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ORIGINAL RESEARCH

Medication-related risk factors associated with health-related quality of life among community-dwelling elderly in China

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Background: Previous studies have demonstrated that medication adherence has an impact on health-related quality of life (HRQoL). However, other medication-related factors that may influence HRQoL have not been extensively studied, especially factors based on the Medication-Risk Questionnaire (MRQ), and such studies are mostly done in Western countries. Our objective was to explore risk factors associated with HRQoL among community-dwelling elderly with chronic diseases in mainland China, especially the medication-related risk factors regarding MRQ.

Methods: The study was conducted in a community health service center through surveys to eligible patients. The main outcomes of HRQoL were assessed by the EuroQol-5D (EQ-5D) scale and EQ-visual analog scale (EQ-VAS). Medication-related risk factors according to MRQ associated with HRQoL were identified using a multiple linear regression.

Results: A total of 311 patients were analyzed, averaging 71.19±5.33 years, and 68.8% were female. The mean EQ-5D index was 0.72±0.09, and the mean EQ-VAS score was 71.37±11.97. The most prevalent problem was pain/discomfort, and 90.0% believed that they could take care of themselves without any problems. Sex, age, educational level, frailty, function status, and certain medication-related factors regarding MRQ were found to be significant factors impacting the HRQoL. A multivariate analysis showed that MRQ factors of polypharmacy, multimorbidity, feeling difficultly with taking medicines as prescribed, and taking medicines with narrow therapeutic index had negative impacts on the quality of life.

Conclusion: Patient's internal characteristics and medication-related risk factors according to MRQ were associated with quality of life. The results of the MRQ is an indicator of quality of life that can identify patients who need interventions.

Keywords: quality of life, medication risk factors, elderly, community-dwelling, EQ-5D

Introduction

The population around the world is rapidly aging,[1,2] and the elderly population, aged ≥60 years, is expected to grow by 56% from 2015 to 2030, with the fastest growth in developing countries – India (64%), South Korea (77%), and China (71%).[3,4] However, living longer does not necessarily mean health and longevity,[2] and a person's quality of life may decline. With aging, an elderly may frequently suffer from multimorbidity and experience symptoms due to age-related changes in pharmacokinetics and pharmacodynamics.[5,6] The World Health Organization (WHO) report on Aging and Health defines "healthy aging" as the process of developing and maintaining the functional ability that enables well-being in older age, a process that runs through a person's entire life rather than a specific point in time.[1,4]

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Health-related quality of life (HRQoL) is an important indicator of an individual's health status, which can be used to evaluate the effectiveness of health care interventions and improve treatment outcomes.[7,8] HRQoL is a multidimensional concept, which is defined as the state of health of individuals under the influence of illness, medical interventions, aging, and social changes, as well as subjective satisfaction associated with their economic, social, and cultural values.[9–11] HRQoL measures have been identified as a significant endpoint for understanding the health status of older people and evaluating the effects of other related factors for the quality of life.[12]

Medications are widely used in the elderly to reduce morbidity and mortality, and they have an important role in older patients' health status.[13] However, medications may also increase the risk of medication-related problems (MRPs), which result in additional health care costs, and the associated negative health outcomes have attracted a widespread attention. Many studies identified the relationship between medications and quality of life, which demonstrated the effects of medication adherence on HRQoL.[14–16] However, other medication-related factors that may influence HRQoL have not been extensively studied, especially factors based on medication-risk questionnaire (MRQ). The MRQ is a validated self-administered tool[6,17,18] that can identify patients who are at a higher risk of experiencing an MRP, notably for the elderly. A better understanding of the relationship between medication-related factors and HRQoL could assist in improving the quality of life in the elderly. This study aimed to explore the relationship between medication-related factors and HRQoL in community-dwelling elderly patients with chronic diseases in mainland China.

Methods

Setting and participants

The study took place in a Community Health Service Center (CHSC) in the suburb of Chongqing, a national central city located in the southwest of China, from March 1 to May 31, 2016. The study subjects were patients who came to the CHSC for routine physical examinations. Patients were invited to participate in the study if they met the following criteria: 1) age ≥65 years and 2) taking one or more chronic medications for a period of ≥3 months. Exclusion criteria were patients with 1) severe or terminal illness, 2) functional or cognitive severe impairment (Barthel index ≤60 or a score of <10 in HDS-R), and 3) inability to complete questionnaires.

A sample size of 196 was calculated based on a prevalence of chronic diseases at 85%,[19] with a precision of 5% and a confidence interval of 95%. We invited 350 patients to participate in the study, 15 patients refused (4.3%), and 24 patients were excluded for the following reasons: severe cognitive impairment (n=5), severe functional impairment (n=7), and incomplete information (n=12). Finally, a total of 311 patients participated and were included in the final analysis.

Survey instruments and data collection

Demographic information was obtained for the patient sample on sex, age, education level, residence setting, marital status, and type of health insurance. Clinical information collected was chronic disease states and chronic medications. Each patient was also assessed on cognitive function using the Revised Hasegawa Dementia Scale (HDS-R), function status using the basic activities of daily living (BADL), frailty using the Reported Edmonton Frail Scale (REFS), medication-related risk factors using the MRQ, and HRQoL using the EuroQol-5D (EQ-5D) scale. The total score of the REFS ranges between 1 and 18, and a cutoff point for frailty is 8.[20] The HDS-R has a total score of 32.5, and a score of <10 is used to detect severe cognitive impairment.[21,22] The BADL (Barthel index) is a 10-item scale, and the total score ranges from 0 to 100, with a score of ≤60 indicating functional impairments.[23] MRQ, first developed and validated by Barenholtz Levy in 2003,[18] has 10 items based on patient's medication use, and each item has a "yes" or "no" option. EQ-5D scale, a well-known and widely used generic HRQoL instrument, was developed by the EuroQoL group.[24–26] EQ-5D has been used to evaluate the quality of life in Chinese.[27] The EQ-5D consists of the following two parts: the EQ-5D descriptive system and a EQ-visual analog scale (EQ-VAS). The EQ-5D descriptive system has five dimensions, including mobility, self-care, usual activities, pain/discomfort, and anxiety/depression.[24,26] Each dimension has the following three levels: no problems, some or moderate problems, and severe or extreme problems. The EQ-5D health states were converted into "the EQ-5D index", a single index "utility" score, by using a scoring algorithm based on the overall population, and the EQ-5D index in this study was calculated by using the Japanese value set scoring algorithm as a Chinese scoring algorithm is not yet available.[28] The EQ-VAS is a 20 cm vertical VAS, with the top 100 points labeled "the best health status in mind" and the bottom 0 point labeled "the worst health status in mind", and requires participants to rate their overall health on the vertical line that represents "your health status today".

Four trained pharmacy students who were familiar with the study objectives and methodology conducted the surveys through face-to-face interviews. Surveys were first piloted in 20 patients to evaluate the validity and reliability of the questionnaires, and 18 (90.0%) patients completed. Final

questionnaires in the study were appropriately adjusted based on the pilot study.

Statistical analysis

All statistical analyses were carried out by SPSS, version 22.0. A descriptive analysis was conducted for demographics, clinical characteristics, MRQ, and quality of life. Categorical variables were presented as frequencies and percentages, and continuous variables were presented as mean and standard deviation. The Student's *t*-test was used for continuous variables, and chi-square test was used for categorical variables. A one-way analysis was performed to identify the relationships between factors and quality of life in both EQ-5D index and EQ-VAS. Medication-related risk factors according to MRQ were entered into a multiple linear regression model to further identify the association between medication-related risk factors and HRQoL. $P<0.05$ was considered as statistically significant. To prevent multicollinearity, a variance inflation factor (VIF) was generated among the variables. Multicollinearity is unlikely to be problematic if VIF <10.0.[29]

Ethical approval

The study was approved by the Ethics Committee of The First Affiliated Hospital of Chongqing Medical University, and all participants signed informed consent forms.

Results

Participant characteristics

A total of 311 patients participated in the study, average age 71.19±5.33 years, and 68.8% were female. The characteristics and clinical data of the study population are summarized in Table S1. The mean number of chronic diseases was 4.47±2.10, and the three most common chronic conditions were hypertension (80.4%), hyperlipidemia (42.4%), and diabetes mellitus (37.6%). A total of 2.9% of patients were considered low function (dependent) and 10.3% were frail based on REFS. The daily average number of drugs taken was 4.96±2.50, and the three most common drug classes classified by the anatomical therapeutic chemical (ATC) classification[30] were calcium channel blockers (66.6%), agents acting on the renin–angiotensin system (43.4%), and lipid-modifying agents (30.9%). In addition, 54.7% of patients were exposed to polypharmacy (taking ≥5 medications), 21.5% took Chinese herbal medicine, and 24.1% took dietary supplements.

Medication-risk questionnaire

According to the MRQ, a total of 89.4% of respondents reported having more than one risk factor for MRP. A significant number of patients took five or more different medicines (54.7%) or had high daily pill burdens (45.0%), taking ≥12 tablets or capsules. This may be related to 74.3% of patients having three or more medical problems. However, 85.2% of patients indicated that they know the reasons of taking their medications. The details are shown in Table 1.

The HRQoL

In total, the mean value of EQ-5D index was 0.72±0.09 and the mean EQ-VAS score was 71.37±11.97. The frequencies and percentages of each dimension are summarized in Table 2. Overall, the most prevalent problem was pain/discomfort, with 75.9% of the elderly rated as moderate and 3.2% rated as severe. The least frequent problem was the self-care dimension, and 90.0% of the elderly took care of themselves without any problems.

The percentages of individuals with problems in EQ-5D dimensions by age and sex are presented in Table 3.

Table 1 Frequencies of item responses to medication-risk questionnaire

Items	Yes, n (%)	No, n (%)
Q1. Do you currently take five or more different medicines?	170 (54.7)	141 (45.3)
Q2. Do you currently take 12 or more tablets or capsules per day?	140 (45.0)	171 (55.0)
Q3. Do you take any of the following medicines: carbamazepine, lithium, phenytoin, warfarin, digoxin, phenobarbital, procainamide, and theophylline?	15 (4.8)	296 (95.2)
Q4. Does more than one doctor prescribe medicines for you on a regular basis?	229 (73.6)	82 (26.4)
Q5. Are you taking medicines for three or more medical problems?	231 (74.3)	80 (25.7)
Q6. Are your prescriptions always dispensed at the same pharmacy?	185 (59.5)	126 (40.5)
Q7. Do you collect your own medicines from the pharmacy?	115 (37.0)	196 (63.0)
Q8. Is it difficult for you to take your medicines as prescribed?	95 (30.5)	216 (69.5)
Q9. Have your medicines or the instructions on how to take them been changed four times or more in the last 12 months?	6 (1.9)	305 (98.1)
Q10. Do you know why you are taking all of your medicines?	265 (85.2)	46 (14.8)

Note: Barenholtz Levy H. Self-administered medication-risk questionnaire in an elderly population. 37(7–8), pp.982–987, copyright © 2003 by *Ann Pharmacother*. Reprinted by Permission of SAGE Publications, Inc.[50]
Abbreviation: Q, question.

Table 2 Frequencies of each level to quality of life among participants

Dimension	No problem, n (%)	Moderate problem, n (%)	Severe problem, n (%)
Mobility	200 (64.3)	110 (35.4)	1 (0.3)
Self-care	280 (90.0)	31 (10.0)	0 (0.0)
Usual activities	147 (47.3)	163 (52.4)	1 (0.3)
Pain/discomfort	65 (20.9)	236 (75.9)	10 (3.2)
Anxiety	266 (85.5)	45 (14.5)	0 (0.0)

Women had statistically significantly higher percentages in pain/discomfort and anxiety problems than men. In addition, regarding age, there were significant differences in mobility and usual activities rated by patients.

The related risk factors of quality of life

On the univariate analysis, the associations between the study variables, EQ-5D index, and EQ-VAS scores are shown in Tables 4 and 5. A significant difference in EQ-5D index was found between patients according to sex, age, the level of education, frailty, function status, and certain factors based on MRQ. Similarly, significant differences in EQ-VAS scores were found between patients according to sex, the level of education, residence, type of health insurance, frailty, and certain factors based on MRQ. Concerning factors according to MRQ, polypharmacy (Q1) was the most important factor related to lower scores in both EQ-5D and EQ-VAS (Table 5).

On the multivariate analysis, results of the multiple linear regression that aimed to recognize the relationship among MRQ, EQ-5D, and EQ-VAS are presented in Table 6. A lower quality of life was positively associated with polypharmacy (Q1), multimorbidity (Q5), feeling difficult to take medicines as prescribed (Q8), and using medicines with narrow therapeutic index (Q3).

Discussion

Our study investigated the quality of life in the community-dwelling elderly with chronic diseases in Chongqing, China, and we identified the risk factors associated with HRQoL, especially medication-related risk factors regarding MRQ. To the best of our knowledge, this is the first research exploring the relationship between MRQ and HRQoL in mainland China.

Overall, our mean score of EQ-VAS was similar to the study by Xu et al, who investigated the elderly older than 60 years in China.[31] However, compared with the finding reported by McCaffrey et al,[32] which measured the quality of life of adults in South Australian, our study had lower EQ-VAS scores, and this could be due to age differences in the study population.

Regarding the MRQ, a high prevalence of medication-related risk factors was found. Almost 9 of the 10 respondents reported having more than one medication-related risk factor in our findings, and this is consistent with the results from George et al[33] in a study of medication-related misadventure in the elderly, which reported that three-quarters of patients had one or more risk factors for MRP. Multimorbidity and polypharmacy had impacts on the high prevalence of risk factors present in our study sample. A vicious circle exists between multimorbidity and polypharmacy that the increase of chronic diseases results in an increased medication use and a decreased medication adherence, and in turn, polypharmacy increases the risk of adverse events and a decreased quality of life.[34–36]

In terms of the EQ-5D dimensions, the most frequent problem was pain/discomfort, and, on the contrary, the self-care dimension was the least problem, which was consistent with the findings of other studies.[32,37,38] Moreover, the anxiety/depression dimension had a lower prevalence in our finding compared to other studies.[7,37] This may indicate that our study patients have already accepted the mental reality, adapted to their internal physical characteristics, disease conditions, and adjusted to the external environment.

Similar to previous studies, our research demonstrated that there were significant differences of health status in terms of sex,[32,39–41] women generally had lower scores in both EQ-VAS (69.79±10.93 vs 74.85±13.47) and EQ-5D index (0.71±0.08 vs

Table 3 The percentage of participants with problems in EuroQol-5D index dimensions by age and sex

Dimension	Total, n (%)	Male, n (%)	Female, n (%)	*P*-value	<75 years, n (%)	≥75 years, n (%)	*P*-value
Mobility	111 (35.7)	29 (29.9)	82 (38.3)	0.151	68 (28.8)	43 (57.3)	<0.001
Self-care	31 (10.0)	7 (7.2)	24 (11.2)	0.276	20 (8.5)	11 (14.7)	0.119
Usual activities	164 (52.7)	47 (48.5)	117 (54.7)	0.309	105 (44.5)	59 (78.7)	<0.001
Pain/discomfort	246 (79.1)	63 (64.9)	183 (85.5)	<0.001	185 (78.4)	61 (81.3)	0.585
Anxiety	45 (14.5)	5 (5.2)	40 (18.7)	0.002	35 (14.8)	10 (13.3)	0.748

Table 4 Risk factors associated with EuroQol-5D (EQ-5D) index and EQ-visual analog scale (EQ-VAS) scores among participants

Variables	EQ-5D index	*P*-value	EQ-VAS	*P*-value
Sex		0.004		0.001
Male	0.74±0.10		74.85±13.47	
Female	0.71±0.08		69.79±10.93	
Age (years)		<0.001		0.491
<75	0.73±0.09		71.63±12.43	
≥75	0.68±0.08		70.53±10.55	
Educational level		0.001		0.032
Illiterate	0.67±0.08		70.35±10.14	
Primary school	0.72±0.10		68.96±12.11	
Junior high school	0.72±0.08		73.43±10.88	
High school	0.76±0.10		74.25±18.73	
University and above	0.70±0.09		76.25±4.79	
Marital status		0.062		0.175
Widowed	0.69±0.09		70.23±11.14	
Married	0.72±0.09		71.89±12.10	
Others	0.69±0.05		64.29±14.84	
Residence		0.527		<0.001
Rural	0.71±0.10		67.88±11.45	
City	0.72±0.08		73.00±11.92	
Type of health insurance		0.305		0.001
Rural cooperative medical care	0.71±0.09		69.62±11.30	
Urban workers health insurance	0.73±0.09		75.42±12.13	
Urban residents health insurance	0.72±0.13		71.07±15.34	
Others	0.75±0.04		81.67±12.58	
HDS-R[a]		0.279		0.061
Normal	0.73±0.09		75.35±14.33	
Impairment	0.71±0.09		70.96±11.68	
BADL[b]		<0.001		0.086
Independent	0.72±0.08		71.72±11.59	
Dependent	0.56±0.15		59.44±18.78	
REFS[c]		<0.001		<0.001
Robust	0.73±0.08		72.37±11.39	
Frailty	0.63±0.11		62.66±13.74	
Taking Chinese herbal medicine		0.369		0.235
No	0.72±0.09		70.94±12.35	
Yes	0.71±0.08		72.91±10.56	
Taking dietary supplement		0.947		0.050
No	0.72±0.09		70.61±11.45	
Yes	0.71±0.09		73.73±13.38	

Notes: [a]HDS-R: normal (≥30), mild impairment (20–29.5), moderate impairment (10–19.5), and severe impairment (<10). [b]BADL: independent (100) and dependent (<100). [c]REFS: robust (<8) and frailty (≥8). Data presented as mean ± SD.
Abbreviations: BADL, basic activities of daily living; HDS-R, Revised Hasegawa Dementia Scale; REFS, Reported Edmonton Frail Scale.

0.74±0.10) than men. Especially in terms of pain/discomfort (85.5% vs 64.9%) and anxiety dimensions (18.7% vs 5.2%), the prevalence of women experiencing these problems was higher than that of men. Also, our findings indicated that age had a negative effect on the quality of life, the EQ-5D index declined with age increase, and this highlights that aging has an impact on a person's health status.[32,39,41]

In our study, there were significant differences in quality of life according to sex, age, educational level, frailty, and function status, which were similar to previous studies.[32,39] This means that patient's intrinsic factors play a decisive role in quality of life. Most studies have shown that, besides patient intrinsic factors, medication-related factors may be determining factors in patient's quality of life. Most of the reports about medication and quality of life are in the area of adherence. Iqbal et al[42] reported that adherence was a predictor among type 2 diabetes mellitus patients with an improved quality of life, and Adelufosi et al[43] found that medication nonadherence was related to worse quality of life in patients with schizophrenia. In our study, we also found that patients feeling difficult to take medicines as prescribed had a lower quality of life in the elderly, which is consistent with previous studies. The association between adherence and quality of life indicated that worse quality of life may be owing to patient attitudes to medications rather than medications themselves.[37]

However, in many cases, it seems that other medication-related risk factors are strongly associated with a worse quality of life, especially risk factors according to MRQ.[6,18] In our study, we found the following risk factors that were also associated with poor quality of life: taking five or more medicines, taking 12 or more tablets or capsules per day, taking medicines with narrow therapeutic index, and suffering from three or more comorbidities. These risk factors would help identify patients who need interventions desperately. We were unable to find any other similar studies that explore the relationship between MRQ and quality of life. However, studies that investigated the risk factors for health outcomes among patients[33,44,45] have identified two risk factors of taking five or more medications, and taking medications with narrow therapeutic index increased the risk of adverse drug events and hospitalizations. Other studies on medication-related risk factors including a recent systemic review have reported that medication-related burden including multiple medicines, complex medication regimens, and the exchange of medication brands and instructions had negative influences on patients' health beliefs and behaviors. This may contribute to a potential risk for the presence of drug-related problems and result in nonadherence and poorer outcomes.[46–49] These data strongly supported our findings that medication-related risk factors according to MRQ had a negative effect on the quality of life.

Table 5 Risk factors according to MRQ-associated EuroQol-5D (EQ-5D) index and EQ-visual analog scales (EQ-VAS) scores among participants

MRQ items	EQ-5D index	*P*-value	EQ-VAS	*P*-value
Take five or more different medicines		<0.001		<0.001
No	0.77±0.06		77.70±9.17	
Yes	0.67±0.09		66.12±11.54	
Take 12 or more tablets or capsules per day		<0.001		<0.001
No	0.75±0.07		75.56±9.21	
Yes	0.67±0.10		66.25±13.00	
Take any of the following medicines: carbamazepine, lithium, phenytoin, warfarin, digoxin, phenobarbital, procainamide, and theophylline		<0.001		<0.001
No	0.72±0.08		72.38±10.88	
Yes	0.59±0.14		51.33±15.52	
More than one doctor prescribe medicines		0.092		0.571
No	0.73±0.09		72.01±12.34	
Yes	0.71±0.09		71.14±11.88	
Taking medicines for three or more medical problems		<0.001		<0.001
No	0.77±0.08		79.75±11.33	
Yes	0.70±0.09		68.46±10.81	
Prescriptions from the same pharmacy		0.114		0.598
No	0.71±0.10		70.91±13.51	
Yes	0.72±0.09		71.68±10.87	
Collect own medicines from the pharmacy		0.610		0.905
No	0.72±0.09		71.43±11.40	
Yes	0.71±0.09		71.26±12.99	
Take medicines as prescribed		<0.001		<0.001
No	0.73±0.07		73.80±10.79	
Yes	0.68±0.11		65.84±12.79	
Medicines or instructions changed four times or more in the last 12 months		0.739		0.012
No	0.71±0.09		71.61±11.76	
Yes	0.73±0.09		59.17±18.00	
Know why take all medicines		0.001		0.102
No	0.67±0.09		68.70±10.51	
Yes	0.72±0.09		71.83±12.19	

Note: Data presented as mean ± SD.
Abbreviation: MRQ, medication-risk questionnaire.

Our study is the first research to explore the relationship between medication-related risk factors based on MRQ and the quality of life among older patients in mainland China. The limitation of our study is the single-center survey; our findings may not be generalizable to the whole country. Since we only detected the medication-related risk factors affecting the quality of life, further research on the factors related to the quality of life is warranted.

Table 6 Multiple linear regression analyses between medication-related risk factors and variables related to EuroQol-5D (EQ-5D) index and EQ-visual analog scales (EQ-VAS) scores

MRQ items	EQ-5D index			EQ-VAS		
	B[a]	95% CI	*P*-value	*B*[a]	95% CI	*P*-value
Take five or more different medicines	−0.052	−0.074, −0.030	<0.001	−6.243	−8.877, −3.609	<0.001
Take 12 or more tablets or capsules per day	−0.038	−0.058, −0.018	<0.001	−3.459	−6.005, −0.913	0.008
Take any of the following medicines: carbamazepine, lithium, phenytoin, warfarin, digoxin, phenobarbital, procainamide, and theophylline	−0.070	−0.109, −0.031	0.001	−12.901	−17.923, −7.879	<0.001
More than one doctor prescribe medicines	−0.007	−0.027, 0.013	0.492	0.217	−2.164, 2.598	0.858
Taking medicines for three or more medical problems	−0.030	−0.050, −0.010	0.004	−6.492	−9.073, −3.911	<0.001
Prescriptions from the same pharmacy	0.009	−0.009, 0.027	0.304	0.229	−1.980, 2.438	0.839
Collect own medicines from the pharmacy	0.010	−0.008, 0.028	0.280	1.792	−0.440, 4.024	0.117
Take medicines as prescribed	−0.027	−0.045, −0.009	0.004	−5.031	−7.340, −2.722	<0.001
Medicines or instructions changed four times or more in the last 12 months	0.036	−0.025, 0.097	0.239	−8.734	−16.323, −1.145	0.025
Know why take all medicines	0.005	−0.019, 0.029	0.663	−2.709	−5.790, 0.732	0.086

Notes: [a]Beta regression coefficient. Barenholtz Levy H. Self-administered medication-risk questionnaire in an elderly population. 37(7–8), pp.982–987, copyright © 2003 by *Ann Pharmacother*. Reprinted by Permission of SAGE Publications, Inc.[50]
Abbreviation: MRQ, medication-risk questionnaire.

Conclusion

Patient's internal characteristics and medication-related risk factors according to MRQ are associated with quality of life. Polypharmacy, multimorbidity, poor medication adherence, and taking medicines with narrow therapeutic index have negative effects on quality of life. The results of the MRQ is an indicator of quality of life that can identify patients who need interventions. More research is needed on multidisciplinary interventions to reduce medication-related risk factors and improve the quality of life in the elderly.

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SZ and LM should be considered co-first authors.

Disclosure

The authors report no conflicts of interest in this work.

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Supplementary material

Table S1 Demographic and clinical characteristics of participants

Variables	n	%
Demographic characteristics		
Age (years)		
<75	236	75.9
≥75	75	24.1
Sex		
Female	214	68.8
Male	97	31.2
Educational level		
Illiterate	43	13.8
Primary school	120	38.6
Junior high school	124	39.9
High school	20	6.4
University and above	4	1.3
Residence		
Rural	99	31.8
City	212	68.2
Marital status		
Widowed	66	21.2
Married	238	76.5
Others	7	2.3
Type of health insurance		
Rural cooperative medical care	210	67.5
Urban workers health insurance	84	27.0
Urban residents health insurance	14	4.5
Others	3	1.0
Clinical characteristics		
Chronic disease		
Hypertension	250	80.4
Diabetes mellitus	132	42.4
Hyperlipidemia	117	37.6
HDS-R[a]		
≥30	29	9.3
20–29.5	208	66.9
10–19.5	74	23.8
BADL[b]		
Independent	302	97.1
Dependent	9	2.9
REFS[c]		
Frailty	32	10.3
Robust	279	89.7
Medication characteristics		
Medication classification[d]		
Calcium channel blockers	207	66.6
Agents acting on the renin–angiotensin system	135	43.4
Lipid modifying agents	96	30.9
Polypharmacy[e]	170	54.7
Taking Chinese herbal medicine	67	21.5
Taking dietary supplement	75	24.1

Notes: [a]HDS-R: normal (≥30), mild impairment (20–29.5), moderate impairment (10–19.5), and severe impairment (<10). [b]BADL: independent (100) and dependent (<100). [c]REFS: robust (<8) and frailty (≥8). [d]Medication classification: medication classification according to ATC classification. [e]Polypharmacy: taking ≥5 medications.
Abbreviations: ATC, anatomical therapeutic chemical; BADL, basic activities of daily living; HDS-R, Revised Hasegawa Dementia Scale; REFS, Reported Edmonton Frail Scale.

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