Healthcare-Seeking Behavior and Its Influencing Factors among Multimorbid Patients in the Context of Tiered Healthcare: A Postprint

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Abstract

Objective To analyze the influencing factors of healthcare-seeking behavior in patients with multimorbidity from the perspective of the tiered medical system, and to provide research reference for further implementing the tiered medical system and rationally allocating medical resources. Methods Patients with multimorbidity who visited the Shanghai Yangpu District Central Hospital Medical Consortium (Shanghai Yangpu District Central Hospital and Dinghai, Yanji, and Changbai Community Health Service Centers) from June 1, 2019 to January 1, 2020 were selected as study subjects. General information and influencing factors of healthcare-seeking intention were collected through questionnaire surveys, and statistical analysis was performed on the survey data. Results A total of 1100 questionnaires were distributed, and 1072 valid questionnaires were recovered. More than 80% of patients were willing to choose community health service centers for first contact care during the stable phase of multiple chronic diseases or when diseases were mildly uncontrolled. Binary Logistic regression analysis results showed that age was an independent influencing factor in the choice of medical institution for patients with multimorbidity (regression coefficient = -1.543, OR = 0.214, 95% CI: 0.099–0.464, P = 0.001). Statistical ranking of factors considered by patients in healthcare choice showed the following order: medical accessibility, medical technical level, healthcare satisfaction, medical insurance coverage, medical expenditure, and other factors. Conclusion The elderly are a high-risk population for multimorbidity and also the main population choosing primary care first contact. Compared with regional medical centers, community health service centers have high accessibility, which is a favorable factor for achieving primary care first contact for patients with multimorbidity. Therefore, accelerating the construction of medical consortia, promoting the sharing and transferring of various high-quality resources to the primary level, and improving the service quality and capacity of primary medical institutions are conducive to achieving primary care first contact in the

tiered medical system.

Full Text

Research on Medical Treatment Behavior and Its Influencing Factors of Patients with Multiple Chronic Diseases Under the Hierarchical Diagnosis and Treatment System

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Abstract

Objective: From the perspective of hierarchical diagnosis and treatment, this study analyzes the factors influencing medical treatment behavior among patients with multiple chronic diseases to provide research-based recommendations for further implementing the hierarchical diagnosis and treatment system and rationally allocating medical resources.

Methods: Patients with multiple chronic diseases who visited the Yangpu District Central Hospital Medical Consortium in Shanghai (including Yangpu District Central Hospital and Dinghai, Yanji, and Changbai Community Health Service Centers) between June 1, 2019, and January 1, 2020, were selected as study subjects. General patient information and factors influencing medical treatment intentions were collected through questionnaire surveys, and the data were statistically analyzed.

Results: A total of 1,100 questionnaires were distributed, and 1,072 valid questionnaires were recovered. Over 80% of patients were willing to choose community health service centers for their first visit during the stable period of multiple chronic diseases or when diseases were mildly uncontrolled. Binary logistic regression analysis showed that age was an independent influencing factor for the choice of medical institutions among patients with multiple chronic diseases (regression coefficient: -1.543, OR = 0.214, 95% CI: 0.099–0.464, P = 0.001). Statistical ranking of factors considered by patients when choosing medical institutions revealed the following order of importance: medical accessibility, medical technology level, treatment satisfaction, medical security status,

medical expenses, and other factors.

Conclusion: The elderly represent a high-prevalence population for multiple chronic diseases and are also the primary group choosing first-contact care at the primary level. Compared with regional medical centers, community health service centers offer higher accessibility, which is a favorable factor for achieving first-contact care for patients with multiple chronic diseases at the primary level. Therefore, accelerating the construction of medical consortia, promoting the sharing and downward flow of high-quality resources, and improving the service quality and capacity of primary-level medical institutions will facilitate the realization of primary-level first-contact care within the hierarchical diagnosis and treatment framework.

Keywords: hierarchical diagnosis and treatment; multimorbidity; medical-seeking behavior

Introduction

Multimorbidity refers to an individual suffering from two or more chronic diseases simultaneously, which may be unrelated or may influence each other [1]. Studies have shown that the prevalence of chronic disease multimorbidity among elderly patients in Chinese communities exceeds two-thirds [2], placing enormous pressure on individuals, families, and the healthcare system. To further alleviate the problem of "difficult and expensive access to healthcare," China has adopted hierarchical diagnosis and treatment as an important means to promote rational utilization of medical and health resources. Various regions have conducted extensive and meaningful explorations and active attempts in building the hierarchical diagnosis and treatment system, gradually adopting medical consortia as the carrier for implementing this model. Since March 2015, Shanghai has implemented the "1+1+1" combination contracting strategy, where residents voluntarily select one family doctor at a community health service center to establish a contracted service relationship, and then choose one district-level hospital and one municipal-level hospital as designated medical institutions. This approach integrates relevant medical resources within the region, leverages the professional technical and research advantages of tertiary hospitals to enhance the service capacity of primary-level medical and health institutions, and promotes the development of nursing and rehabilitation institutions.

Since the state first explicitly proposed the concept of hierarchical diagnosis and treatment in 2009, chronic diseases have remained the main focus of disease management at primary-level health institutions. However, under the current medical model dominated by "specialized diseases" and with uneven distribution of medical resources, multimorbidity—as a common chronic disease condition—still leads a large number of patients to seek treatment at different departments of tertiary hospitals, resulting in issues such as polypharmacy, discontinuous treatment, and excessive medical care [3]. In recent years, domestic research

on the medical treatment behavior of patients with multimorbidity under the background of hierarchical diagnosis and treatment has been limited, making the study of medical choices among these patients particularly significant.

From the perspective of hierarchical diagnosis and treatment, this study examines the medical choices of patients with multiple chronic diseases and analyzes the influencing factors behind these choices. The findings aim to provide research-based recommendations for improving policies related to hierarchical diagnosis and treatment, enhancing patients' enthusiasm for first-contact care at the community level, further implementing the hierarchical diagnosis and treatment system, and rationally allocating medical resources.

Methods

1.1 Study Subjects Patients with multiple chronic diseases who visited the Yangpu District Central Hospital Medical Consortium in Shanghai (including Yangpu District Central Hospital, Dinghai Community Health Service Center, Yanji Community Health Service Center, and Changbai Community Health Service Center) between June 1, 2019, and January 1, 2020, and met the inclusion and exclusion criteria were selected as study subjects. All patients signed informed consent forms before participating in the survey. This study complies with the ethical standards of the Helsinki Declaration and was approved by the Ethics Committee of Yangpu Hospital, School of Medicine, Tongji University.

Based on the principle of random sampling, nine family doctor teams were selected from 26 teams across the three community health service centers using simple random sampling. According to the list of contracted residents receiving family doctor services provided by these teams, 100 cases were selected from each team using simple random sampling, totaling 900 contracted residents as survey subjects. Using the same method, 200 outpatients were selected from the list provided by Yangpu District Central Hospital as survey subjects. Patients with multiple chronic diseases were divided into two groups based on their choice of first-contact medical institution for chronic disease management: the community health service center group and the regional medical center group.

1.2 Inclusion and Exclusion Criteria **Inclusion criteria:** (1) Patients simultaneously suffering from two chronic diseases with the following combinations: hypertension + coronary heart disease or hypertension + diabetes (the same disease combinations across all four medical institutions); (2) Age $\geq$ 18 years; (3) Able to cooperate in completing the questionnaire with informed consent.

Exclusion criteria: (1) Patients with fewer than 4 annual visits due to coexisting diseases; (2) Disease combinations that did not match the study design; (3) Patients with cognitive dysfunction, mental disorders, hearing impairment, visual impairment, or other conditions preventing questionnaire completion; (4)

Patients who had already participated in the questionnaire survey at any of the four medical institutions (to avoid duplicate surveys at the other three institutions).

1.3 Research Methods A questionnaire survey on medical choices and influencing factors for patients with multiple chronic diseases was conducted within the designated area to collect data on patient medical behavior and related influencing factors. The questionnaire was designed, pre-tested for reliability and validity, revised, and then formally implemented. The questionnaire mainly included: (1) Individual characteristics of patients with multiple chronic diseases, including basic information such as age, gender, education level, marital status, employment status, annual household income, and medical insurance type; (2) Awareness and actual compliance with the hierarchical diagnosis and treatment policy; (3) Investigation of medical institution choices and influencing factors, including choices of first-contact medical institutions under different health conditions and related factors considered when selecting medical institutions.

Based on preliminary literature analysis, the most frequently mentioned factors considered by patients when choosing medical institutions included the following five aspects: medical accessibility (in this questionnaire, referring to the time and distance required to reach the medical service institution and waiting time for consultation, such as total time from registration to consultation, from laboratory testing to receiving results, and from payment to medication collection), medical technology level, treatment satisfaction (including doctors' service attitude, whether adequate communication time was available, prescription writing time, and medical environment of the institution), medical security status, and medical expenses. Patients were asked to supplement other considerations in item 6 and to rank all six factors by importance, with the most important factor scored as 6 points and scores decreasing sequentially according to weight.

Before formal implementation, the questionnaire was tested according to relevant standards. The results showed a Cronbach' s alpha coefficient of 0.818 for the full scale, indicating acceptable reliability and good internal consistency among the designed indicators. The commonality values for all research items were higher than 0.4, the cumulative variance explanation rate after four-factor rotation was 77.65% (>50%), and the KMO value was 0.899 (>0.6), indicating that the validity of the questionnaire data met the requirements.

1.4 Quality Control Before the survey, investigators received unified training on the purpose, content, specific requirements, and precautions. At the beginning of the formal survey, investigators provided unified explanations to participants, clarified the questionnaire content, and fully gained their trust and support. During the questionnaire survey, investigators ensured that participants fully understood each question. When asking and explaining questions, investigators avoided using guiding or suggestive language to prevent influencing participants.

1.5 Disease Severity Classification **Stable period:** Blood pressure <140/90 mmHg and HbA1c <7%, or blood pressure <140/90 mmHg and cardiac function class 1 (NYHA).

Mildly uncontrolled: Meeting any one of the following conditions: (1) Hypertension grade 1; (2) 7% ≤ HbA1c <8%; (3) Cardiac function class 2 (NYHA).

Moderately uncontrolled: Meeting any one of the following conditions: (1) Hypertension grade 2; (2) 8% ≤ HbA1c <9%; (3) Cardiac function class 3 (NYHA); or simultaneously meeting two of the mildly uncontrolled criteria.

Severely uncontrolled: Meeting any one of the following conditions: (1) Hypertension grade 3; (2) HbA1c $ $9%; (3) Cardiac function class 4 (NYHA); or simultaneously meeting two of the moderately uncontrolled criteria.

1.6 Statistical Methods Data were initially organized using Excel 2017 software and analyzed using SPSS 22.0 (SPSS Inc., USA). Measurement data were expressed as mean ± standard deviation (±s), with analysis of variance used for multi-group comparisons. Count data were expressed as percentages (%), with ^{2} tests used for comparisons between two groups and Wilcoxon rank-sum tests used for ordinal data. Binary logistic regression analysis was used to explore influencing factors related to medical institution selection among patients with multiple chronic diseases. $P < 0.05$ was considered statistically significant.

Results

2.1 Basic Characteristics of Survey Subjects A total of 1,100 questionnaires were distributed, and 1,072 valid questionnaires were recovered, yielding a response rate of 97.5%. Among the valid questionnaires, 928 patients with multiple chronic diseases indicated that their first-contact medical institution for this illness episode was a community health service center.

The survey included 456 males (42.54%) and 616 females (57.46%), with 912 elderly individuals ($ $60 years) accounting for 85.08% of the sample. Among all participants, the majority (624 individuals, 58.21%) participated in urban employee medical insurance, followed by urban and rural resident medical insurance (416 individuals, 38.81%). Twenty individuals (1.87%) received medical assistance, and 12 (1.12%) had no insurance coverage. Additionally, 52 individuals (4.85%) had purchased commercial health insurance as a supplement to basic medical insurance. See Table 1 for details.

2.2.1 Choice Preferences of Patients with Multiple Chronic Diseases for Medical Institutions Based on patients' subjective assessment of their condition and disease severity classification, 928 individuals (86.57%) were willing to choose community health service centers for first-contact care during the stable period of multiple chronic diseases. As disease severity gradually

increased, the proportion of patients choosing community-based first-contact care gradually decreased. When diseases were mildly, moderately, and severely uncontrolled, the numbers of patients willing to choose community-based first-contact care were 920 (85.82%), 600 (55.97%), and 240 (22.39%), respectively.

2.2.2 Influencing Factors of Medical Treatment Behavior in Patients with Multiple Chronic Diseases Univariate analysis of medical institution selection among patients with multiple chronic diseases showed statistically significant differences between the two groups in terms of age, gender, education level, annual household income, and insurance type (all $P < 0.05$). See Table 2 for details.

Further binary logistic regression analysis was conducted on influencing factors related to medical institution selection. The choice of medical institution was used as the dependent variable, while five factors with statistical significance in univariate analysis (gender, age, education level, annual household income, and insurance type) were included as independent variables. Specific assignments are detailed in Table 3 . The results showed that age (regression coefficient: -1.543, OR = 0.214, 95% CI: 0.099-0.464, P = 0.001) was an independent influencing factor for medical institution selection among patients with multiple chronic diseases.

Analysis of factors considered by patients and their relative importance revealed that the order of importance for patients with multiple chronic diseases when choosing medical institutions was: medical accessibility (5.5 points), medical technology level (5.13 points), treatment satisfaction (3.74 points), medical security status (3.6 points), medical expenses (2.93 points), and other factors (2.24 points).

2.3.1 Awareness and Compliance with the Hierarchical Diagnosis and Treatment System The majority of patients with multiple chronic diseases (624 individuals, 58.21%) were aware of the hierarchical diagnosis and treatment system, though their understanding varied, with only 52 individuals reporting thorough knowledge. The survey also showed that 940 individuals (87.69%) were willing to follow the medical treatment concept advocated by the hierarchical diagnosis and treatment system. Among patients who were partially or thoroughly knowledgeable about the system, over 92.95% expressed willingness to comply, while among those who were unclear or unaware of the system, 80.35% still expressed willingness to follow it.

2.3.2 Awareness and Enrollment in the "1+1+1" Combination Contracting System Among the 1,072 patients with multiple chronic diseases who participated in the survey, 152 (14.18%) were unclear or unaware of the "1+1+1" combination contracting system, 552 (51.49%) had partial understanding, and 368 (34.33%) had thorough understanding. A total of 964 individuals

(89.93%) reported having participated in the "1+1+1" combination contracting program.

2.3.3 Actual Medical Institution Choices and Referrals After Enrollment Further statistical analysis of the 964 patients with multiple chronic diseases who had participated in the "1+1+1" combination contracting system revealed that 44 individuals (4.56%) actually visited non-contracted medical institutions. A total of 697 patients (72.30%) involved referrals for various reasons during their medical visits. Regarding reasons for upward referral, 261 patients were referred due to critical conditions or unsatisfactory initial treatment outcomes at the community level; 180 were referred because community resources could not meet their diagnostic and treatment needs; and 56 were referred after communicating with doctors based on their own requests. Regarding reasons for downward referral, 387 patients (74.57%) were transferred back to primary-level institutions for further rehabilitation after completing treatment at higher-level institutions and achieving stable conditions; 89 patients (17.15%) were advised by physicians at higher-level institutions to return to primary-level care for follow-up after objective assessment confirmed stable conditions; and 43 patients (8.29%) requested to return to primary-level care due to economic and other reasons. Analysis of the advantages of upward referral showed that timeliness of treatment was the most significant benefit, with over 80% of patients reporting timely access to consultation or hospitalization. Additionally, 6.64% of patients reported obtaining higher reimbursement rates or reduced medical expenses through referral, while 11.07% of patients with multiple chronic diseases reported no advantage compared with directly visiting higher-level institutions, having not experienced benefits from the referral process.

Discussion

In recent years, to reduce the burden of chronic diseases on individuals, families, and the healthcare system and to further address the problem of "difficult and expensive access to healthcare," the government has promoted hierarchical diagnosis and treatment as an important policy strategy. However, during the implementation of this system, patients' own medical treatment intentions and actual choices still do not align with policy requirements. This study investigated the medical treatment behavior of patients with multiple chronic diseases within a single medical consortium in Shanghai and identified several characteristics of their behavior and influencing factors.

3.1 The Elderly Are a High-Prevalence Population for Multiple Chronic Diseases Due to factors such as population aging, the number of people with chronic diseases in China continues to increase. According to statistics, deaths caused by chronic diseases account for 88.5% of total deaths among Chinese residents [4]. Among the 1,072 subjects in this study,

elderly individuals aged $ $60 years accounted for 85.08%, representing a high-prevalence population for multiple chronic diseases, with 82.46% of patients reporting that coexisting diseases affected their daily lives. Studies from the United Kingdom [5], Germany [6], Canada [7], and other countries have found that the prevalence of multiple chronic diseases among the elderly ranges from approximately 55% to 98%, similar to the results of this study. Further analysis revealed that this population shared common characteristics of low education levels and modest incomes, and some patients' understanding of relevant policies and expectations for medical service quality did not fully align with actual circumstances.

3.2 Insufficient Awareness of Hierarchical Diagnosis and Treatment Among Patients with Multiple Chronic Diseases In this study, over half of the participants were aware of the hierarchical diagnosis and treatment system, but only 4.85% had clear knowledge of it. Although this result represents an improvement compared with previous studies [8,9], it is significantly lower than the concurrent level in Shanghai' s Minhang District [10]. Regarding the actual implementation of Shanghai' s hierarchical diagnosis and treatment system—the "1+1+1" combination contracting system [11]—85.82% of patients with multiple chronic diseases reported understanding the family doctor contracting service policy, consistent with the survey results of Zhang Jingya et al. [12] across 50 community health service centers in 16 districts of Shanghai. This proportion is higher than related research findings in urban areas of Xuzhou (56.19%) [13], towns in Foshan (56.10%) [14], and rural areas of Shandong Province (44.30%) [15], but lower than recent local studies in Shanghai [16,17].

Differences between various research results may be related to the intensity of policy promotion at different levels and may also be associated with individual factors among patients with multiple chronic diseases. Most patients with multiple chronic diseases belong to the elderly age group, generally have low education levels, and some experience family-assisted contracting, all of which contribute to insufficient policy understanding.

3.3 Discrepancy Between Compliance Intention and Actual Choice Behavior Regarding Hierarchical Diagnosis and Treatment The survey results showed that 940 patients (87.69%) with multiple chronic diseases were willing to follow the medical treatment concept advocated by the hierarchical diagnosis and treatment system and choose primary-level first-contact care according to policy, with 928 individuals actually selecting community health service centers as their first-contact medical institutions. This indicates that most patients translated positive intentions into actual actions. Among those who participated in upward referrals, 11.07% of patients with multiple chronic diseases reported no difference compared with directly visiting higher-level institutions, having not experienced advantages from the referral process. Furthermore, regarding patients' subjective assessment of their conditions, this study

found that patients who self-assessed their conditions as more severe tended to prefer higher-level hospitals. This suggests that patients' non-compliance with the hierarchical diagnosis and treatment system is not solely due to insufficient awareness of its advantages but also results from multiple factors, including their own assessment of disease severity and evaluation of the advantages provided by community-based referrals, which reduce their compliance.

Although community health service centers are designed as integrated institutions providing "prevention, health care, medical treatment, rehabilitation, health education, and family planning technical guidance" to comprehensively meet the diverse healthcare needs of community residents, they struggle to achieve the expected goal of "first-contact care in the community" in actual operation. This reveals a gap between planning and practice in the functional positioning of community health service centers. Therefore, identifying the reasons why some patients with multiple chronic diseases do not choose primary-level first-contact care represents a breakthrough point for further implementing the hierarchical diagnosis and treatment system. Only by fully understanding the health needs of these patients can medical resources be rationally allocated within the region, the service capacity of community medical institutions be targeted for improvement, and the hierarchical diagnosis and treatment system be prevented from becoming a mere formality.

3.4 Multiple Factors Are Associated with Medical Institution Selection Among Patients with Multiple Chronic Diseases This study found that among various influencing factors, medical accessibility was the primary consideration for patients with multiple chronic diseases when seeking medical treatment, followed by medical technology level. This is similar to the findings of Wang Xiaolu et al. [18]. Additionally, female patients and older patients with multiple chronic diseases were more inclined to visit community health service centers, while those with higher education levels and higher annual household incomes preferred regional medical centers.

Notably, this study found that patients' willingness to choose primary-level first-contact care was inversely proportional to disease severity. Regarding reasons for upward referral, 261 patients (52.52%) indicated that community treatment was ineffective for critical conditions, and 180 patients (36.22%) cited limited diagnostic technology and equipment resources. These findings suggest that community health service centers currently suffer from uneven specialist technical skills among general practitioner teams, incomplete examination equipment, and lack of necessary emergency conditions. They also indicate that improving service quality and capacity at primary-level health institutions is an effective measure to attract patients to primary-level first-contact care. Therefore, accelerating the construction of medical consortia and leveraging the development of general practice and medical consortium building can effectively achieve information connectivity between community health service centers and regional medical centers, improve the medical technical skills, chronic disease manage-

ment capabilities, and research capabilities of primary-level medical personnel, thereby enhancing management efficiency for patients with multiple chronic diseases, optimizing medical treatment behavior, and positively contributing to the realization of primary-level first-contact care and rational hierarchical diagnosis and treatment.

This study analyzed the medical treatment behavior and related influencing factors of patients with multiple chronic diseases, but it has certain limitations. The survey subjects were limited to patients with multiple chronic diseases within a single medical consortium in one district of Shanghai, and the disease combinations did not encompass all possible multimorbidity patterns. Additionally, social and comprehensive factors were not extensively analyzed. Based on this study, future research will further explore the role of general practitioners in guiding patients with multiple chronic diseases toward primary-level first-contact care and two-way referrals, analyze influencing factors, and propose improvement measures to enhance residents' medical treatment experience and compliance with primary-level first-contact care, maximize cost-effectiveness of medical expenditures, and ensure full and rational utilization of limited health resources.

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Table 1 Socio-demographic characteristics of survey subjects

Table 2 Single factor analysis of medical institution selection for patients with multiple diseases

Table 3 The variable assignment of logistic regression analysis

Note: Figure translations are in progress. See original paper for figures.