

Postprint: Impact of Health Record Establishment on Healthcare Utilization Among Older Adults: A Propensity Score Matching Study

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Abstract

Background China's population aging problem is becoming increasingly prominent, and elderly health has become an important issue. Strengthening the construction of elderly health records can guide elderly individuals to seek medical care rationally and maintain their own health levels. Objective To understand the current status of establishing health records for the elderly and explore the impact of health record establishment on elderly individuals' medical-seeking behavior. Methods Using the newly released 2020 China Longitudinal Aging Social Survey (CLASS) data, which included 11,398 samples. After excluding samples with missing values in core variables, 11,381 valid samples were obtained. Propensity Score Matching (PSM) was employed to conduct 1:1 nearest neighbor matching between elderly individuals who had established health records and those who had not. The dependent variable was elderly medical-seeking behavior (choosing no medical consultation, using common medications, and purchasing medicine from pharmacies was categorized as self-treatment and assigned a value of 0; choosing specialized/general hospitals was assigned a value of 1; choosing village clinics/community hospitals was categorized as primary-level medical and health institutions and assigned a value of 2). The independent variable was whether health records were established in community medical institutions. Control variables included residential area, gender, age, marital status, self-rated health status, chronic disease conditions, number of hospitalizations within two years, utilization of elderly care services, and education level. Results After PSM matching, a total of 1,244 pairs were successfully matched, comprising 2,488 individuals. Univariate analysis results showed that the comparison of general characteristics between 1,224 pairs of elderly individuals who had established health records and those who had not revealed no statistically significant difference ($P < 0.05$). Multinomial Logistic regression analysis results indicated that, compared with self-treatment, establishing health records was a facilitating

factor for elderly individuals to seek medical care at specialized/general hospitals (OR=2.596, 95%CI=2.024~3.330) and at primary-level medical and health institutions (OR=1.774, 95%CI=1.484~2.122). Conclusion Elderly individuals who have established health records exhibit positive medical-seeking behavior. Efforts to develop health record systems for the elderly should be intensified, with regular health education lectures conducted. The positive role of family doctor contract services should be utilized, and knowledge related to health records should be regularly disseminated according to the health service needs and health status of contracted elderly individuals, continuously strengthening elderly individuals' awareness of self-health management and guiding them to develop good medical-seeking habits.

Full Text

Research on the Impact of Health Record Establishment on Medical Behavior Among the Elderly Using Propensity Score Matching

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Abstract

Background China's population aging problem is becoming increasingly prominent, making elderly health a critical public health priority. Expanding health record establishment for older adults can guide them toward appropriate health-care utilization and help maintain their health status.

Objective To examine the current status of health record establishment among the elderly and explore its impact on their medical behavior.

Methods Data from the latest 2020 wave of the Chinese Longitudinal Aging Social Survey (CLASS) were used. The dataset initially contained 11,398 samples, yielding 11,381 valid samples after excluding cases with missing values on core variables. Propensity Score Matching (PSM) was employed to perform 1:1

nearest neighbor matching between elderly individuals with and without established health records. The dependent variable was medical behavior, categorized as: self-treatment (no medical consultation, using 常备 medication, or pharmacy purchase, coded as 0), specialized/general hospital visits (coded as 1), and primary healthcare institution visits (village clinics/community hospitals, coded as 2). The independent variable was whether health records were established at community medical institutions. Control variables included residential area, gender, age, marital status, self-rated health, chronic disease status, hospitalization frequency within two years, elderly care service utilization, and education level.

Results After PSM, 1,244 matched pairs were successfully created (2,488 individuals). Univariate analysis showed no statistically significant differences in general characteristics between the 1,224 pairs of individuals with and without health records ($P < 0.05$). Multinomial logistic regression revealed that, compared with self-treatment, health record establishment significantly promoted visits to both specialized/general hospitals (OR=2.596, 95%CI=2.024–3.330) and primary healthcare institutions (OR=1.774, 95%CI=1.484–2.122).

Conclusion Elderly individuals with established health records demonstrate more proactive medical-seeking behavior. We must intensify efforts to develop health records for older adults, conduct regular health education campaigns, and leverage the positive effects of family doctor contract services. Based on the health service needs and health status of contracted elderly individuals, health record-related knowledge should be disseminated regularly to continuously enhance self-health management awareness and guide older adults toward forming appropriate medical-seeking habits.

Keywords: Office visits; Aged; Medical behavior; Health records; Propensity score; Propensity score matching

Introduction

Health records serve as a comprehensive database of residents' health status, enabling physicians to update and supplement medical information during consultations. Establishing health records facilitates information sharing across medical institutions, promotes referrals and collaboration, and improves treatment outcomes. As population aging intensifies in China, health issues among the elderly have become increasingly prominent, with medical behavior playing a crucial role in improving health status and ensuring continuity of care. Data from the Sixth National Health Service Survey show that consultation rates among older adults have increased compared to the Fifth Survey. However, elderly medical behavior is influenced by health awareness and lifestyle factors, with some older adults still choosing self-treatment rather than seeking professional care, leading to delayed treatment and disease progression.

Health records, as databases documenting health behaviors, store information on past medical visits, medication records, and health status. They help older adults systematically understand their health changes across different life stages. When experiencing common or chronic conditions, elderly individuals can use their health records to assess their health status, make informed decisions about seeking care, and follow medical advice to improve their health. Therefore, studying the impact of health record establishment on elderly medical behavior has practical significance. Previous research on factors influencing elderly medical behavior has primarily focused on family doctor contract services and tiered diagnosis and treatment systems, with limited attention to the specific effects of health records. This study systematically analyzes the relationship between health record establishment and medical behavior among older adults to provide evidence for guiding appropriate and effective healthcare utilization.

Methods

Data Source

This study utilized data from the Chinese Longitudinal Aging Social Survey (CLASS), a national, longitudinal social survey project. CLASS conducted its first national baseline survey in 2014, with follow-up surveys in 2016, 2018, and 2020. The survey targets individuals aged 60 years and older from household samples across 28 provinces, collecting information on sociodemographic characteristics, daily activities, and health status. With permission from the data administrators, we used the most recent 2020 dataset, which initially included 11,398 samples. After excluding cases with missing values on core variables, 11,381 valid samples remained.

Variables

Dependent Variable The dependent variable was elderly medical behavior, derived from the 2020 CLASS question on treatment-seeking for minor illnesses. Based on previous research and study requirements, responses were categorized as: self-treatment (no medical consultation, using 常备 medication, or pharmacy purchase, coded as 0), specialized/general hospital visits (coded as 1), and primary healthcare institution visits (village clinics/community hospitals, coded as 2).

Independent Variable The independent variable was whether health records were established at community medical institutions, based on the CLASS question: “In the past year, have you established health records at a community medical institution?” Responses were dichotomous (yes/no), coded as 1 and 0 respectively.

Control Variables Previous studies indicate that elderly medical behavior is influenced by sociodemographic characteristics, health behaviors, and socioeconomic status. Based on research requirements, we included the following control variables: residential area, gender, age, marital status, self-rated health, chronic disease status, hospitalization frequency within two years, elderly care service utilization, and education level. Self-rated health was assessed through the question: “How would you rate your health status?” Responses of “relatively unhealthy” and “very unhealthy” were combined as “unhealthy” (coded 0), “generally healthy” as (coded 1), and “very healthy” and “relatively healthy” as “healthy” (coded 2). Due to small and dispersed numbers, divorced, widowed, and unmarried individuals were combined as “other marital status” (coded 0), with married individuals coded as 1. Elderly care service utilization was assessed by asking about use of any of the following services: home visits, elderly hot-lines, accompaniment to medical appointments, daily shopping assistance, legal aid, day care centers, meal services, housekeeping, or psychological counseling. Use of any service was coded as 1; no use was coded as 0.

Statistical Analysis

Data were analyzed using SPSS 22.0 for descriptive statistics (frequencies and percentages). Propensity Score Matching (PSM) was performed using R 4.3.3 software, implementing 1:1 nearest neighbor matching between elderly individuals with and without established health records. PSM is a statistical method that handles non-randomized data by controlling and balancing confounding bias, effectively equating 混杂 factors to reduce their interference in outcome effect estimation. Based on the matched sample, chi-square tests and unordered multinomial logistic regression were used to analyze the impact of health record establishment on medical behavior, with $P < 0.05$ considered statistically significant.

Results

General Characteristics of Study Subjects

Among the 11,381 study participants, 5,738 (50.4%) were male and 5,643 (49.6%) were female. Age distribution was: 5,024 (44.1%) aged 60–69 years, 4,740 (41.6%) aged 70–79 years, and 1,617 (14.3%) aged 80 years or older. Education levels were: 2,659 (23.3%) illiterate, 4,670 (41.1%) with primary school/private school/literacy class education, 3,781 (33.2%) with junior high school/technical secondary school education, and 271 (2.4%) with college education or higher. Residential distribution was 5,119 (44.9%) rural and 6,262 (55.1%) non-rural.

PSM Results for Health Record Establishment

Before matching, health record establishment differed significantly by elderly care service utilization, age, education level, self-rated health, chronic disease status, and hospitalization frequency within two years ($P < 0.05$). No significant differences were observed by gender, residential area, or marital status ($P < 0.05$). After PSM, 1,244 matched pairs were successfully created (2,488 individuals). Univariate analysis showed no statistically significant differences in general characteristics between the 1,224 pairs of individuals with and without health records ($P < 0.05$), as detailed in Table 1. The standardized mean difference (SMD) was less than 0.1 for all control variables, indicating good balance between groups [Figure 1: see original paper].

Univariate Analysis of Health Record Establishment and Medical Behavior

Among the 2,488 elderly individuals after PSM, participants were divided into three groups based on medical behavior. Univariate analysis revealed statistically significant differences in health record establishment across the three groups ($P < 0.05$). Control variables showing significant differences included residential area, self-rated health, chronic disease status, and elderly care service utilization ($P < 0.05$). No significant differences were found for gender, age, education level, marital status, or hospitalization frequency within two years ($P > 0.05$). Details are provided in Table 2.

Multinomial Logistic Regression Analysis

Using medical behavior as the dependent variable (0=self-treatment, 1=specialized/general hospital, 2=primary healthcare institution) with self-treatment as the reference group, variables showing statistical significance in univariate analysis were entered into an unordered multinomial logistic regression model. Results showed that, compared with self-treatment, health record establishment, non-rural residence, poor self-rated health, and chronic disease status were associated with higher likelihood of visiting specialized/general hospitals ($P < 0.05$). Health record establishment, rural residence, chronic disease status, and elderly care service utilization were associated with higher likelihood of visiting primary healthcare institutions ($P < 0.05$). Details are presented in Table 3.

Discussion

Health Record Establishment Promotes Proactive Medical Behavior

Our findings demonstrate that health record establishment positively influences elderly medical behavior. Compared with self-treatment, older adults with established health records are more likely to seek care at either specialized/general hospitals or primary healthcare institutions, consistent with findings from Lai

et al. This relationship may be explained by two mechanisms. First, individuals with health records exhibit higher health awareness. Compared with those without records, they have greater healthcare needs and more positive attitudes toward self-health management, leading to increased attention to their health status. When experiencing minor illnesses, health records containing previous examination results, disease histories, and medication details can simplify the consultation process, reduce unnecessary tests, shorten waiting times, and lower medical costs, thereby facilitating access and increasing medical-seeking willingness. Second, health records enhance the quality of care. During consultations at either specialized/general hospitals or primary healthcare institutions, physicians can review patients' health records to understand their medical history and treatment records, enabling more detailed medical advice and targeted health assessments and guidance. This helps elderly patients better understand their health status, follow medical recommendations, and adopt interventions to improve their health.

Health records not only help older adults make appropriate medical decisions and improve consultation efficiency but also strengthen the relationship between patients and healthcare institutions, improving doctor-patient relationships and providing reference for subsequent health management, disease prevention, and rehabilitation. Our findings further confirm that health record policies can effectively guide older adults toward proactive medical-seeking behavior. Government departments should continue prioritizing health record development for the elderly, conduct regular health education campaigns, and establish dedicated health record columns. Using new media platforms such as short videos and public accounts, they should disseminate health record knowledge, explain application procedures and usage guidelines, and encourage older adults to actively seek record establishment rather than passively accepting it.

Furthermore, as family doctor contract service coverage expands among the elderly population, the positive role of these services should be fully utilized. Family doctors should regularly disseminate health record knowledge based on contracted elderly individuals' health service needs and health status, or explain the importance of health records during consultations and follow-ups, continuously enhancing self-health management awareness and guiding the formation of appropriate medical-seeking habits.

Influencing Factors of Elderly Medical Behavior: Residence, Self-Rated Health, and Chronic Disease Status

Our study found that, compared with self-treatment, rural elderly individuals are more likely to seek care at primary healthcare institutions, consistent with findings from Kang and Que. This reflects the relative scarcity of medical resources in rural areas, where healthcare services primarily rely on village clinics and other primary healthcare facilities. To ensure healthcare accessibility for rural elderly populations, we recommend further promoting direct allocation of medical resources to rural grassroots levels, continuously improving

primary healthcare facilities, and constructing high-quality medical service environments. Simultaneously, accelerating the development of county-level medical communities can leverage superior medical resources and information technology from county-level and higher institutions to expand primary physician coverage in rural areas, strengthen training for rural primary care physicians, and improve service quality.

Elderly individuals with chronic diseases choosing primary healthcare institutions aligns with findings from Cai et al. Primary healthcare institutions are typically located near residential areas, offering short travel distances and fast waiting times, which facilitates timely medical access for elderly patients with chronic conditions. Elderly individuals utilizing elderly care services are also more willing to visit primary healthcare institutions, likely due to services such as accompaniment to medical appointments provided through community-based elderly care programs.

Our results also show that, compared with self-treatment, elderly individuals with poor self-rated health are more likely to seek care at specialized/general hospitals, consistent with Zhao's findings. Those choosing specialized/general hospitals often have poorer health status and require professional disease management and diagnostic testing. Non-rural elderly individuals are also more likely to visit specialized/general hospitals, reflecting both greater availability of medical resources in non-rural areas and preference for better-equipped facilities with higher service quality. This also suggests that China's tiered diagnosis and treatment policy is less effective in non-rural areas, indicating a need to strengthen primary care development in these regions. We recommend accelerating the 下沉 of high-quality resources, establishing "hospital-community" medical consortia, and implementing specialist consultation services at primary healthcare institutions to increase utilization rates among non-rural elderly populations.

Chronic disease patients tending to visit specialized/general hospitals indicates that some elderly individuals with chronic conditions inappropriately choose large hospitals, leading to underutilization of primary healthcare resources. We recommend conducting health education campaigns and preventive care services to publicize the importance of primary healthcare institutions as health "gatekeepers," and actively guide elderly chronic disease patients to prioritize primary healthcare institutions to reduce pressure on specialized/general hospitals.

Conclusion

This study reveals that health record establishment has a positive impact on elderly medical behavior. Older adults with established health records demonstrate more proactive medical-seeking behavior, preferring visits to either specialized/general hospitals or primary healthcare institutions. Health records not only simplify consultation processes and reduce medical costs but also signifi-

cantly enhance medical-seeking willingness and efficiency. Additionally, factors such as residential area, self-rated health, and chronic disease status influence elderly medical behavior. Therefore, government departments should continue strengthening health record development for older adults, improve health record utilization rates, optimize medical resource allocation, and enhance primary healthcare service capacity to further improve the medical environment for elderly individuals, guide them toward scientific and rational medical-seeking habits, and ultimately promote better health management and quality of life.

Author Contributions: TANG Xinyi conceived the study and drafted the manuscript; HU Xinyu designed the study and collected literature; ZHANG Yimin and LIU Shanshan supervised quality control and review, and provided overall responsibility for the manuscript.

Conflict of Interest Statement: The authors declare no conflicts of interest.

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References

- [1] ZHU Ziwen. Research on the Equalization of Urban and Rural Public Health Services [D]. Wuhan: Zhongnan University of Economics and Law, 2022.
- [2] LI Fanjie. Impact of Resident Health Record Policy on Medical Behavior of Chronic Disease Patients [J]. Enterprise Herald, 2016(7): 181-182.
- [3] WEI Zepeng. A Study on Group Work for Health Intervention Among Urban Community Elderly—A Case Study of Z Community [D]. Chongqing: Chongqing Technology and Business University, 2023.
- [4] REN Qingman, REN Xiaohui. Study on the Impact of Intergenerational Support from Children on Medical Behavior of the Elderly [J]. Journal of Sichuan University (Medical Sciences), 2023, 54(3): 614-619. DOI: 10.12182/20230560505.
- [5] PANG Huijun, ZHONG Lin, ZHOU Yiji. Investigation and Analysis of Management Needs for Elderly Patients with Cerebrovascular Disease Comorbidities Under the County Medical Community Model in Pinghu City, 2022-2023 [J]. Chinese Journal of Rural Medicine and Pharmacy, 2024, 31(5): 60-63. DOI: 10.19542/j.cnki.1006-5180.2303-258.
- [6] LI Chuanyan, DING Yanli, YANG Honglei, et al. Analysis of Nursing Needs and Satisfaction of Elderly Hypertensive Patients Under the “Hospital-Family-Internet” Model [J]. Journal of Qilu Nursing, 2023, 29(23): 86-89. DOI: 10.3969/j.issn.1006-7256.2023.23.025.

- [7] LIU Dan, XIA Jiamin, QIU Xuerong. Investigation and Analysis of Graded and Classified Health Management Among Community Elderly [J]. *Ningxia Medical Journal*, 2023, 45(9): 863-864. DOI: 10.13621/j.1001-5949.2023.09.0863.
- [8] SUN Zheng, HAO Yanqing, ZHANG Min. Study on Influencing Factors of Reproductive Tract Infection Health Service Utilization Among Perimenopausal Women in Tai'an City [J]. *Community Medicine Journal*, 2013, 11(6).
- [9] DU Jie, WANG Na, YU Liping, et al. Analysis of Health Status and Influencing Factors of Floating Ethnic Minority Populations [J]. *Chinese Journal of Public Health*, 2022, 38(7): 917-921. DOI: 10.11847/zgggws1128065.
- [10] ZENG Yanbing, YUAN Zhipeng, FANG Ya. Study on Medical Behavior and Its Influencing Factors Among Chinese Elderly [J]. *Chinese Journal of Health Statistics*, 2020, 37(2): 199-205.
- [11] FU Shu, WEI Bing. Study on Influencing Factors of Medical Behavior Among the Elderly from the Perspective of Full-Cycle Health Management [J]. *Health Economics Research*, 2024, 41(2): 56-60. DOI: 10.14055/j.cnki.33-1056/f.2024.02.020.
- [12] ZHOU Huabo. Study on Influencing Factors of Medical Institution Choice Among Middle-Aged and Elderly Groups [D]. Chengdu: Southwestern University of Finance and Economics, 2022.
- [13] ZHAO Chuangyi, YANG Yuan, YUAN Kongjun, et al. Exploring the Impact of Social Activity Participation on Elderly Health Using Propensity Score Matching [J]. *Chinese Journal of Disease Control & Prevention*, 2023, 27(8): 974-978. DOI: 10.16462/j.cnki.zhjbkz.2023.08.017.
- [14] LI Zhibo, JIANG Yunjie, YANG Shanshan, et al. Impact of Delirium on In-Hospital Mortality in ICU Patients with Acute Myocardial Infarction [J]. *Journal of Practical Medicine*, 2022, 38(23): 2952-2956. DOI: 10.3969/j.issn.1006-5725.2022.23.011.
- [15] LAI Sha, GAO Jianmin, YANG Xiaowei, et al. Study on Medical Behavior of Rural Chronic Disease Patients Under New Healthcare Reform—Analysis Based on Shaanxi Rural Household Health Survey Data [J]. *Chinese Health Service Management*, 2015, 32(4): 291-293, 316.
- [16] TANG Rong, SUN Yufeng, MA Xiaohua, et al. Analysis of Influencing Factors of Healthcare Needs Among Ningxia Elderly [J]. *Medicine and Society*, 2024, 37(5): 18-23, 39. DOI: 10.13723/j.yxysh.2024.05.003.
- [17] WANG Nan, WU Qunhong, FENG Yajie, et al. Impact of Health Record Establishment on Health Management Service Utilization Among Young and Middle-Aged Floating Populations with Chronic Diseases—Taking Hypertension and Type 2 Diabetes as Examples [J]. *Modern Preventive Medicine*, 2024, 51(9): 1630-1636. DOI: 10.20043/j.cnki.MPM.202310179.

- [18] LI Hongtao. Discussion on How to Improve Archives Management Level in Township Health Centers [J]. Heilongjiang Archives, 2024(2): 114-116.
- [19] YANG Linlin. Study on the Current Status of Establishment, Awareness, Utilization, and Evaluation of Resident Health Records in Chongqing Main Urban Area [D]. Chongqing: Chongqing Medical University, 2020.
- [20] ZHAO Qinqin, FENG Xiang, QIAN Dongfu, et al. Study on Medical Treatment Patterns and Influencing Factors Among Middle-Aged and Elderly Residents Under the “Healthy China” Initiative [J]. Chinese Rural Health Service Management, 2020, 40(3): 160-165. DOI: 10.3969/j.issn.1005-5916.2020.03.005.
- [21] KANG Rui. Study on Medical Status of Rural Elderly in Wuling Area—A Case Study of Dongxiacao Village in Enshi Prefecture [D]. Enshi: Hubei Minzu University, 2021.
- [22] QUE Chengbo. Study on Medical Institution Choice for First Diagnosis Among Middle-Aged and Elderly Residents in China [D]. Wuhan: South-Central Minzu University, 2021.
- [23] CAI Yumeng, ZHU Yi, YAN Shijiao, et al. Analysis of Two-Week Illness Consultation at Primary Healthcare Institutions and Its Influencing Factors Among Chinese Residents [J]. Chinese Journal of Public Health, 2023, 39(6): 725-729. DOI: 10.11847/zgggws1140784.
- [24] QIN Fan, YANG Lianzhao, CHEN Ling, et al. Qualitative Study on Influencing Factors of Community Medical Behavior Among Elderly Patients with Chronic Disease Comorbidities [J]. General Nursing, 2024, 22(4): 718-722. DOI: 10.12104/j.issn.1674-4748.2024.04.027.
- [25] ZHAO Yang. Changes in Hospital Preference Among Elderly Patients from 2011 to 2015 [J]. People’s Health, 2018(7): 82. DOI: 10.3969/j.issn.1004-597X.2018.07.058.
- [26] SHEN Yue, LI Liang. Impact of Medical Facility Accessibility on Residents’ Medical Behavior from an Age-Stratified Perspective—A Case Study of Chongming Island, Shanghai [J]. Human Geography, 2021, 36(2): 46-54. DOI: 10.13959/j.issn.1003-2398.2021.02.007.
- [27] NONG Sheng, HUANG Erdan, HAN Wenjing, et al. Policy Synergy of Tiered Diagnosis and Treatment and Drug Markup Removal on Patient Flow [J]. Chinese Health Resources, 2021, 24(5): 555-559. DOI: 10.13688/j.cnki.chr.2021.210067.
- [28] WANG Junyan, ZHENG Yaqu, WAN Zhiqiang. Practice and Exploration of Comprehensive Hospital Entrustment Model Under Integrated Health Community Background—A Case Study of Shanghai Jiading District Jiangqiao Hospital Entrustment Model [J]. Soft Science of Health, 2024, 38(4): 52-55.

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