Utilization of traditional Chinese medicine and the impact on medical burden of geriatric inpatients with chronic diseases

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Research

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Abstract

Background

The burden of chronic diseases seriously affects the health and quality of life of the geriatric. Many studies have pointed out that traditional Chinese medicine(TCM) can alleviate the problem of expensive medical treatment. It is unknown that how situation of the utilization of TCM in geriatric patients with chronic diseases and the impact of the use of TCM on their medical burden.

Methods

Through stratified multi-stage sampling method, 1336 institutions in Hunan Province of China were surveyed to obtain expenditure inpatient's of geriatric with chronic diseases in 2018. Possion regression model was used to analysis the utilization of TCM. Kolmogorov-Smirnov test was performed to observe the medical burden in TCM user' group and TCM nouters' group. The relationship between proportion of expenses of TCM to expenses of drugs(Ptcm) and medical burden were analyzed using Spearman's correlation analyses.

Results

In geriatric inpatients with chronic diseases, female ($RR=1.009$, $RR95\%CI$: 1.006-1.013), patients who have not undergone surgery($RR=1.246$, $RR95\%CI$:1.237-1.255), the elderly and the insured patients were more likely to use TCM for treatment. The distribution of Totalexp in the TCM users group and the TCM nouters group was different in various types of chronic diseases (all $p<0.001$). For some types of chronic diseases, the Ptcm has a negative correlation with Totalexp, cost of medicine $\Delta OOPs(r_s<0$ and $p<0.005$).

Conclusion

There were differences in the utilization of TCM treatment of geriatric patients with chronic diseases in terms of gender, age, institution and insurance status. Treatment mainly used TCM for geriatric chronic diseases of respiratory system, digestive system, circulatory system, ear and neurological has obvious cost-benefit advantages, and conducive to reducing the burden of patients.

Background

As of the end of 2019, Chinese population aged 60 and over was 253.88 million, and population aged 65 and older was 176.03 million, accounting for 18.1% and 12.6% of the total population respectively[1]. According to the United Nations standard for aging society (the proportion of the total population 60 y and over , 65 y and over reached 10% and 7% respectively)[2], China has a deeper ageing. Due to the decline of body function and the long-term accumulation of disease factors[3], the elderly population has a higher prevalence and medical service needs than other age groups[4]. Zheng et al's research shown that the repeated hospitalization rate of geriatric is significantly higher than that of non-elderly people[5]. Geriatric spend more than 50% of total curative expenditure[6]. This poses challenges for medical financing.

From the perspective of the cost of the disease distribution, the treatment costs of the population after the age of 60 are mainly used for the treatment of chronic diseases. A study based on the degree of change in results showed that from 2013 to 2017, the proportion of medicine costs accounted for the highest proportion of medical expenses in hospitalization[7]. The average medicine cost and proportion of the geriatric in different medical and health institutions are generally higher than the average of all ages[8]. In order to reduce the burden of patients on medicine costs, in 2017, China implemented a zero-plus drug policy for public hospitals[9]. Although the cost burden of patients was reduced to a certain extent, the effect was not obvious[10]. How to reduce the medical burden on patients has always been an important issue in the field of health care.

In recent years, the role of traditional Chinese medicine(TCM) in the prevention and treatment of diseases has been further highlighted and widely recognized by the international community[11]. Lu's research found that the clinical cure rate of the TCM group (81.8%) was higher than that of the western medicine group (54.8%) when treating H1N1[12]. In addition, researchers have found that TCM has a cost advantage in treating certain diseases. Tsai's research shown that the cumulative outpatient medical cost of in the TCM users with heart failure was lower than that of the non-TCM users within 1 year, and the hospitalization cost at 1-year follow-up was lower for TCM users than for non-TCM users[13]. For the treatment of uterine fibroids, the total fibroid-related conventional western medicine consumed by TCM users was less than that by nonusers,the total annual medical cost was less in TCM users than in nonusers[14].

Previous research has shown that the geriatric is more inclined to choose TCM for treatment[15], and the treatment costs of geriatric are mainly used for chronic diseases[16]. The objective of this study was to explore the utilization of TCM in geriatric patients with chronic diseases and the impact of the use of TCM on their medical burden, and analyse which chronic diseases mainly treated with TCM has high cost-effectiveness.

Methods

Data collection

The basic data used in this study were obtained from the information system of the sample institutions.The multi-stage stratified sampling method was used to determine the sample institutions. In the first stage, Changsha, Yueyang, Zhuzhou, Yongzhou and Hengyang were selected as sample areas based on the comprehensive consideration of the economic development, demographic characteristics, medical and health conditions, and cultural differences. The second stage was to select one district and three counties from the monitoring cities. The third stage was to choose medical institutions in the monitoring areas at all

levels according to the type of institutions of administrations structure. The sample data were obtained from 76 hospitals, 36 community health service centers, 102 township hospitals.

Study sample

The inpatient curative care data of patients over 60 y were derived from the information system of the sample institutions, involving age, gender, disease, length of stay, total and detailed costs of treatment, types of insurance coverage, insurance reimbursement, and out-of-payments(OOPs) of patients in 2018, but did not contain any information that may infer personal identity. Based on the method of disease division in the global disease burden, the remaining diseases are classified as chronic diseases after deducting the acute diseases from the non infectious diseases[17]. After the invalid or false information was excluded in this study, there were 395678 items involving the treatment and nursing expenditure, of which 280929 items of chronic diseases treatment were included (154122 male and 129285 female involved). The age of chronic diseases patients in sample data were from 60 to 107 years old.

Statistical analysis

The TCM mentioned in this study includes Chinese patent medicine and Chinese herbal medicine. For that the inpatient data were distributed abnormally, Possion regression model was used to analysis the distribution of inpatients who used TCM treatment.Two-sample Kolmogorov-Smirnov test was performed to observe whether there is difference in the expenditure and hospitalization days between TCM users group and TCM nousers group. Spearman correlation analysis was conducted to determine the relationship between proportion of expenses of traditional Chinese medicine to expenses of drugs(Ptcm), total expenditure of hospitalization(Totalexp), OOPs, length of stay. The statistical software STATA 15.0 was used for the analyses. The significance for all statistical tests was indicated by a two-tailed p_value of 0.05.

Results

Utilization of TCM in different group of geriatric inpatients

Among the 280929 geriatric patients with chronic diseases, the proportion of patients in TCM users group and TCM nousers group was 78.64% and 21.36% respectively. The results of Poisson regression shown that from the perspective of the treatment probability of TCM, female (*RR*=1.009, *RR95% CI*: 1.006-1.013) were slightly higher than male, and those who have not undergone surgery (1.246, 1.237-1.255) were higher than those who have undergone surgery. With reference to general hospitals, other types of medical institutions were more likely to use TCM for treatment (all *RR*> 1). Partial regression coefficients for urban employees, urban and rural residents, work injury insurance, public medical insurance, and other medical insurance types were statistically significant compared to the group of self-paying. Patients in these groups were more likely to experience TCM treatment (Table 1).

Table 1 Poisson regression analysis for utilization of TCM in different group of geriatric inpatients

	TCM nouser		TCM user		<i>b</i>	<i>S_b</i>	<i>z</i>	<i>p</i>	<i>RR</i>	<i>RR95% CI</i>	
	N	%	N	%							
	60014	21.36	220915	78.64							
Gender											
male	33220	55.35	119161	53.94					1		
female	26794	44.65	101754	46.06	0.009	0.002	4.930	0.000	1.009	1.006	1.013
Surgery											
Yes	45554	75.91	195278	88.40					1		
No	14460	24.09	25637	11.60	0.220	0.005	58.650	0.000	1.246	1.237	1.255
Age											
60-69	29931	49.87	99167	44.89					1		
70-79	20226	33.70	78069	35.34	0.017	0.002	7.820	<0.001	1.017	1.012	1.021
80-89	9108	15.18	40241	18.22	0.028	0.003	11.180	<0.001	1.029	1.024	1.034
≥90	749	1.25	3438	1.56	0.023	0.007	3.200	0.001	1.023	1.009	1.037
Institution type											
General hospital	42234	70.37	98895	44.77					1		
Traditional Chinese medicine hospital	6578	10.96	86128	38.99	0.250	0.003	127.270	<0.001	1.285	1.280	1.290
Maternity and child care hospital	114	0.19	631	0.29	0.270	0.021	16.910	<0.001	1.311	1.270	1.352
Community Health Centre	494	0.82	1728	0.78	0.039	0.012	3.440	0.001	1.040	1.017	1.063
Township Hospital	10594	17.65	33533	15.18	0.025	0.003	7.810	<0.001	1.026	1.019	1.032
Insurance status											
Self-paying	4633	7.72	11274	5.10					1		
Commercial health insurance	129	0.21	254	0.11	0.047	0.036	1.340	0.179	1.048	0.979	1.122
Insurance for urban and rural residents	44104	73.49	164158	74.31	0.117	0.005	24.510	<0.001	1.124	1.114	1.135
Public medical insurance	2	0.00	71	0.03	0.187	0.030	7.610	<0.001	1.206	1.149	1.265
Employment injury insurance	4	0.01	38	0.02	0.159	0.050	3.710	<0.001	1.172	1.078	1.274
Other insurance	141	0.23	4783	2.17	0.157	0.006	29.730	<0.001	1.170	1.158	1.182
Retired cadre insurance	2329	3.88	4247	1.92	-0.001	0.010	-0.140	0.890	0.999	0.979	1.019
Urban employee insurance	7990	13.31	34163	15.46	0.115	0.006	22.410	<0.001	1.122	1.110	1.133
Medical assistance	682	1.14	1927	0.87	0.014	0.012	1.210	0.225	1.014	0.991	1.038

Comparison of the cost in TCM users group and TCM nusers group

According to international Classification of Diseases,Tenth Revision(ICD-10), chronic diseases were classified into 15 categories. The Kolmogorov-Smirnov test was performed on the distribution of the Totalexp, length of stay, medicine cost,OOPs in the TCM nusers group and TCM users group. The results showed that the distribution of Totalexp in the TCM users group and the TCM nusers group was different in various types of diseases (all $p < 0.001$); the Totalexp of the TCM nusers group was lower than that of TCM users group. TCM nusers group and TCM users group had different distribution in cost of medicine, and the difference was statistically significant (all $p < 0.001$). Except for digestive diseases, the cost of medicine in the TCM nusers group was lower than that in the TCM users group(Table2). Excluding congenital malformations, deformities, and chromosomal abnormalities ($p = 0.059$), other chronic diseases had different distributions of length of stay in the TCM nusers group and TCM users group($p < 0.05$). Among patients with various diseases,the distribution of patient's OOPs in the TCM nusers group and TCM users group was different, and the difference was statistically significant (all $p < 0.05$), the OOPs for patients in the TCM nusers group was higher than that in the TCM users group (Table3).

The effect of using TCM on the cost and burden of geriatric inpatients

Divide the cost of TCM by the cost of medicine to get the proportion of TCM(Ptcm). A correlation analysis was conducted to find the intercorrelations among Ptcm and Totalexp, cost of medicine,length of stay, OOPs. The results of Spearman correlation test were shown in Table 3. There was no correlation between the Ptcm and Totalexp, length of stay, and OOPs for congenital malformations, deformations and chromosomal abnormalities. The Ptcm correlated significantly and positively with the length of stay ($r_s > 0$, $p < 0.05$), and negatively with the OOPs ($r_s < 0$, $p < 0.001$) for patients with other types diseases. The Ptcm was associated with increased Totalexp for neoplasms,diseases of the blood and blood-forming organs and certain disorders involving the immune

mechanism, mental and behavioural disorders ($r_s>0$, $p<0.001$). The Ptcn was negatively correlated with the Totalexp for Endocrine,nutritional and metabolic diseases,diseases of the nervous system, the ear and mastoid process system, the circulatory system,the respiratory system,the digestive system,the musculoskeletal system and connective tissue, the genitourinary system. There was negative correlation between Ptcn and the cost of medicines for diseases of the nervous system,the ear and mastoid process, the respiratory system,the digestive system,the musculoskeletal system and connective tissue($r_s<0$, $p<0.05$). For other types of diseases, the Ptcn was positively related to the cost of medicine($r_s> 0$, $p<0.001$)(Table4).

Table2 Two-sample Kolmogorov Smirnov test of Totalexp, medicine cost in TCM nouters group and TCM users group

	N		Totalexp		Medicine cost			
			Median[P25,P75](RMB)				Median[P25,P75](RMB)	
	TCM nouser	TCM user	TCM nouser	TCM user	D	p	TCM nouser	TCM user
Neoplasms	7028	17627	4720.93(3099.34,6927.30)	6748.95 [4548.57,9832.43]	0.242	<0.001	1446.22(517.45,3028.82)	2951.12(1446.22,4455.67)
Diseases of the blood and blood-farming organs and certain disorders involving the immune mechanism	536	1066	4445.67(2890.36,6416.17)	5702.43 [3810.53,8254.89]	0.199	<0.001	728.12(310.80,1387.59)	1600.00(728.12,2511.37)
Endocrine,nutritional and metabolic diseases	2912	11551	5140.85(3067.33,7263.48)	5758.11 [3889.28,7985.43]	0.108	<0.001	1130.68(558.26,1918.92)	1818.18(1130.68,2511.37)
Mental and behavioural disorders	269	813	4769.90(3005.57,7132.37)	5910.01 [3879.00,8236.55]	0.153	<0.001	740.64(288.28,1566.24)	1740.64(740.64,2511.37)
Diseases of the nervous system	1511	9983	4530.85(2735.04,6530.29)	5481.69 [3775.47,7531.75]	0.149	<0.001	1022.72(482.65,1902.26)	1600.00(1022.72,2511.37)
Diseases of the eye and adnexa	4956	4312	4428.33(2956.06,5750.32)	4377.08 [3191.82,6173.44]	0.063	<0.001	279.26(142.80,477.13)	979.26(279.26,1566.24)
Diseases of the ear and mastoid process	355	2228	2772.94(1430.40,4546.36)	3194.94 [1674.31,5182.72]	0.091	<0.001	558.58(304.95,1145.56)	969.26(558.58,1566.24)
Diseases of the circulatory system	13628	72722	4069.16(2241.65,6558.29)	5442.53 [3404.57,8050.68]	0.171	<0.001	991.62(445.48,1867.33)	1818.18(991.62,2511.37)
Diseases of the respiratory system	7752	32866	3459.37(1541.86,6072.20)	4744.12 [2375.2,7351.23]	0.142	<0.001	954.97(398.12,1914.56)	1600.00(954.97,2511.37)
Diseases of the digestive system	10490	20269	4322.13(2358.77,6664.52)	4616.18 [2511.37,7251.99]	0.050	<0.001	1031.51(466.85,1943.96)	1818.18(1031.51,2511.37)
Diseases of the skin and subcutaneous tissue	1070	2647	2362.60(1198.11,4251.12)	3670.50 [1753.4,6039.66]	0.201	<0.001	531.44(211.19,1206.53)	1818.18(531.44,2511.37)
Diseases of the musculoskeletal system and connective tissue	3960	31597	2292.09(984.83,4914.41)	3716.43 [2125.51,6078.00]	0.251	<0.001	424.31(179.50,950.09)	979.26(424.31,1566.24)
Diseases of the genitourinary system	5427	12877	3810.23(2081.08,6554.31)	5202.00 [2826.17,8575.96]	0.150	<0.001	820.63(363.85,1622.19)	1818.18(820.63,2511.37)
Congenital malformations, deformations and chromosomal abnormalities	120	357	4824.48(3060.58,7750.71)	6259.02 [4694.00,8010.26]	0.248	<0.001	1072.035(491.29,2160.54)	2072.035(1072.035,2511.37)

Table3 Two-sample Kolmogorov Smirnov test of length of stay, OOPs in TCM nusers group and TCM users group

	N		Length of stay				OOPs			
			Median [P25,P75](day)		<i>D</i>	<i>p</i>	Median[P25,P75](%)		<i>D</i>	<i>p</i>
	TCM nouser	TCM user	TCM nouser	TCM user			TCM nouser	TCM user		
Neoplasms	7028	17627	5(3,8)	8(5,12)	0.265	<0.001	39.33(27.65,59.18)	32.99(20.36,51.03)	0.141	<0.001
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	536	1066	5(3,7)	7(5,10)	0.234	<0.001	47.20(34.83,62.10)	41.57(27.08,54.57)	0.153	<0.001
Endocrine,nutritional and metabolic diseases	2912	11551	7(4,9)	8(6,10)	0.171	<0.001	42.37(30.15,57.78)	36.86(25.79,47.90)	0.148	<0.001
Mental and behavioural disorders	269	813	6(4,11)	8(5,12)	0.179	<0.001	44.19(31.38,61.94)	37.57(26.11,51.74)	0.147	<0.001
Diseases of the nervous system	1511	9983	6(4,8)	8(6,10)	0.203	<0.001	42.96(29.35,59.63)	36.72(23.45,52.50)	0.134	<0.001
Diseases of the eye and adnexa	4956	4312	4(2,6)	7(5,9)	0.327	<0.001	54.82(38.37,72.90)	39.31(31.30,52.30)	0.306	<0.001
Diseases of the ear and mastoid process	355	2228	5(3,7)	6(5,9)	0.211	<0.001	43.45(32.05,61.12)	35.41(25.32,46.84)	0.214	<0.001
Diseases of the circulatory system	13628	72722	6(4,8)	8(6,10)	0.228	<0.001	40.22(27.43,56.02)	35.46(23.84,47.54)	0.116	<0.001
Diseases of the respiratory system	7752	32866	6(4,8)	7(6,10)	0.153	<0.001	35.42(21.51,53.40)	31.91(22.03,43.34)	0.115	<0.001
Diseases of the digestive system	10490	20269	5(4,8)	7(5,9)	0.176	<0.001	44.85(33.02,60.98)	37.71(26.29,51.32)	0.161	<0.001
Diseases of the skin and subcutaneous tissue	1070	2647	6(4,9)	8(6,11)	0.203	<0.001	39.91(24.80,56.43)	33.23(21.85,46.70)	0.142	<0.001
Diseases of the musculoskeletal system and connective tissue	3960	31597	6(4,9)	7(6,10)	0.154	<0.001	33.69(13.31,54.19)	33.00(22.22,46.53)	0.126	<0.001
Diseases of the genitourinary system	5427	12877	6(4,8)	7(5,10)	0.188	<0.001	44.08(31.50,58.81)	39.16(25.65,53.88)	0.112	<0.001
Congenital malformations, deformations and chromosomal abnormalities	120	357	7(5,9)	8(6,9)	0.140	0.059	46.27(33.18,61.12)	40.44(28.37,55.59)	0.151	0.033

Table4 Spearman correlation analysis among Ptcn, Totalexp, medicine cost, length of stay, OOPs

	Totalexp		Medicine cost		Length of stay		OOPs	
	r_s	p	r_s	p	r_s	p	r_s	p
Ptcm of various diseases								
Neoplasms	0.185	<0.001	0.217	<0.001	0.204	<0.001	-0.116	<0.001
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0.067	0.008	0.229	<0.001	0.139	<0.001	-0.165	<0.001
Endocrine,nutritional and metabolic diseases	-0.082	<0.001	0.073	<0.001	0.090	<0.001	-0.141	<0.001
Mental and behavioural disorders	0.077	0.011	0.235	<0.001	0.121	<0.001	-0.122	<0.001
Diseases of the nervous system	-0.068	<0.001	-0.038	<0.001	0.143	<0.001	-0.145	<0.001
Diseases of the eye and adnexa	-0.018	0.079	0.376	<0.001	0.302	<0.001	-0.288	<0.001
Diseases of the ear and mastoid process	-0.197	<0.001	-0.052	0.008	0.055	0.005	-0.276	<0.001
Diseases of the circulatory system	-0.052	<0.001	0.024	<0.001	0.142	<0.001	-0.144	<0.001
Diseases of the respiratory system	-0.132	<0.001	-0.043	<0.001	0.021	<0.001	-0.134	<0.001
Diseases of the digestive system	-0.123	<0.001	-0.012	0.031	0.126	<0.001	-0.212	<0.001
Diseases of the skin and subcutaneous tissue	0.024	0.139	0.156	<0.001	0.109	<0.001	-0.153	<0.001
Diseases of the musculoskeletal system and connective tissue	-0.047	<0.001	-0.054	<0.001	0.029	<0.001	-0.094	<0.001
Diseases of the genitourinary system	-0.071	<0.001	0.040	<0.001	0.045	<0.001	-0.121	<0.001
Congenital malformations, deformations and chromosomal abnormalities	-0.037	0.421	0.112	0.014	0.037	0.419	-0.081	0.079

Discussion

The choice of treatment mode is related to the patient, sometimes influenced by the doctor and the type of disease. Regarding the situation of using TCM in different groups of geriatric inpatients with chronic diseases, our results indicate that the possibility of TCM treatment in female inpatients with chronic diseases was higher than that in male. On the one hand, it may be affected by the patient's preference for medical treatment. In 2016, the results of the national survey on health care literacy of TCM shown that female pay more attention to health care issues of TCM in life than male[18]. Chung's study found that women were more likely to choose TCM for treatment of diseases[19]. On the other hand, it may be related to the distribution of dominant diseases in TCM. According to the survey of the predominant diseases of TCM, the predominant diseases of TCM are distributed in internal, external, gynecology, pediatrics, orthopedics, ophthalmology, otolaryngology[20]. If female with chronic diseases suffer from gynecological diseases at the same time, doctors are more likely to choose TCM for treatment.

Our study also found that taking the group of 60-69 y as a reference, the elderly were more likely to receive TCM treatment. This may be related to the trust of TCM. The affirmation and trust of the efficacy of TCM is the key factor affecting the residents' consumption behavior of TCM[21]. Qiu's research shown that age has the greatest influence on the factors of trust and seeking medical treatment and the elderly have greater trust in TCM, and they are more likely to use TCM for treatment[22]. In our study, patients who have undergone surgery were less likely to use TCM. This may be the reason that surgical patients must be fasting before and after surgery, and also can not take oral TCM.

From the comparison of various institutions, the possibility of TCM treatment in general hospitals was lower than other institutions. Differences in the allocation of TCM resources among different types of institutions may lead to this situation. Cai's results shown that the number of TCM doctors was an important factor affecting the provision of TCM services by institutions[23]. In 2018, the proportion of TCM physicians in general hospitals (7.23%) in Hunan province was lower than in TCM hospitals (48.11%), community health service centers (18.28%), and township health centers (14.18%). Western doctor does not have the legal prescription right of Chinese herbal medicine, so the utilization rate of TCM was lower in general hospitals with less doctors of TCM.

In our study, compared with the self-financed patient group, the possibility of TCM treatment in groups of urban employees, urban and rural residents, work injury insurance, public health care, and other medical insurance types were higher. This may be the effect of medical insurance on the compensation of TCM services. Patients with chronic diseases who need to be hospitalized are in serious condition. Some studies have shown that under the hypothesis of severe chronic disease, patients are more inclined to choose western medical services and willingness to pay low-cost medical treatment[24]. In recent years, China has formulated a series of policies and measures to promote the role of TCM in disease treatment. The Chinese medicine law of the people's Republic of China, which came into effect in 2017, clearly stipulates that governments at or above the county level should include eligible TCM decoction pieces, proprietary TCM, and TCM preparations in medical institutions into the basic medical insurance fund payment scope[25]. At present, there are 1,321 kinds of Chinese patent medicines, and 892 kinds of TCM decoction pieces have been included in the "National Basic Medical Insurance, Work Injury Insurance and Maternity Insurance Drug Catalogue"[26]. Medical insurance not only increases the willingness of patients to use TCM services through economic means, but also increases the enthusiasm of medical institutions to provide TCM services.

The length of stay, the cost of medicine, Totalexp, and OOPs are often used as indicators to evaluate the patient's hospitalization burden[27][28][29]. Ji Conghua's study concluded that patients using TCM were higher than the western medicine group in terms of length of stay, total cost of hospitalization of medicines, etc[30]. In our study, we found that for geriatric inpatients with chronic congenital malformations, deformities, and chromosomal abnormalities, the difference in hospitalization days between the group of TCM user and the TCM nusers group was not significant. For digestive diseases, the cost of medicines in the TCM users group was lower than that in the TCM nusers group. For patients with different types of diseases and symptoms, the means of TCM treatment of digestive system diseases are not necessarily all drug treatment, but also Taiji, dietotherapy, acupuncture, massage, which may explain why the drug cost of TCM nusers group was lower[31]. Although the Totalexp level of the TCM users group for most diseases were higher than those of TCM nusers group, the OOPs in TCM users group was lower than that of TCM nusers group. This may be related to the health insurance reimbursement policy. When the national basic medical insurance pays the expenses of Chinese patent medicine and Western medicine, it is divided into class A and class B. The expenses incurred by using class a drugs and Chinese herbal pieces included in the medical insurance shall be paid in full by the medical insurance fund[32]. Among the drugs included in the drug catalog of national basic medical insurance, 1134 kinds (51.24%) of TCM and 398 kinds (30.11%) of Western medicine can be fully paid by the fund. Only less than 40 kinds of Chinese herbal pieces have not been included in the scope of fund payment. The number of Western medicines not included in the fund is far more than that.

Regarding the relationship between the use of TCM treatment and the length of stay, previous research conclusions are not completely consistent. The results of Wang's study showed that the length of stay with TCM treatment was longer[33]. Li found that the combined treatment of ischemic stroke with TCM and west medicine can reduce the length of stay[34]. Our results shown that the Ptcn was negatively related to the length of stay for inpatient treatment of various chronic diseases for geriatric. We did not distinguish between specific diseases, so we are not sure whether there is such a correlation between the Ptcn and the length of stay for each disease. It should be noted that the severity of the illness is the most important factor affecting the length of stay[35]. Since we did not obtain information about the condition, we cannot rule out the increase in the Ptcn caused by the degree of the disease, which also affected the length of stay.

Concerning the impact of Ptcn on the cost of medicines and Totalexp, previous studies have shown that the cost of medicines decreases as Ptcn increases[36]. The higher Ptcn, the lower Totalexp[37]. We have found that Ptcn was not necessarily related to Totalexp of geriatric inpatients with chronic diseases. For certain diseases, the cost of medicines and Totalexp may increase with the increase in Ptcn, such as tumors, blood and hematopoietic organ diseases and certain diseases involving immune mechanisms, endocrine, nutritional and metabolic diseases, mental and behavioral disorders, eye and appendage disorders, urogenital diseases. On the one hand, it may be determined by the natural characteristics of the disease species. Taking geriatric inpatients with cancer as an example, their disease severity is relatively high. Many patients were treated with TCM for symptomatic treatment in the later stage because of unsatisfactory effect after previous repeated treatment. The treatment characteristics of the disease are long hospital stays, high proportion of drugs, and high total cost of a single hospital stay. On the other hand, it may be affected by the degree of illness. Some patients are hospitalized in critical condition. Doctors often choose west medicine such as infusion to control their condition at first[38]. After patient's condition improves, TCM could be need to take for a long time. Although the cost of hospitalization of certain diseases will increase with the increase of Ptcn, Ptcn was negatively related to OOPs. It shows that the higher Ptcn, the smaller the burden on patients.

According to the relationship between Ptcn for various diseases, the cost of medicines, and the cost of hospitalization, We believe that the use of TCM for the treatment of geriatric chronic diseases respiratory system, digestive system, ear diseases, nervous system are relatively cost-effective. The higher the Ptcn, the lower the cost of medicines and Totalexp, and the lower OOPs. The use of TCM for the treatment of chronic circulatory diseases and ophthalmic diseases, although the cost of medicine is higher, but Totalexp and the OOPs decrease with the increase of Ptcn.

To our knowledge, this is the first comprehensive report on the use and cost of TCM in geriatric inpatients with chronic diseases. In this study, not only the situation of using TCM were analyzed from the perspective of gender, age, institution, and insurance status, but also the relationship between the Ptcn and the cost of hospitalization and personal burden of various geriatric chronic patients were discussed. However, It is undeniable that our research still has two limitations. First, the data we obtained only reflects a single cost and cannot reflect the annual cost and burden level of geriatric inpatients with chronic diseases. In addition, due to space limitations, there is a lack of research on the path of Ptcn affects hospitalization costs.

Conclusion

There are differences in the distribution of TCM treatment of geriatric inpatients with chronic diseases in terms of gender, age, institution, and insurance status. Treatment mainly used TCM for geriatric chronic respiratory system, consumption system diseases, circulatory system, ear diseases and neurological diseases has obvious cost-benefit advantages, and conducive to reducing the burden of patients.

Abbreviations

TCM: traditional Chinese medicine

Totalexp: the total hospitalization expenses

OOPs: out-of-pocket payments;

Ptcn: proportion of expenses of traditional Chinese medicine to expenses of drugs

Declarations

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Availability of data and materials

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

Authors' contributions

HZ drafted the manuscript and performed the statistical analysis.ZS, LJ did some expeditionary research. LRZ,XW helped revise the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

The study was approved by Ethics Committee of The First Hospital of Hunan University of Chinese Medicine (HN-LL-KY-2019-18). All participants provided verbal consent prior to participation in the study. This method of obtaining consent was approved by the ethics committee as the study presented no more than minimal risk to the participants.

Consent for publication

Not Applicable.

Competing interests

The authors declare that they have no competing interests.

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