Treatment Burden for Older People with Multimorbidity: A Cross-Sectional Study in China

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ABSTRACT

Background: There has been little research in China about treatment burden. Studies internationally have found high treatment burden is associated with number of long-term conditions, low Quality of Life (QoL) and poor medication adherence. The purpose of this study is to understand factors associated with high treatment burden for older people with multimorbidity in China.

Methods: Cross-sectional survey was conducted from February to May 2022. Through convenience sampling, 353 older people (≥ 60 years) with multimorbidity (≥ 2 long term conditions) admitted to hospital in Zhengzhou, China, were invited to complete a survey including sociodemographic characteristics, long-term conditions and the Chinese version of Multimorbidity Treatment Burden Questionnaire (C-MTBQ). Ordinal logistic regression was used to identify the factors associated with high treatment burden.

Results: 342 older people with multimorbidity participated (response rate 92.2%) among whom, the prevalence of no，low, medium and high treatment burden was 1.2% (4/342), 13.9% (44/342), 49.1% (168/342) and 36.8% (126/342), respectively. Ordinal logistic regression analysis found high treatment burden was associated with age, monthly household income, type of medical insurance and number of long-term conditions.

Conclusion: Most surveyed older people with multimorbidity experienced medium to high treatment burden. Interventions to reduce treatment burden for people with multimorbidity in China, should focus particularly on people at risk of higher treatment burden, namely older people with low income and high number of long-term conditions.

Keywords: Multimorbidity; Respiratory; Endocrinology; Rheumatology

Abbreviations: QoL: Quality of Life; HRQoL: Health Related Quality of Life; OR: Odds Ratio; Page 12/15; CI: 95% Confdence Interval

INTRODUCTION

With the aging population in China, the number of people with multimorbidity (two or more long-term conditions existing in one individual) is increasing. Multimorbidity is common in older people (≥ 60 years) [1-3]. One study in China found that 26.8%, 33.1% and 4% of people aged ≥ 60 years had two, three or four long-term conditions, respectively [4]. Treatment burden refers to the effort required of people to look after their health and the impact this has on their health and wellbeing [5]. This includes ordering, collecting and taking medications; coordinating and attending appointments with multiple health professionals; self-monitoring health conditions (e.g. monitoring blood pressure or blood glucose levels); and making lifestyle changes (e.g. losing weight, being more active). Treatment burden can be conceptualized as the 'workload' of being a patient (e.g. having to take multiple medications at different times of the day) and the 'capacity' a patient has to do the work [6]. Some patients with high workload may have good capacity (e.g. strategies and support) to manage the workload and so experience minimal treatment burden. Conversely, some patients with low workload may experience high treatment burden due to lack of capacity to manage the work (e.g. due to caring responsibilities for family members). Studies have shown

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that high treatment burden is associated page 3/15 with low Health Related Quality of Life (HRQoL) and poor adherence to treatment [7,8]. Compared with patients with single conditions, people with multimorbidity are required to attend appointments with multiple specialists and to take multiple treatments, and so are at higher risk of treatment burden [9]. Little is known about factors associated with high treatment burden for older people with multimorbidity living in China. Using the validated Chinese multimorbidity treatment burden questionnaire, this study aimed to describe levels of treatment burden and to explore factors associated with high treatment burden for older people with multimorbidity in China [10].

MATERIALS AND METHODS

Study setting and participants

This cross-sectional study took place in Zhengzhou city of henan province, China. Zhengzhou has a population of 98.8 million permanent residents, including 55.8 million urban residents and 43.0 million rural residents. Patients admitted to cardiology, neurology, respiratory, endocrinology, rheumatology or immunology wards within the first affiliated hospital of Zhengzhou University in Zhengzhou between February and May 2022 were invited to take part.

Inclusion criteria:

• Age ≥ 60 years.
• Two or more long-term conditions including hypertension, coronary heart disease, cerebral infarction, diabetes, COPD, and osteoarthritis.
• Hospital records and diagnosis at time of discharge complete.

Exclusion criteria: Unable to complete the survey due to serious physical or mental illness. The long-term conditions included in this study were classified according to the International Classification of Diseases, 10th edition (ICD-10) [11,12]. According to the literature, the most common longterm conditions in older people are hypertension, coronary heart disease, cerebral infarction, diabetes, Chronic Obstructive Pulmonary Disease (COPD) and osteoarthritis [13,14]. All data were collected by trained nurses through face to face interviews. All study participants signed informed consent before they completed the survey [15,16].

Measures

Treatment burden: The Multimorbidity Treatment Burden Questionnaire (MTBQ) was originally developed and validated in United Kingdom (UK), and has been translated into Danish, German and French Canadian, demonstrating good content validity, construct validity and reliability. The Chinese Multimorbidity Treatment Burden Questionnaire (C-MTBQ) was translated, culturally adapted and validated, to assess the treatment burden of multimorbidity in China. The C-MTBQ has 12 questions and three dimensions page 4/15 that were named as the medication and treatment dimension (4 items), the medical related dimension (5 items) and the daily self-health management dimension (3 items). For each question, answers are ranked using a 5-point Likert scale, ranging from 0 (does not apply or not difficult), 1 (a little difficult), 2 (quite difficult), 3 (very difficult) and 4 (extremely difficult). The global MTBQ score is calculated as the mean score, multiplied by 25, giving a score of 0 to 100. Global treatment burden scores can be categorized as: no (0), low (<10), medium (10-22) and high treatment burden (≥ 22) [17-20].

Sociodemographic characteristics and long-term conditions: Sociodemographic and disease-related characteristics were collected, including: age (years), gender (male/female), marriage status (married/single/divorced/widowed), education level (primary school and below/secondary education/tertiary education), household income per month (Yuan), primary caregiver (oneself/spouse/sons and daughters/a nanny or nurses) and health insurance (almost everyone in China has one of four types of insurance: town medical insurance/new rural cooperative/public medical care/commercial health insurance), long-term conditions (hypertension/coronary heart disease/stroke/diabetes/chronic obstructive pulmonary disease/ostearthritis), and number of long-term conditions. The survey was piloted to examine the comprehensibility and revised accordingly.

Statistical analysis: Data were analyzed using SPSS version 21.0. Continuous variables were presented with means and Standard Deviations (SDs), and categorical variables were shown as frequencies with percentages. The Wilcoxon rank sum test was used to compare treatment burden in different groups. Multilevel logistic regression models examined the associations between the level of treatment burden and risk factors. A P value below 0.05 was considered significant [21-24].

RESULTS

Participant characteristics

371 patients were invited, 342 (92.2%) completed the MTBQ (Table 1). The average age was 74 years (60 years-100 years), slightly more females (55.8%), most were married (79.5%), most received secondary level education or below (87.4%) and cared for themselves (86.0%) and 52.3% had a household income below Chinese Yuan 3000 yuan (445 US dollars). The most common type of medical insurance was Town Medical Insurance (51.8%), followed by new rural cooperative insurance (35.7%). The most common long-term condition was hypertension (77.2%), followed by coronary heart disease (58.5%), chronic obstructive pulmonary disease (46.5%) and stroke (41.2%) [25,26]. Almost half of participants had two long-term conditions, 27.5% had three long term conditions and 24.2% had four or five long term conditions.

Table 1: Characteristics of patients with multimorbidity.

Characteristics	N	%
Gender		
Male	151	44.2
Female	191	55.8
Age (years)		
60~69	130	38
70~79	106	31
80~89	92	26.9
≥ 90	14	4.1
Marital status		
married	272	79.5
divorced	5	1.5
widowed	64	18.7
unmarried	1	0.3
Education level		
No formal/primary education	107	31.3
junior high school	79	23.1
Secondary education	113	33
Tertiary education	43	12.6
Household income per month (Yuan		
<1000	60	17.5
1000~3000	119	34.8
3000~5000	106	31
≥ 5000	57	16.7
Primary caregiver		
Oneself	294	86
Spouse	7	2
Sons and daughters	27	7.9
Characteristics	N	%
A nanny or nurses	14	4.1
Health insurance		
Town medical insurance	177	51.8

Commercial health insurance	24	7
New Rural Cooperative	122	35.7
Public medical care	19	5.6
Long-term conditions		
Hypertension	264	77.2
Coronary heart disease	200	58.5
Stroke	141	41.2
Diabetes	159	21.8
Chronic obstructive pulmonary disease	20	46.5
Joint disease	103	30.1
Number of chronic diseases		
2	165	48.2
3	94	27.5
4	48	14
5	35	10.2

Overall prevalence of treatment burden

Of the 342 individuals who completed the MTBQ questionnaire, mean MTBQ score was 21.75, median MTBQ score was 18.75 (lower quartile 12.50, upper quartile 27.61). The proportion of participants with no, low, middle and high treatment burden was 1.2%, 12.9%, 49.1% and 36.8% respectively [27].

Mtbq scores of multimorbidity compared to general population

We analyzed the characteristics of all participants (Table 2). High treatment burden was associated with increasing age, low education level, low household income, new rural cooperative medical insurance and number of long-term conditions. The level of burden of treatment did not vary by gender or marital status.

Table 2: Characteristics of study participants' treatment burden (n=342).

Characteristics	The level of treatment burden sum Z				Chi-square (χ^2)/ Rank	P-value
	None	Low	Medium	High		
Age (years)						
60~69	1	19	69	41	26.453	<0.001
70~79	3	16	58	29		
80~89	0	9	40	43		
≥ 90	0	0	1	13		

Gender						
Male	3	21	74	53	0.746	0.388
Female	1	23	94	73		
Marital status						
unmarried	0	0	0	1	2.544	0.467
married	2	36	138	96		
widowed	2	6	29	27		
divorced	0	2	1	2		
Education Level	1	7	49	50	14.342	0.002
No formal/Primary education						
junior high school	2	12	37	28		
Secondary education	1	14	60	38		
Tertiary education	0	11	22	10		
Primary caregiver	4	42	161	87	40.929	<0.001
Oneself						
Spouse	0	0	2	5		
Sons and daughters	0	2	4	21		
A nanny or nurses	0	0	1	13		
Household income per month (Yuan)						
<1000	0	1	38	30	12.544	0.006
1000~3000	1	12	53	48		
3000~5000	2	16	58	30		
≥ 5000	1	15	19	18		
Health insurance	3	39	113	22	144.613	<0.001
Town medical insurance						
Commercial health insurance	0	0	19	5		
New rural co-operative	1	2	20	99		
Public medical care	0	3	16	0		
Number of chronic diseases						

2	3	23	87	52	10.818	0.013
3	1	11	52	30		
4	0	7	18	23		
5	0	3	11	21		

Factors associated with high treatment burden

Logistic regression analysis was used to calculate the Odds Ratios (ORs) for different levels of treatment burden, adjusting for age, education level, primary caregivers, household income per month (Yuan), health insurance and number of chronic diseases (Table 3). After adjusting for confounders, age, low household income, number of long-term conditions and new rural cooperative health insurance were associated with high treatment burden [28].

Table 3: Ordinal Logistic regression analysis of the influencing factors of the treatment burden of the participants.

Variable	Regression coefficient	Standard error	Adjusted OR (95%CI	P-value
Age (years				
60~69	-3.35	1.23	0.035 (0.003, 0.389)	0.006
70~79	-3.88	1.23	0.021 (0.002, 0.232)	0.002
80~89	-2.78	1.23	0.062 (0.006, 0.691)	0.024
≥ 90	1		1	
Education level				
No formal/Primary education	0.31	0.48	1.362 (0.531, 3.488)	0.52
Junior high school	0.18	0.46	1.200 (0.490, 2.937)	0.69
Secondary education	0.3	0.43	1.352 (0.579, 3.154)	0.486
Tertiary education	1		1	
Primary caregiver				
oneself	-2.41	1.43	0.090 (0.005, 1.475)	0.091
spouse	-0.6	1.75	0.548 (0.018, 17.066)	0.732
Sons and daughters	-0.94	1.53	0.389 (0.020, 7.753)	0.536
A nanny or nurses	1		1	
Household income per month (Yuan				
<1000	1.62	0.49	5.046 (1.916, 13.293)	0.001
1000~3000	1.57	0.44	4.821 (2.051, 11.329)	0
3000~5000	0.98	0.41	2.655 (1.195, 5.897)	0.016
≥ 5000	1		1	

Health insurance				
Town medical insurance	-0.22	0.53	0.807 (0.285, 2.287)	0.686
Commercial health insurance	0.46	0.74	1.591 (0.373, 6.791)	0.53
New rural cooperative	3.04	0.59	20.988 (6.573,67.016)	0
Public medical care	1		1	
Number of chronic diseases				
2	-1.32	0.48	0.267 (0.104, 0.687)	0.006
3	-1.21	0.51	0.300 (0.110, 0.817)	0.018
4	-0.69	0.57	0.502 (0.163, 1.544)	0.229
5	1		1	

DISCUSSION

To our knowledge, this is the first study in China to explore treatment burden severity and factors associated with high treatment burden for older people with multimorbidity. A key finding was that most participants experienced medium or high treatment burden. Factors associated with high treatment burden included increasing age, lower household income per month (Yuan), New Rural Cooperative medical insurance, and number of long-term conditions. These factors should be considered when designing interventions to reduce treatment burden for older people with multimorbidity in China. The level of treatment burden reported by participants was higher than in studies in the UK, US, France and Denmark. This may be due differences in the study sample, as participants of the present study were older, had been admitted to hospital and over half had three or more long-term conditions; and differences in how healthcare is delivered between countries. Consistent with other studies, this study found that treatment burden increases with the number of longterm conditions. This study found that high treatment burden was associated with increasing age. This finding differs from studies in the UK and France, where younger people were more likely to report high treatment burden [29-33]. One important difference is that the present study only included people aged 60 years or older, whereas the other two studies included people aged 18 years or over. The authors of the UK study suggest that younger people may experience higher treatment burden due to work and childcare commitments. Working aged people with children were not included in the present study. For people aged 60 years or above, one might expect treatment burden to increase with age given that factors associated with increased 'workload', such as number of medicines and number of long-term conditions, increase with age, and it is possible that one's 'capacity' to manage the workload (e.g. due to physical and cognitive problems) reduces with age. The population of China is aging and the findings of this study suggest that treatment burden is likely to increase over time. For the present study, education was

not associated with the level of treatment burden, consistent with research in the United States. Conversely, a study of multimorbid patients with cardiovascular disease in Denmark found that high treatment burden was associated with low health literacy [21]. One might expect people with lower levels of education to experience higher treatment burden, although one can also argue that people with low levels of education might have lower expectations of what is acceptable compared to more educated people. Page 11/15 this study found that low housebound income was associated with high treatment burden, a finding consistent with research in the US. Health professionals interviewed in Australia reported that lack of financial resources were likely to impact on patients' capacity to manage the workload, and hence, increase treatment burden [32]. Reimbursement rates are different for different types of medical insurance, so medical insurance impacts on financial burden. This study found that patients with New Rural Cooperative health insurance reported higher treatment burden. This may reflect lower reimbursement rates for this type of medical insurance.

Recommendations for policy makers, clinical practice and future research:

• Varying reimbursement rates from different medical insurance providers should be addressed to reduce health inequalities
• Interventions to reduce treatment burden for older people with multimorbidity in China should be developed and evaluated, paying particular attention to people at risk of high treatment burden, including older people, those with a high number of long-term conditions and people with low income

CONCLUSION

In this study of older people with multimorbidity in China, most participants reported medium or high treatment burden. Factors associated with high treatment burden included age, low income, specific types of medical insurance and increase in number of long-term conditions. Attention should be paid to

these factors when developing and evaluating interventions to reduce treatment burden.

LIMITATIONS

This study has some limitations. First, the sample size was relatively small and convenience sampling was used to identify participants, introducing potential selection bias. Second, participants were recruited from one hospital in Zhengzhou, China, and caution should be taken in generalizing the findings to the wider population in China. In addition, the long-term conditions included in the study were relatively limited, so the impact on the treatment burden for those not included (with other conditions not included in the list) is unknown. This may have also impacted on the morbidity count—had a wider number of long-term conditions been included, the morbidity count for some participants (with additional conditions that were not included on the list) would have been higher.

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AUTHOR CONTRIBUTIONS

All authors have actively contributed to the work. LD, QJ and PD were involved in the study design. LD, QJ and XL designed the survey. LD, QJ and PD undertook the statistical analyses and the interpretation of the results. All authors participated in the preparation of the manuscript, read and approved the final version to be submitted.

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AVAILABILITY OF DATA AND MATERIALS

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare that are relevant to the content of this article.

CONSENT FOR PUBLICATION

Not applicable.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics Committee of the First Affiliated Hospital of Zhengzhou University, Number 2022-KY-0204-002.

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