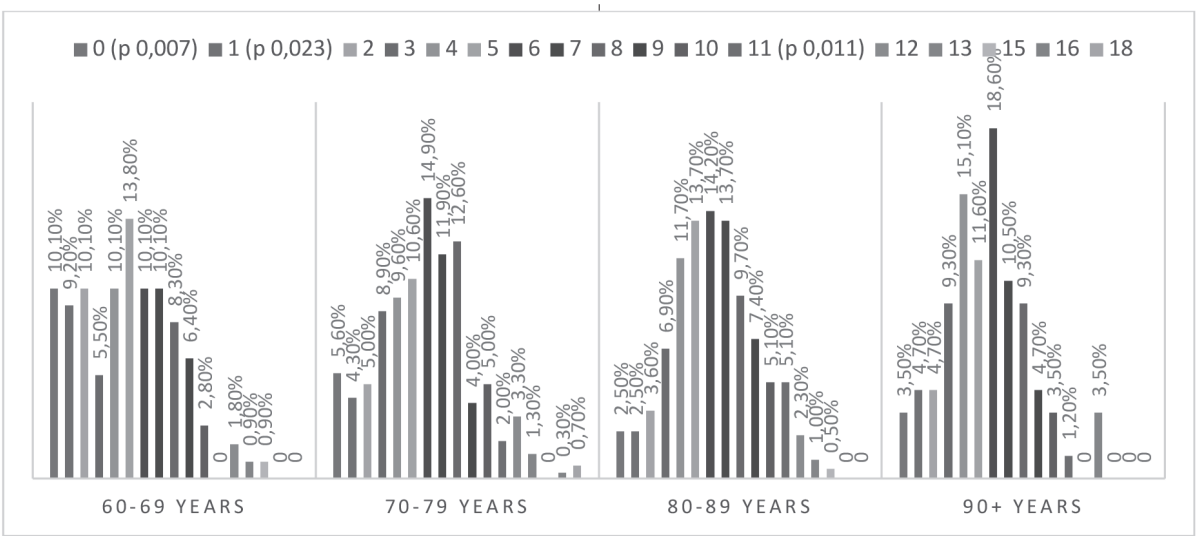


Figure 2. The number of medications taken by patients before hospitalization in the geriatric ward depending on their age

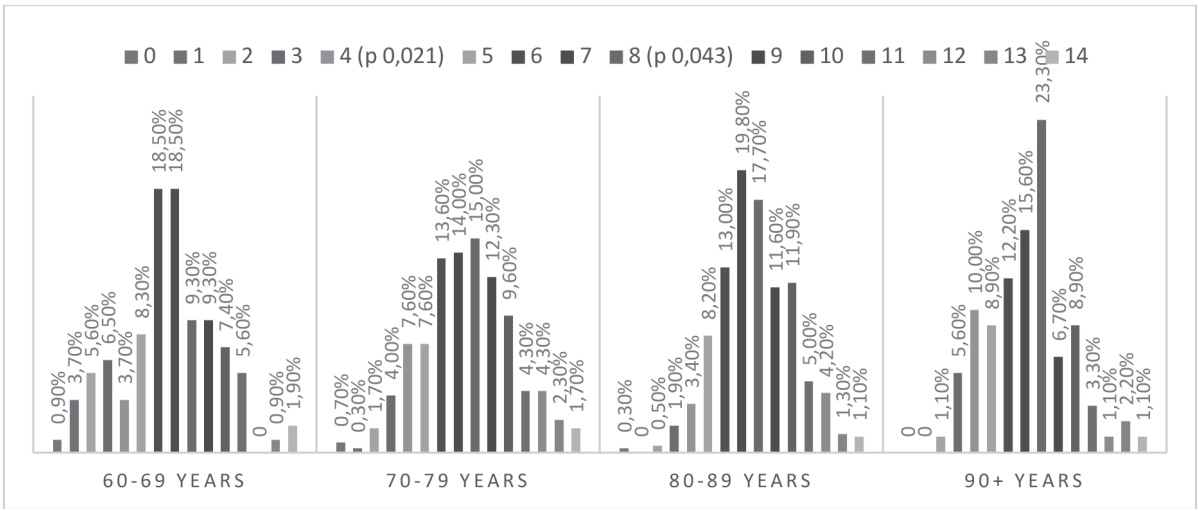


Figure 3. The number of medications taken by patients after hospitalization in the geriatric ward depending on their age

After hospitalization, the oldest patients, at least 90 years old, were significantly more often prescribed four (10.0%, n = 9, p = 0,021) or eight medications (23.3%, n = 21, p = 0,043) (Fig. 3).

There were no statistically significant differences in the amount of medications used before admission depending on gender. After discharge, three (5,2% n = 16, p = 0.047) and four (8.2%, n = 25, p = 0,015) medications were more frequently prescribed to men.

During the stay in the geriatric ward, a large group of patients had added medications, including vitamin D (51.0%, n = 438) and calcium (22.9%, n = 197), improving cognitive functions (24.4%, n = 210), painkillers (14.8%, n = 127), statins / fibrates (11.6%, n = 100), PPIs (9.1%, n = 78), diuretics (9.0%, n = 77), VKAs / DOAcs (8.8%, n = 76), ACEIs / ARBs (8,1%, n = 70), beta-blockers (8.0%, n = 69) and others (15.4%, n = 132) (table I)

Table I. Added and withdrawn medications during hospitalization in the geriatric ward

group of medications	added n = 859		withdrawn n = 859	
	amount	%	amount	%
beta-blockers	69	8.0	14	1.6
calcium channel blockers	63	7.3	28	3.3
statins/fibrates	100	11.6	19	2.2
ACEIs/ARBs	70	8.1	52	6.1
diuretics	77	9.0	48	5.6
potassium	43	5.0	32	3.7
vitamin D	438	51.0	–	–
calcium	197	22.9	–	–
antibiotics	109	12.7	8	0.9
SABA	26	3.0	2	0.2
LABA	23	2.7	1	0.1
LAMA	16	1.9	–	–
ICSs	45	5.2	12	1.4
aminophylline	9	1.0	21	2.4
thyroxine	9	1.0	2	0.2
aldosterone antagonists	15	1.7	61	7.1
digitalis preparations	3	0.3	39	4.5
allopurinol	34	4.0	8	0.9
ASA	53	6.2	73	8.5
VKAs/DOACs	76	8.8	12	1.4
LMWH	29	3.4	7	0.8
PPIs	78	9.1	52	6.1
diabetes mellitus tablets	25	2.9	19	2.2
insulin preparations	15	1.7	–	–
painkillers	127	14.8	27	3.1
narcotic painkillers	35	4.1	1	0.1
dressings for treating pressure ulcer	22	2.6	–	–
anti-parcinsonian	9	1.0	–	–
medications that improve cognitive functions	210	24.4	–	–
neuroleptics, benzodiazepines, sleeping pills, antiepileptics	48	5.6	72	8.4
antidepressants	44	5.1	19	2.2
other medications	132	15.4	120	14.0

The medicatios that were withdrawn among others, ASA (8.5%, n = 73), aldosterone antagonists (7.1%, n = 61), PPIs (6.1, n = 52), ACEIs / ARBs (6.1%, n = 52), digitalis preparations (4.5%, n = 39), diuretics (5.6%, n = 48), neuroleptics, benzodiazepines, sleepings pills and anticonvulsants (8.4%, n = 72) and others (8.4%, n = 72) (table I).

At the time of hospitalization, the youngest 60-69 years old patients more often were added statins / fibrates (25.0%, n = 27, p = 000) and antidepressants (10.2%, n = 11, p = 0,007), less often were added calcium (13.0%, n = 14, p = 0,024). The oldest at the age of 90 years more often were added vitamin D (64.6%, n53, p = 0,000), drugs improving cognitive functions (52.4%, n = 43, p = 0,000), VKAs / DOACs (19,5%, n = 16, p = 0,000), neuroleptics, benzodiazepines, sleeping pills and antiepileptics (12.2%, n = 10, p = 0,001) and dressings for treating pressure ulcer (9.8%, n = 8, p = 0,000), less

often were added ACEI / ARB (2.4%, n = 2, p = 0,045). In patients aged 80-89 years, painkillers were added statistically the lest frequently (11.1%, n = 41, p = 0,032).

Medications were significantly more often withdrawn in the 90-year-old and older patients: ASA (20.7%, n = 17, p = 0,000), ACEIs/ARBs (15.9%, n = 13, p = 0,000), painkillers (6.1%, n = 5, p = 0.025) and other (20.7%, n = 17, p = 0,031) and in the age of 80-89: diuretics (8.4%, n = 31, p = 0,011) and calcium channel blockers (4.9%, n = 18, p = 0.047).

Women were added more often vitamin D (56.7%, n = 318, p = 0,000) and calcium (28.5%, n = 160, p = 0,000), painkillers (16,6%, n = 93, p = 0.042), antidepressants (6,2%, n = 35, p = 0.042), and calcium channel blockers (8.9%, n = 50, p = 0.015), men antibiotics (17,1%, n = 51, p = 0.005), LABA (4.4%, n = 13, p = 0.026), LAMA (3.4%, n = 10, p = 0,018) and alpha-blockers (2.3%, n = 7, p = 0.043).

There were no significant differences between women and men in the amount of discontinued medications from particular groups.

Before admission to the geriatric ward, the mean (SD) number of medicationss per patient was 5.9 (3.1), after hospitalization increased to 7.5 (2.6). The mean (SD) 2.7 (1.8) of drugs was added, 0.9 (1.2) was discontinued. The oldest patients 80 years of age and older had their medication changed much more often. The mean (SD), a patient aged 80-89 years was added 2.9 (1.8) and withdrawn 1.1 (1.3) medications, aged 90 and more years was added 3.3 (2.0) and withdrawn 1.1 (1.4) (p = 0.000) (table II).

The odds ratio for including at least one medication during hospitalization was the highest in the oldest patients, 90 years of age and older (OR = 2.32; 95% CI 0.92-5.87). In the case of remaining patients, it was not much higher than in the youngest, aged 60-69 years (70-79 years OR = 1.10; 95% CI 0.60-2.01; 80-89 years OR = 1.10; 95% CI 0.61-1.98). Withdrawal of at least one drug was most likely in patients aged 80-89 years (OR = 2.64; 95% CI 1.70-4.11) and those aged 90 years and older (OR = 2.16; 95% CI 1.23-3.80) and then at the age of 70-79 (OR = 1.52; 0.97-2.41) (table III, IV).

Discussion

Clinical guidelines focus almost exclusively on single diseases. They do not explain how to set recom-

Table II. Number of drugs added and discontinued in patients hospitalized in a geriatric ward

medicatios groups	60-69 years n = 108		70-79 years n = 301		80-89 years n = 378		90 years and more n = 90		p
		SD		SD		SD		SD	
included	2.4	1.8	2.5	1.7	2.9	1.8	3.3	2.0	0.000
withdrawal	0.5	0.8	0.7	1.0	1.1	1.3	1.1	1.4	0.000

Table III. The odds ratio for including at least one medication during hospitalization

age	at least one medication added		OR	95 CI
	n	%		
60-69 years	92	84,4	1	x
70-79 years	261	85,6	1,10	0,60 – 2,01
80-89 years	345	85,6	1,10	0,61 – 1,98
90 and more years	88	92,6	2,32	0,92 – 5,87

Table IV. The odds ratio for withdrawn at least one medication during hospitalization

age	at least one medication withdrawn		OR	95% CI
		%		
60-69 years	37	33,9	1	x
70-79 years	134	43,9	1,52	0,97 – 2,41
80-89 years	232	57,6	2,64	1,70 – 4,11
90 and more years	50	52,6	2,16	1,23 – 3,80

mendations for patients with a high treatment burden [8]. It is considered that 5-10% of admissions to the emergency departments of patients over 65 years of age are caused by adverse drugs-related events (ADREs: adverse drugs reactions, drug-interactions, drug withdrawals, a medication errors, or noncompliance) [9-11]. They mainly result from polypharmacy and inappropriate prescribing of drugs, i.e. prescribing potentially inappropriate medications (PIMs) and/or not prescribing the appropriate (PROs: potential prescribing omissions) [12]. About 30% of older adults are also using medications that can cause a potential adverse drug interaction (PADIs). Half of the elderly patients admitted to the emergency department have at least one PADI on their list of medications used [10]. Evidence for an association between polypharmacy and many adverse outcomes, including adverse drugs-related events and disability, are still conflicting [13,14]. However, it was confirmed for example that with increasing numbers of cardiometabolic diseases, associations of polypharmacy with hospitalization and frailty were attenuated, remained statistically significant still [15].

Polypharmacy is most often defined as the use of five or more medications, includes prescription and over-the-counter, traditional and complementary medicines [16]. The assessments of the prevalence of polypharmacy are very varied. It is greater in the higher age groups. In study, which was conducted in 17 European countries and in Israel, among older people aged 65 or more living in the community, its frequency of occurrence was estimated at 26.3 – 39.9% (from 25.3% aged 65-74 years to 46.5% aged ≥ 85 years) [17]. Another study in Switzerland estimated its prevalence at 11,8% and it increased considerably with age, from 2.9% for age group 40–49 to 25.5% for age group 65–81 [18]. Based on adult electronic primary healthcare records from Scotland the level of polypharmacy was estimated at 36.0% in patients aged 60-69 years and 70.4% in patients over 80 years of age [19]. The level of polypharmacy among the elderly in Sweden (prospective cohort study) was estimated at 44.0% [20].

Admission to hospital is a driving factor behind polypharmacy. The study in Australia found that long-term medication use among the elderly (n = 424, mean age 80.3 ±8 years) increased during hospitalization from mean (SD) 6.6 (4) to 7.7 (4) (p <0.001) [21]. The mean (SD) number of drugs used by the elderly after hospitalization in twelve general hospitals in Flanders, Belgium (n = 400, mean [SD] age 81.7 [5] years) was 9.3 (3.4) [22]. Among 558 patients ≥65 years of age with adjudicated heart failure hospitalized in the United States the level of polypharmacy was 84% on admission and 95% on discharge (42% and 55% ≥ 10 drugs, respectively) [23].

Polypharmacy is associated with many negative clinical outcomes such as frailty, hospitalization and higher mortality. A systematic review and meta-analysis of thirty-seven studies showed bidirectional association between polypharmacy and frailty. Increased odds ratio of polypharmacy were seen for pre-frail (OR = 1,52; 95% CI 1,32-1,79) and frail persons (OR = 2,62; 95% CI 1,81-3,79). A significant higher odds of developing pre-frailty was found in robust persons with polypharmacy (OR = 1.30; 95% CI 1.12-1.51) [24]. In a nationwide longitudinal cohort study from South Korea an incrementally higher numer of daily prescribed medications was found to be associated with increasingly higher risk for hospitalization and mortality. These associations were consistent across subgroups of age, sex, residential area, and comorbidities. Furthemore, polypharmacy was associated with greater risk of hospitalization and death overall (OR = 1.18; 95% CI 1.18-1.19 and OR = 1.25; 95% CI 1.24-1.25) and in the matched cohorts (OR = 1.16; 95% CI 1.16-1.17 and OR = 1,25; 95% CI 1.24-1.25) [25]. Patients with polypharmacy have an increased risk of 1-year rehospitalization as compared with those in the no polypharmacy group (RR = 1.81; 95% CI = 1.18-2.75) [26]. Numerous studies have confirmed an association between polypharmacy and falls. For example, has found a 21% increase in the fall rate in people 60 years of age and older over a 2-year follow-up period (adjusted IRR = 1.21; 95% CI 1.11 – 1.31) [27]. Polypharmacy has been shown to be associated with a physical and cognitive impairment in older adults [28].

In the presented group of 912 patients referred to the geriatric ward by family doctors, 67.5% (n = 601) used at least 5 drugs. After hospitalization, it was the group of 88.2% (n = 774) of patients. Most often they were patients aged 80-89 (72.8%, n = 286 v. 93.9%, n = 355). The medications that were added most often were vitamin D (51.0%, n = 438) and calcium (22.9%, n = 197) preparations, antidementia drugs (24.4%, n = 210) and painkillers (14.8%, n = 127). Much difficulty it was possible to withdraw the drugs: ASA (8.5%, n = 73), aldosterone antagonists (7.1%, n = 61), PPIs (6.1%, n = 52), ACEIs (6.1%, n = 52), digitalis

preparations (4.5%, n = 39), diuretics (5.6%, n = 48) and neuroleptics, benzodiazepines, sleepings pills, anticonvulsants (8.4%, n = 72). The mean (SD) numer of medications used by a patient before admission was 5.9 (3.1), after 7.5 (2.6). The mean (SD) of 2.7 (1.8) were added, 0.9 (0.9) of drugs were discontinued. The most frequent changes in drugss concerned the oldest patients. The odds ratio for including at least one medications was highest in the patients 90 years of age and older (OR = 2.32; 95% CI 0.92-5.87). Withdrawal from at least one drug was most likely in patients 80-89 (OR = 2.64; 95% CI 1.70-4.11) years of age and those at least 90 years of age (OR = 2.16; 95% CI 1.23-3.80).

During hospitalization the mean (SD) of 3.1 (1.8) new diseases was diagnosed per patient. The most common were: vitamin D deficiency (37.6%, n = 343), renal failure (32.9%, n = 300), cognitive disorders (24.8%, n = 226), back pain syndromes (21.7%, n = 198), anemia (14.0%, n = 128), and heart failure (10.9%, n = 99). A weakness of the study may be the failure to analyze the relationship between the diagnosed diseases and the new drugs introduced.

However, the lack of a precise definition of polypharmacy complicates the analysis of its prevalence and impact on relevant health outcomes. Generally, polypharmacy can serve as an indicator for adverse clinical outcomes, a causal relation with clinical outcomes has not been unequivocally proven. The rational use of even many drugs can be often beneficial. The quality of the drug treatment, rather than the number of drugs used in the same patient, is crucial to a beneficial therapy [29]. Therefore, physicians should optimize prescription regardless of the number of diseases [15].

Most of the elderly with polytherapy are more likely to deprescribe medication, especially since forty percent of people taking 5 or more medicines a day report feeling burdened by their use. Because they trust their GPs, doctors should communicate responsibly evidence to them about the benefits and risks of medication use [30,31]. Especially addressing problematic polypharmacy, when "intended benefit of the medication is not realised" require compromise between medical and patient perspectives [2]. For GPs, it is obviously associated with responsibility to make decisions (ITP: *Individually Tailored Prescribing*) in the context of unsuitable guidelines, time constraints, deficient multidisciplinary co-operation and not fully proven benefits of deprescribing [32-34]. It should also be remembered that only 19.3% of the community--dwelling older people exposed to chronic polypharmacy fully adherent to all therapies [35].

Conclusions

It is very difficult to stop the medications that are being taken by the elderly. This is often impossible or even unnecessary. However, it's important to systematically review the medications they use. The oldest patients require the greatest attention. Among patients referred to the geriatric ward by GPs, it was in the group of patients aged 80 and more that drugs were most often withdrawn, and in the group of 90-year-olds they were added most often.

Abbreviations of words used in the text
ASA: *acetylsalicylic acid*
ACEIs: *angiotensin-converting enzyme inhibitors*
ARBs: *angiotensin II receptor blockers*
DOACs: *direct oral anticoagulants*
LABA: *long-acting beta agonists*
LAMA: *long-acting muscarinic antagonist*
LMWH: *low-molecular-weight-heparin*
ICSs: *inhaled corticosteroids*
PPIs: *proton pump inhibitors*
SABA: *short-acting beta agonists*
VKAs: *vitamin K antagonists*

Conflict of interest
None

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