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RESEARCH ARTICLE

Factors associated with patient preferences towards deprescribing: a survey of adult patients on prescribed medications

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Abstract

Background Deprescribing is a patient-centered intervention with inherent uncertainties and requires shared decision making and patient involvement. *Objective* In the present study, we aimed to investigate factors associated with patient preferences toward deprescribing in a representative sample in Japan. *Methods* We conducted a nationwide cross-sectional survey and used a quota sampling method to select representative samples of the Japanese general population. We collected data on participant demographic and clinical factors including the number of chronic health conditions and the number of regular prescription medications. Patients' willingness to deprescribe was assessed using the patients' attitudes towards deprescribing questionnaire. Multivariable logistic regression analyses were conducted to determine factors associated with the outcome measure. *Results* Data were analyzed for 1483 adult outpatients. The proportion of patients having willingness to deprescribe was 67.8%. After adjustment for age and gender, multimorbidity was significantly positively associated with patients' willingness to deprescribe [adjusted odds ratio (aOR) 1.35; 95% confidence interval (CI) 1.06–1.72]. A similar association was found with polypharmacy (aOR 1.43; 95% CI 1.08–1.88). The number of visits to medical institutions and increasing age were also found to be associated with patients' willingness to deprescribe. *Conclusion* Our study indicated that patient preferences towards deprescribing are consistent with the established clinical evidence regarding the efficacy of deprescribing for patients with multimorbidity and polypharmacy. These findings may be beneficial for health care providers to implement shared decision making regarding deprescribing effectively.

Keywords Chronic disease · Decision making · Deprescribing · Japan · Multimorbidity · Patient preference · Polypharmacy

Impacts on practice

- Health care providers may expect that outpatients with multimorbidity and/or polypharmacy would be willing to stop one or more of their regular prescription medicines if their doctor said it was possible.
- Outpatients are eager to undertake deprescribing, especially if they are experiencing treatment-related burden caused by a large number of medications or frequent visits to medical institutions.
- A shared decision making process is necessary for deprescribing, because there is individuality in patient preferences toward deprescribing.

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Introduction

The risk of overuse of medications, combined with the trend of population aging worldwide, is an area of prime concern in the health care system. Therefore, the focus is shifting from prescribing, which has traditionally been thought of as starting or renewing medications, to "deprescribing" [1]. Deprescribing is defined as the process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of improving health outcomes [2]. Polypharmacy is defined as the use of multiple regular medications for the treatment of one to several medical conditions and has the potential to increase the rates of adverse drug reactions, reduced quality of life, hospitalization, and mortality [3–5]. The evidence supporting the benefits and safety of deprescribing is growing, including health and quality of life benefits to patients and cost benefits to the health care system and the individual [1, 6].

Deprescribing is a patient-centered intervention with inherent uncertainties and requires shared decision making and patient involvement [7]. Instead of assuming that decisions should be guided by scientific consensus about effectiveness, shared decision making proposes that informed patient and family preferences should play a major role [8].

However, factors associated with patient preferences toward deprescribing have been unclear. For example, previous small-sample-size studies showed inconsistent results regarding the association between polypharmacy and patients' willingness to deprescribe [9–12]. Sirois et al. [11] reported the association between the number of medications that patients are taking and their willingness to deprescribe, but on the other hand, no similar relationship was found in other studies [9, 10, 12]. Additionally, associations of possible clinical factors including the presence of multiple chronic health conditions (multimorbidity), healthcare utilization, and health status with willingness to deprescribe have also been unclear. From patients' perspective, polypharmacy, complex regimens, and frequent visits to medical institutions are important treatment-related burden when it comes to improving patients' quality of life of patients [13].

To implement this process, the identification of the factors associated with patient preferences toward deprescribing should be beneficial for health care providers. In this study, we assessed comprehensive factors in relation to preferences toward deprescribing using a representative and larger sample.

Aim of the study

Our aim was to investigate the association of multimorbidity and polypharmacy with patient preferences toward deprescribing. We also investigated patient preferences toward deprescribing in relation to treatment-related burden, health status, and demographic factors.

Ethics approval

The institutional review board of the Institute for Health Outcomes and Process Evaluation Research (iHope International) provided ethical approval for this study. All methods were performed in accordance with the guidelines and regulations of the institutional review board of the iHope International.

Methods

Setting and participants

In this study, we used data collected from the Norm Study conducted in 2016. The Norm Study was a nationwide cross-sectional survey to evaluate health-related quality of life, health conditions, healthcare utilization, and sociodemographic characteristics in a Japanese general population [14]. We used a quota sampling method to select representative samples of the Japanese general population, aged 16–84 years, from a residents' panel administered by the Nippon Research Center. This large panel is composed of approximately 300,000 residents in Japan. In this study, we set quotas with regard to age, gender, and residential area to make our sample representative of the demographic distribution of Japan as shown in the most recent census data. Data collection was either web-based for patients aged ≤69 years or mail-based for those aged ≥70 years. The survey items of the web-based and the mail-based survey were identical. In the web-based survey, samples were extracted from the panel until the number of respondents reached a specified sample size. In total, 3307 participants completed the questionnaire. In this study, data were analyzed from outpatients aged 18 or older who were taking one or more regular prescription medications.

Measures

Exposure data

We used a structured questionnaire to collect data on demographic and clinical factors of participants. The questionnaire measured age, gender, years of education, household income, the number of chronic health conditions, the number of regular prescription medications, the number of doses per day, the number of visits to medical institutions during the past 3 months, and physical and mental health status. Years of education (less than high school, high school,

junior college, and more than or equal to college) and annual household income [< 3.00, 3.00–4.99, 5.00–6.99, 7.00–9.99, and ≥ 10.00 (million JPY)] were evaluated as categorical variables. We collected data on 17 chronic health conditions. Detailed information on the data collection of chronic health conditions is available in our previous study [14]. Multimorbidity was defined as the presence of two or more chronic health conditions in an individual. We asked patients a count of the medications that were regularly prescribed to them. Externally applied medications were excluded from the count of the regularly taken medications. Polypharmacy was defined as the concurrent use of five or more prescription medications, because in the previous study it was used to estimate the medication-related adverse effects for frailty, disability, falls and mortality [15]. Physical and mental health statuses were measured using the 36-Item Short Form Health Survey Physical Component Summary and Mental Component Summary scores [16, 17]. Scores ranged from 0 to 100, with higher scores indicating better health.

Outcome data

The primary outcome measure in this study was patients' willingness to deprescribe. This outcome was defined as a preference of withdrawal of one or more of inappropriate regular prescription medications under the supervision of doctors [2]. Patients' willingness to deprescribe was assessed using a global question in the patients' attitudes towards deprescribing (PATD) questionnaire [18, 19], which was developed by Dr. Emily Reeve et al. The PATD is a tool to assess patients' views and beliefs surrounding the number of medications that they are taking. Previous work has shown that the PATD has good reliability and validity [19]. Patients' willingness to deprescribe was determined from the question "If my doctor said it was possible, I would be willing to stop one or more of my regular medications." Participants were asked to rate this question on a 5-point Likert scale (1 = strongly agree, 2 = agree, 3 = unsure, 4 = disagree, and 5 = strongly disagree). Participants were identified as having willingness to deprescribe, if they responded "strongly agree" or "agree" to this question.

Data analysis

Descriptive statistics for continuous data are reported as means and standard deviation; categorical data are reported as frequencies and percentages.

Multivariable logistic regression analyses were conducted to determine the associations of multimorbidity and polypharmacy with patients' willingness to deprescribe. Each of the number of chronic health conditions and the number of regular prescription medications was included individually in the model to avoid multicollinearity. Then, we included gender and age that may confound the associations of multimorbidity and polypharmacy with the outcome in each model.

We also performed secondary analyses of the outcome in relation to treatment-related burden, health status, and demographic factors. First, each of the following clinical variables was included individually in the model: the number of doses per day, the number of visits to medical institutions, and the physical and mental health status. Second, we included gender and age that may confound the associations between these clinical factors and the outcome in each model. Next, the following demographic variables were included in the model: gender, age, years of education, and annual household income. For each analysis, we used a two-sided significance level of $p = 0.05$. Missing data for independent and dependent variables were accounted for using multiple imputation by fully conditional specification, with all demographic and clinical variables and the outcome variable in the imputation model, thus creating 20 imputed datasets.

Statistical analyses were conducted using R version 3.4.2 (R Foundation for Statistical Computing, Vienna, Austria; www.R-project.org/) and mice package for statistical analyses.

Results

Participants' characteristics

Out of a total of 3307 study participants, 1483 (44.8%) outpatients met the inclusion criteria and were included in the analyses (Fig. 1). Table 1 shows the characteristics of the study population. The proportion of elderly patients aged 65 or older was 39.7% (N = 590). Multimorbidity and polypharmacy were found in 774 (52.2%) and 349 (23.5%) patients, respectively. The proportion of patients having willingness to deprescribe was 67.8% (N = 1006).

Associations between clinical factors and patients' willingness to deprescribe

Table 2 shows unadjusted and adjusted associations between clinical factors (multimorbidity and polypharmacy) and patients' willingness to deprescribe. After adjustment for age and gender, multimorbidity was significantly positively associated with patients' willingness to deprescribe [adjusted odds ratio (aOR) 1.35; 95% confidence interval (CI) 1.06–1.72]. Polypharmacy was also positively associated with the primary outcome (aOR 1.43; 95% CI 1.08–1.88). In the secondary analyses, the number of visits to medical institutions were significantly associated with the primary outcome, but no such association was found with the number

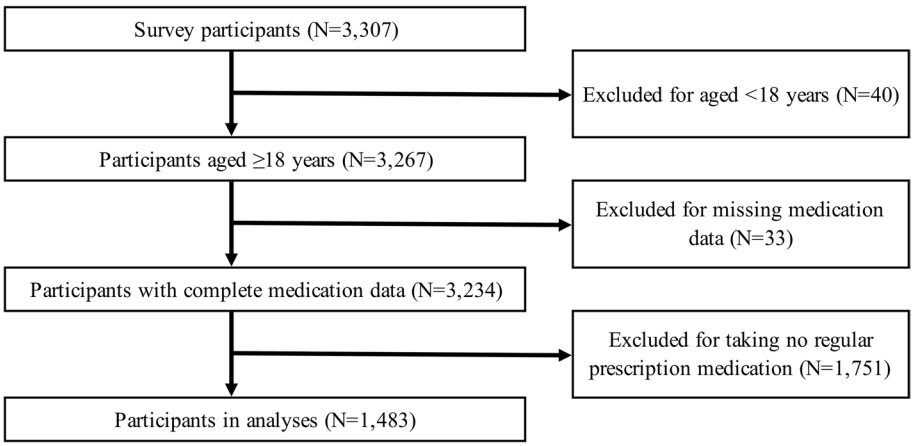

Fig. 1 Participant flow chart

of doses per day, physical health status, and mental health status in the adjusted models.

Associations between demographic factors and patients' willingness to deprescribe

Table 3 shows the associations between demographic factors and patients' willingness to deprescribe. Increasing age was found to be significantly associated with patients' willingness to deprescribe (OR per 10-year increase 1.12; 95% CI 1.04–1.20). All other associations between demographic factors and the primary outcome were not statistically significant.

Discussion

In a representative sample of Japanese adult outpatients, aged 18–84 years, our study identified factors associated with patient preferences toward deprescribing. Multimorbidity and polypharmacy were positively associated with patients' willingness to deprescribe. Similar associations were found with frequent visits to medical institutions and increasing age. The results of this study indicated that multimorbidity and associated patients' treatment-related burden have positive effect on patients' willingness to deprescribe.

In our study, 67.8% of patients reported that they would be willing to stop a regular medication if their physician informed them that it was possible. Other studies using PATD questionnaire reported higher proportion of patients with willingness to deprescribe than our study (92.0% in Australia, 93.4% in Singapore, and 89.0% in Italy) [9, 12, 20]. However, it is unclear whether these differences reflect cultural variation or not, because the settings of the previous studies in other countries were restricted to some healthcare facilities and should have introduced selection bias.

Previous studies have established relationship between multimorbidity and polypharmacy [21, 22]. There is growing direct evidence of the efficacy and safety of deprescribing for patients with polypharmacy [1, 6]. However, associations of multimorbidity and polypharmacy with patient preferences toward deprescribing have been unclear. Our study indicated that patient preferences towards deprescribing are consistent with the established clinical evidence regarding the efficacy of deprescribing for patients with multimorbidity and polypharmacy.

A key advantage of our study was its use of data from a nationwide representative sample of the Japanese adult outpatients, which allows for generalization of its results to the wider population. To the best of our knowledge, this is the first study showing the associations of multimorbidity and treatment-related burden with patient preferences toward deprescribing.

Our study had several potential limitations. First, since it relies on cross-sectional data, a causal association cannot be confirmed. However, the possibility of reverse causality is theoretically low. Second, while the quota sampling method ensures that the sample is representative of the quota-defining characteristics, other characteristics might be disproportionately represented in the sample group. Therefore, some selection bias may have affected our results. Third, although self-reported health conditions are commonly used to identify multimorbidity in a general population, this method of assessment may have introduced selection bias because the residents' panel did not include patients with diseases, such as advanced dementia. In addition, the use of self-reported data may have underestimated the prevalence of chronic health conditions in the study participants through misclassification bias. Fourth, no information on the types of medications taken were collected, thus we could not evaluate appropriateness of medications. However, polypharmacy is known as an important risk factor for potentially inappropriate medications [23]. Fifth, although we adjusted gender and age in the primary analyses, potential confounding cannot be completely ruled out.

Table 1 Participants' characteristics (N = 1483)

Characteristic	Total (N = 1483)	Willingness to deprescribe[a]	
		Present (N = 1006)	Absent (N = 471)
Gender, N (%)			
Male	755 (50.9)	517 (51.4)	234 (49.7)
Female	728 (49.1)	489 (48.6)	237 (50.3)
Data missing	0 (0.0)	0 (0.0)	0 (0.0)
Age (year), N (%)			
18–29	135 (9.1)	76 (7.6)	59 (12.5)
30–44	259 (17.5)	177 (17.6)	82 (17.4)
45–64	499 (33.6)	344 (34.2)	155 (32.9)
65–74	358 (24.1)	254 (25.2)	103 (21.9)
≥75	232 (15.6)	155 (15.4)	72 (15.3)
Data missing	0 (0.0)	0 (0.0)	0 (0.0)
Education level, N (%)			
Less than high school	68 (4.6)	47 (4.7)	21 (4.5)
High school	456 (30.7)	301 (29.9)	153 (32.5)
Junior college	274 (18.5)	180 (17.9)	94 (20.0)
More than or equal to college	572 (38.6)	400 (39.8)	171 (36.3)
Data missing	113 (7.6)	78 (7.8)	32 (6.8)
Annual household income (million JPY), N (%)			
< 3.00 (= 27,000 US dollar)	404 (27.2)	265 (26.3)	136 (28.9)
3.00–4.99	444 (29.9)	305 (30.3)	138 (29.3)
5.00–6.99	250 (16.9)	169 (16.8)	81 (17.2)
7.00–9.99	210 (14.2)	146 (14.5)	64 (13.6)
≥ 10.00	143 (9.6)	100 (9.9)	43 (9.1)
Data missing	32 (2.2)	21 (2.1)	9 (1.9)
Number of chronic health conditions, N (%)			
≤ 1	706 (47.6)	450 (44.7)	254 (53.9)
≥ 2 (multimorbidity)	774 (52.2)	555 (55.2)	215 (45.6)
Data missing	3 (0.2)	1 (0.1)	2 (0.4)
Number of regular prescription medications, N (%)			
1–4	1134 (76.5)	748 (74.4)	383 (81.3)
≥ 5 (polypharmacy)	349 (23.5)	258 (25.6)	88 (18.7)
Data missing	0 (0.0)	0 (0.0)	0 (0.0)
Number of doses per day, N (%)			
1	672 (45.3)	435 (43.2)	236 (50.1)
2	449 (30.3)	324 (32.2)	125 (26.5)
≥ 3	352 (23.7)	242 (24.1)	110 (23.4)
Data missing	10 (0.7)	5 (0.5)	0 (0.0)
Number of visits to medical institutions during the past 3 months, N (%)			
0–1	370 (24.9)	229 (22.8)	140 (29.7)
2–5	793 (53.5)	550 (54.7)	238 (50.5)
≥ 6	320 (21.6)	227 (22.6)	93 (19.7)
Data missing	0 (0.0)	0 (0.0)	0 (0.0)
SF-36 PCS, mean (SD)	46.4 (13.1)	46.0 (13.0)	47.4 (13.3)
Data missing	0	0	0
SF-36 MCS, mean (SD)	46.3 (11.8)	46.8 (11.6)	45.2 (12.2)
Data missing	0	0	0

SF-36 36-Item Short Form Health Survey, *PCS* Physical Health Composite Scale score, *MCS* Mental Health Composite Scale score

[a]Data missing for willingness to deprescribe: N = 6 (0.4%)

Table 2 Associations between clinical factors and patients' willingness to deprescribe (N = 1483)

	Unadjusted odds ratio (95% CI)	*p* value	Adjusted[a] odds ratio (95% CI)	*p* value
Primary exposure				
Number of chronic health conditions				
≤ 1	Reference		Reference	
≥ 2 (multimorbidity)	1.45 (1.17–1.81)	< 0.001	1.35 (1.06–1.72)	0.014
Number of regular prescription medications				
1–4	Reference		Reference	
≥ 5 (polypharmacy)	1.50 (1.15–1.98)	0.003	1.43 (1.08–1.88)	0.012
Secondary exposure				
Number of doses per day				
1	Reference		Reference	
2	1.40 (1.08–1.82)	0.011	1.39 (1.07–1.81)	0.013
≥ 3	1.19 (0.90–1.57)	0.213	1.17 (0.89–1.54)	0.273
Number of visits to medical institutions during the past 3 months				
≤ 1	Reference		Reference	
2–5	1.41 (1.09–1.83)	0.009	1.34 (1.03–1.75)	0.028
≥ 6	1.49 (1.08–2.05)	0.015	1.39 (1.00–1.92)	0.050
SF-36 PCS[b]	0.89 (0.80–0.99)	0.043	0.92 (0.82–1.03)	0.156
SF-36 MCS[b]	1.14 (1.02–1.27)	0.019	1.09 (0.96–1.22)	0.175

Each factor was included individually in the model

SF-36 36-Item Short Form Health Survey, *PCS* Physical Health Composite Scale score, *MCS* Mental Health Composite Scale score

[a]Adjusted for age and sex

[b]Continuous variable; OR per 1 standard deviation increase

Table 3 Associations between demographic factors and patients' willingness to deprescribe (N = 1483)

	aOR (95% CI)	*p* value
Gender		
Male	Reference	
Female	1.02 (0.81–1.28)	0.894
Age[a]	1.12 (1.04–1.20)	0.002
Education		
Less than high school	Reference	
High school	0.98 (0.55–1.74)	0.937
Junior college	1.00 (0.55–1.80)	0.995
More than or equal to college	1.30 (0.73–2.31)	0.377
Annual household income (million JPY)		
< 3.00 (= 27,000 US dollar)	Reference	
3.00–4.99	1.10 (0.82–1.46)	0.537
5.00–6.99	1.05 (0.74–1.48)	0.792
7.00–9.99	1.19 (0.82–1.72)	0.362
≥ 10.00	1.13 (0.73–1.73)	0.589

aOR adjusted odds ratio

[a]Continuous variable; OR per 10-year increase

Conclusion

Our study indicated that patient preferences towards deprescribing are consistent with the established clinical evidence regarding the efficacy of deprescribing for patients with multimorbidity and polypharmacy. These findings may be beneficial for health care providers to implement shared decision making regarding deprescribing effectively.

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Conflicts of interest Takuya Aoki, Yosuke Yamamoto, Tatsuyoshi Ikenoue, and Shunichi Fukuhara declare that they have no conflict of interest.

References

1. Reeve E, Thompson W, Farrell B. Deprescribing: a narrative review of the evidence and practical recommendations for recognizing opportunities and taking action. Eur J Intern Med. 2017;38:3–11.

2. Reeve E, Gnjidic D, Long J, Hilmer S. A systematic review of the emerging definition of "deprescribing" with network analysis: implications for future research and clinical practice. Br J Clin Pharmacol. 2015;80(6):1254–68.
3. Calderón-Larrañaga A, Poblador-Plou B, González-Rubio F, Gimeno-Feliu LA, Abad-Díez JM, Prados-Torres A. Multimorbidity, polypharmacy, referrals, and adverse drug events: are we doing things well? Br J Gen Pract. 2012;62(605):e821–6.
4. Olsson IN, Runnamo R, Engfeldt P. Medication quality and quality of life in the elderly, a cohort study. Heal Qual Life Outcomes. 2011;9:95.
5. Beer C, Hyde Z, Almeida OP, Norman P, Hankey GJ, Yeap BB, et al. Quality use of medicines and health outcomes among a cohort of community dwelling older men: an observational study. Br J Clin Pharmacol. 2011;71(4):592–9.
6. Scott IA, Hilmer SN, Reeve E, Potter K, Le Couteur D, Rigby D, et al. Reducing inappropriate polypharmacy: the process of deprescribing. JAMA Intern Med. 2015;175(5):827–34.
7. Jansen J, Naganathan V, Carter SM, McLachlan AJ, Nickel B, Irwig L, et al. Too much medicine in older people? Deprescribing through shared decision making. BMJ. 2016;353:1–6.
8. Elwyn G, Durand MA, Song J, Aarts J, Barr PJ, Berger Z, et al. A three-talk model for shared decision making: multistage consultation process. BMJ. 2017;359:j4891.
9. Reeve E, Wiese MD, Hendrix I, Roberts MS, Shakib S. People's attitudes, beliefs, and experiences regarding polypharmacy and willingness to deprescribe. J Am Geriatr Soc. 2013;61(9):1508–14.
10. Qi K, Reeve E, Hilmer SN, Pearson SA, Matthews S, Gnjidic D. Older peoples' attitudes regarding polypharmacy, statin use and willingness to have statins deprescribed in Australia. Int J Clin Pharm. 2015;37(5):949–57.
11. Sirois C, Ouellet N, Reeve E. Community-dwelling older people's attitudes towards deprescribing in Canada. Res Soc Adm Pharm. 2017;13(4):864–70.
12. Ng WL, Tan MZW, Koh EYL, Tan NC. Deprescribing: what are the views and factors influencing this concept among patients with chronic diseases in a developed Asian community? Proc Singap Healthc. 2017;26(3):172–9.
13. Tran V-T, Harrington M, Montori VM, Barnes C, Wicks P, Ravaud P. Adaptation and validation of the Treatment Burden Questionnaire (TBQ) in English using an internet platform. BMC Med. 2014;12(1):109.
14. Aoki T, Yamamoto Y, Ikenoue T, Onishi Y, Fukuhara S. Multimorbidity patterns in relation to polypharmacy and dosage frequency: a nationwide, cross-sectional study in a Japanese population. Sci Rep. 2018;8(1):3806.
15. Gnjidic D, Hilmer SN, Blyth FM, Naganathan V, Waite L, Seibel MJ, et al. Polypharmacy cutoff and outcomes: five or more medicines were used to identify community-dwelling older men at risk of different adverse outcomes. J Clin Epidemiol. 2012;65(9):989–95.
16. Fukuhara S, Bito S, Green J, Hsiao A, Kurokawa K. Translation, adaptation, and validation of the SF-36 Health Survey for use in Japan. J Clin Epidemiol. 1998;51(11):1037–44.
17. Fukuhara S, Ware JE, Kosinski M, Wada S, Gandek B. Psychometric and clinical tests of validity of the Japanese SF-36 Health Survey. J Clin Epidemiol. 1998;51(11):1045–53.
18. Reeve E, Shakib S, Hendrix I, Roberts MS, Wiese MD. Development and validation of the patients' attitudes towards deprescribing (PATD) questionnaire. Int J Clin Pharm. 2013;35(1):51–6.
19. Reeve E, Low LF, Shakib S, Hilmer SN. Development and validation of the revised Patients' Attitudes Towards Deprescribing (rPATD) Questionnaire: versions for older adults and caregivers. Drugs Aging. 2016;33(12):913–28.
20. Galazzi A, Lusignani M, Chiarelli MT, Mannucci PM, Franchi C, Tettamanti M, et al. Attitudes towards polypharmacy and medication withdrawal among older inpatients in Italy. Int J Clin Pharm. 2016;38(2):1–8.
21. Nobili A, Garattini S, Mannucci P. Multiple diseases and polypharmacy in the elderly: challenges for the internist of the third millennium. J Comorbidity. 2011;1(1):28–44.
22. Mannucci PM, Nobili A, REPOSI Investigators. Multimorbidity and polypharmacy in the elderly: lessons from REPOSI. Intern Emerg Med. 2014;9(7):723–34.
23. Steinman MA, Seth Landefeld C, Rosenthal GE, Berthenthal D, Sen S, Kaboli PJ. Polypharmacy and prescribing quality in older people. J Am Geriatr Soc. 2006;54(10):1516–23.