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Trajectories and influencing factors of medical-help-seeking behaviour of elderly hypertensive patients - Analysis of 8 year clinical follow up data

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ABSTRACT

Background: Hypertension has become a major health issue, impacting both health and quality of life. Due to its long course of illness, multiple and complex complications, and lack of a cure or correcting deviation, patients require lengthy and continuous support and medical management. Understanding the long-term journey and influencing factors of medical-help-seeking behaviour in hypertensive patients is crucial for developing targeted and patient-centred prevention and control strategies.

Objective: The study aimed to identify and analyze the long-term trajectories of medical-help-seeking behaviour among hypertensive patients who were managed by community health centres of Putuo District in Shanghai City. Using trajectory modeling to determine key behavioral patterns and the influencing factors, the study will inform hypertension prevention and treatment policies.

Methods: Continuous clinical records of 8,922 hypertensive patients were retrieved from Resident Electronic Health Record System of Putuo District in Shanghai from 2014 to 2021. The data include histories, encounters, diagnostic, management and follow-up information. The Group-Based Trajectory Model (GBTM) was applied to analyze the patterns of the medical-help-seeking behaviour change, simulate behavioural transitions, and identify the best fitting model. Multivariate logistic regression was employed to examine patient characteristics across different behavioural trajectories. The 'persistently irregular medical-help-seeking behaviour' group served as the reference group for comparing influencing factors among medical-help-seeking behaviour trajectory groups.

Results: A total of 444,126 outpatient records were retrieved. The GBTM analysis revealed five distinct medical-help-seeking behaviour trajectories: sustained regular (39.84%), regular with a slow decline (25.36%), U-shaped (11.43%), regular with slow increase (11.86%), and persistently irregular (14.86%). Statistical differences were observed between these groups, including gender, age, illness duration, diabetes history, transient ischemic attack (TIA) history, and family history ($P < 0.05$). Female patients and those aged 75 years or older were more likely to transition from irregular to regular medical-help-seeking behaviour. Patients with diabetes or a history of TIA were less likely to follow irregular medical-help-seeking behaviour. Longer duration of hypertensive history and a family history were associated with a less favorable shift in behaviour.

Conclusion: Less than 40% of hypertensive patients consistently follow a regular medical-help-seeking behaviour. However, appropriate management strategies can promote regular medical-help-seeking behaviour, particularly in females, patients aged 75 years or above, and those with diabetes or a history of TIA. Further research is suggested identifying factors that can encourage medical help-behavioral changes in other medical-help-seeking behaviour trajectory groups.

Hypertension has become a major health threat, significantly affecting individuals' quality of life and imposing a substantial economic burden on society, families, and individuals.[1] According to the 2023 Report on Cardiovascular Health and Diseases in China, the prevalence of hypertension among adults is 31.6%, affecting approximately 245 million people.[2] Due to the chronic feature of hypertension, its numerous complications, and the fact that it remains largely incurable, patients require long-term and even life-long management, including medication adjustments, prescription management, regular follow-up appointments, and health education. Consequently, frequent medical visits are necessary for hypertensive patients.[3]

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Despite the importance of understanding hypertensive patients' medical-help-seeking behaviours, research in this area remains limited, with most studies being cross-sectional. For example, in Xiamen, a pilot area for tiered medical system, the utilization rates of community health services for hypertensive and diabetic patients increased from 72.6% and 40.7% to 95.7% and 78.1%, respectively, through the exploration of a the three-in-one model for chronic diseases(highlights the synergy of prevention, treatment, and management in controlling and improving chronic disease outcomes). However, these studies have not conducted continuous tracking of medical-help-seeking behaviour nor identified the factors influencing behavior preferences.[4] A study in Beijing identified several factors influencing outpatient care choices for hypertensive patients, including gender, age, health insurance type, residential area, polypharmacy, and the need for outpatient laboratory tests.[3]

This study intends to retrospectively analyze the medical data of hypertensive patients in Putuo District from 2013 to 2021. Using a retrospective cohort design, it investigates the long-term trends in the medical-help-seeking behaviour of hypertensive patients managed in the community health centres and the factors influencing these behaviors, providing scientific evidence for the development of personalized hypertension prevention strategies and health services.

Study participants and methods

Study participants

In Putuo District, an electronic health record system for residents was established in 2012, which comprehensively recorded diverse information about chronic disease patients, including their diagnoses and treatments, public health services, and performance. In 2013, the district launched a chronic disease management system that used information technology to manage hypertensive patients.

Inclusion criteria included: (1)Patients who were enrolled in the hypertension management system before January 1, 2014; (2)Patients who continuously received hypertension management services between 2014 and 2021; (3)Patients whose electronic health records contained at least three consecutive years of hypertension-related medical visits from 2014 to 2021. Exclusion criteria included: (1)Patients who were lost to follow-up for any reason and did not continue receiving hypertension management services between 2014 and 2021; (2)Patients whose electronic health records contained fewer than three years of consecutive hypertension-related medical visits from 2014 to 2021. A total of 8,922 participants met the inclusion criteria for this study.

Survey content and methods

(1) Medical-help-seeking behaviour information: Medical-help-seeking behaviour data were extracted from the electronic health record system, covering 444,126 outpatient visits for hypertension across various medical institutions in the district from 2014 to 2021. This data includes hospital visits, consultation dates.
(2) Patient management information: Patient management and follow-up data were obtained from the Putuo District chronic disease management system. The collected information includes demographic information(gender, age, occupation, and type of residential area), medical history(hypertension, diabetes, cardiovascular diseases, etc.), physical examination results(height, weight, waist circumference, and blood pressure).
(3) Health behaviors and risk factors: family history, smoking, alcohol consumption, and dietary habits.
(4) Follow-up blood pressure: Measured at the end of 2021.

Indicator definitions

(1) Regular medical-help-seeking behaviour: According to the Chronic Disease Management Guidelines, hypertensive patients should receive follow-up visits at least once every three months. A regular medical visit is defined as attending at least four visits per year, with each visit spaced no more than 90 days apart. If these conditions are not met, the visits are classified as irregular.
(2) Medical institutions: Medical institutions are categorized as general hospitals (including specialty hospitals) and community health centres.
(3) Regularity of medical visits score: Less than four visits per year and visits to different medical institutions scores 1 point, less than four visits per year and visits to the same medical institution scores 2 points, four or more visits per year and visits to different medical institutions scores 3 points, four or more visits per year and visits to the same medical institution(4 points).
(4) BMI classification: BMI≥28 kg/m^2 is defined as obesity, BMI≥24 $kg/m^2$is defined as overweight, 18.5 kg/m^2≤BMI < 24 kg/m^2 is defined as normal, BMI < 18.5 kg/m^2 is defined as underweight.
(5) Low-salt diet: A low-salt diet is defined as daily salt intake of less than 6 grams; a high-salt diet is defined as daily salt intake of 6 grams or more.
(6) Smoking: Both former and current smokers are classified as smokers.
(7) Alcohol consumption: Both former and current drinkers are classified as drinkers.
(8) Regular physical activity: Engaging in exercise at least five times per week, with each session lasting at least 30 minutes.

Quality control

The management of hypertensive patients follows a strict quality control process. Regular audits are conducted to ensure data integrity and authenticity. The community conducts quarterly self-assessments, while the district disease control center performs annual phone audits to verify patient identity, disease information, and confirm the accuracy of physical examination data. Patient visit data is sourced from the district's information platform, which collects data from outpatient services at various medical institutions. This data is considered both valid and reliable. Data collection and analysis are carried out through the resident health record platform and chronic disease management system, ensuring the validity of the data sources. During data cleaning and organization, strict adherence to inclusion criteria is followed. Additionally, steps such as data repair, conversion, and imputation of missing values are taken to maintain data completeness, accuracy, consistency, and usability.

Statistical methods

Data analysis was performed using SPSS 22.0 (SPSS, Inc., Chicago, IL). Measurement data were expressed as ($\bar{x}\pm s$), and comparisons among multiple groups were conducted using one-way ANOVA. Counting data were presented as relative frequencies, and comparisons between groups were made using the χ^2 test. A p-value of < 0.05 was considered statistically significant.

The GBTM was used to analyze changes in patients' medical-help-seeking behaviour. This model simulates transitions between different groups and identifies the best-fitting trajectory. The number of groups in the GBTM model ranged from 1 to 5, with each group's trajectory modeled using 1-3 degree polynomial equations. The model fit was evaluated using the following criteria[5-6].

(1) Bayesian Information Criterion (BIC): A smaller BIC value indicates a better model fit.
(2) Average Posterior Probability (AvePP): This reflects how well members of a group align with their assigned trajectory. A value greater than 0.7 is typically considered acceptable.
(3) High Posterior Probability: In each trajectory group, the proportion of individuals with a posterior probability greater than 0.7 should exceed 65%.

Table 1
Logistic regression analysis variable assignment.

Variable	Value
Gender	0 = Male, 1 = Female
Age	0 = Under 75 years, 1 = 75 years or older
Diabetes history	0 = No, 1 = Yes
History of TIA	0 = No, 1 = Yes
Family history	0 = No, 1 = Yes
Smoking	0 = Never smoked, 1 = Ever smoked or currently smoking
Alcohol consumption	0 = Never drank, 1 = Ever drank or currently drinking
Diet habits	0 = Low-salt diet, 1 = High-salt diet
Regular activity	0 = No, 1 = Yes
Overweight or obese	0 = No, 1 = Yes

Multivariate logistic regression was used to analyze the characteristics of different trajectory groups. The group with continuously irregular medical visits was used as the reference group. Multivariate logistic regression was then conducted to examine the influencing factors across the various trajectory groups (Table 1).

Results

Basic information

The average age of the study participants was (75.63±9.08) years. Among them, 3,667 were male (41.10%) and 5,255 were female (58.90%). The average duration of hypertension was (2.84 ±2.57) years. Of the participants, 16.50% (1,472) had a history of diabetes, and 49.17% (4,387) had a family history of hypertension. The average BMI was (24.36±3.19), and the average waist circumference was (80.12±1.92)cm. The proportion of individuals who were overweight or obese was 51.93%. Smoking was reported by 17.37% of participants, while 87.77% consumed alcohol, and 82.63% had a high-salt diet. On average, participants visited healthcare facilities (7.42±6.06) times per year. For detailed data, see Table 2.

Table 2
Basic characteristics of participants.

Feature	n(%)
Gender	
Male	3667 (41.10)
Female	5255 (58.90)
Age	
< 60 years	212 (2.38)
60-74 years	4214 (47.23)
≥ 75 years	4496 (50.39)
Diabetes history	
No	7450 (83.50)
Yes	1472 (16.50)
TIA history	
No	8091 (90.69)
Yes	831 (9.31)
Family history	
No	4535 (50.83)
Yes	4387 (49.17)
Smoking	
Never smoked	7372 (82.63)
Ever smoked	1550 (17.37)
Alcohol consumption	
Never drank	1091 (12.23)
Ever drank	7831 (87.77)
Diet habits	
Low-salt diet	1550 (17.37)
High-salt diet	7372 (82.63)
Regular activity	
No	8041 (90.13)
Yes	881 (9.87)
Overweight or obese	
No	4289 (48.07)
Yes	4633 (51.93)

Medical-help-seeking behaviour trend analysis

The GBTM was employed to analyze the medical-help-seeking behaviour of 8,922 hypertensive patients from 2014 to 2021. The model fitting results showed that the best fit was achieved using a cubic function, which divided the participants into five groups, with a BIC value of 106,985.6. The medical-help-seeking behaviour trajectories of these five groups are shown in Fig. 1. The posterior estimated probabilities for groups 1 to 5 were 0.80, 0.89, 0.77, 0.76, and 0.78, respectively.

The five-group trajectory model was selected to describe the long-term trends in the medical-help-seeking behaviour of hypertensive patients from 2014 to 2021. The characteristics of each group are as follows:

Group 1 (Sustained Regular Group): This group accounted for 39.84% of the total population. Patients in this group consistently maintained regular medical-help-seeking behaviour, predominantly at the same medical institution.

Group 2 (Slow Decline Group): This group made up 25.36% of the total population. Initially, patients in this group exhibited regular medical-help-seeking behaviour, but over time, they transitioned from visiting a fixed medical institution to multiple institutions, and their medical-help-seeking behaviour became irregular.

Group 3 (U-Shaped Change Group): Representing 11.43% of the total population, patients in this group initially showed a steady decline in the regularity of their medical-help-seeking behaviour, but later experienced a gradual improvement, although they did not return to fully regular medical-help-seeking behaviour.

Group 4 (Slow Increase Group): This group accounted for 11.86% of the total population. Initially, patients in this group exhibited poor regularity in their medical-help-seeking behaviour, but their behavior improved over time, and they gradually started visiting a fixed medical institution regularly.

Group 5 (Sustained Irregular Group): Comprising 14.86% of the total population, patients in this group maintained irregular medical-help-seeking behaviour throughout the observation period, with no noticeable improvement in their behavior.

See Table 3 for further details.

Analysis of patient characteristics across different groups of medical-help-seeking behaviour trends.

A multivariate logistic regression was performed to compare the basic characteristics of patients across different subgroups. Significant differences were observed in terms of gender, age, duration of hypertension, history of diabetes, history of TIA, and family history ($P< 0.05$) (see Table 3).

Analysis of factors influencing the change in medical-help-seeking behaviour trends among groups.

Using the sustained irregular medical-help-seeking behaviour group as the reference, multivariate logistic regression was conducted to identify factors influencing the transition between different medical-help-seeking behaviour patterns. A p-value of < 0.05 was considered statistically significant. The analysis revealed that gender, age, duration of hypertension, family history, history of diabetes, and history of TIA were key factors influencing the change in medical-help-seeking behaviour patterns.

Female patients and those aged 75 years or older were more likely to shift from sustained irregular medical-help-seeking behaviour to sustained regular or early regular medical-help-seeking behaviour.

A history of diabetes and TIA facilitated the transition from sustained irregular medical-help-seeking behaviour to other patterns, supporting the maintenance of either long-term or short-term regular medical-help-seeking behaviour. Longer duration of hypertension and a family history of hypertension hindered the transition to regular medical-help-seeking behaviour, with patients more likely to continue irregular health-seeking behaviors (See Table 4).

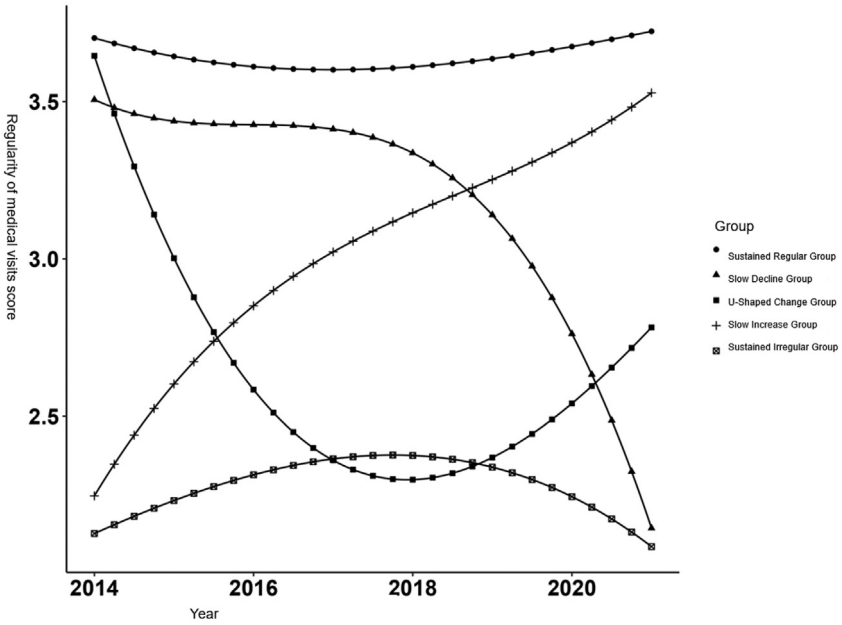

Fig. 1. Trajectories of medical-help-seeking behaviour patterns of hypertensive patients.

Table 3
Analysis of patient characteristics in different groups' medical-help-seeking behaviour trajectories.

Feature	Sustained regular group (n=3255)	Slow decline group (n=2263)	U-shaped change group (n=1020)	Slow increase group (n=1058)	Sustained irregular group (n=1326)	P
Gender						
Male	1306 (40.12)	884 (39.06)	453 (44.41)	442 (41.78)	582 (43.89)	0.007
Female	1949 (59.88)	1379 (60.94)	567 (55.59)	616 (58.22)	744 (56.11)	
Age						
< 60 years	45 (1.99)	79 (2.43)	22 (2.16)	26 (2.46)	40 (3.02)	<0.001
60-74 years	992(43.84)	1517(46.41)	483(47.35)	547(51.70)	675(50.90)	
≥ 75 years	1226 (54.18)	1659 (50.97))	515 (50.49)	485 (45.84)	611 (46.08)	
Hypertension duration (x±s,year)	2.52 ±2.51	2.74±2.48	2.95±2.65	3.18±2.52	3.45 ±2.68	<0.001
Diabetes history						
No	2691 (82.67)	1838 (81.22)	875 (85.78)	903 (85.35)	1143 (86.20)	<0.001
Yes	564 (17.33)	425 (18.78)	145 (14.22)	155 (14.65)	183 (13.80)	
TIA history						
No	2955 (90.78)	2007 (88.69)	926 (90.78)	967 (91.40)	1236 (93.21)	<0.001
Yes	300 (9.22)	256 (11.31)	94 (9.22)	91 (8.60)	90 (6.79)	
Family history						
No	1701 (52.26)	1185 (52.36)	503 (49.31)	508 (48.02)	638 (48.11)	0.011
Yes	1554 (47.74)	1078 (47.64)	517 (50.69)	550 (51.98)	688 (51.89)	
Smoking						
Never smoked	2674 (82.15)	1914 (84.58)	831 (81.47)	869 (82.14)	1084 (81.75)	0.079
Ever smoked	581 (17.85)	349 (15.42)	189 (18.53)	189 (17.86)	242 (18.25)	
Alcohol consumption						
Never drank	412 (12.66)	240 (10.61)	134 (13.14)	126 (11.91)	179 (13.50)	0.061
Ever drank	2843 (87.34)	2023 (89.39)	886 (86.86)	932 (88.09)	1147 (86.50)	
Diet habits						
Low-salt diet	581 (17.85)	349 (15.42)	189 (18.53)	189 (17.86)	242 (18.25)	0.079
High-salt diet	2674 (82.15)	1914 (84.58)	831 (81.47)	869 (82.14)	1084 (81.75)	
Regular activity						
No	3073 (91.60)	2919 (89.68))	917 (89.90)	933 (88.19)	1199 (90.42)	0.027
Yes	190 (8.40)	336 (10.32)	103 (10.10)	125 (11.81)	127 (9.58)	
Overweight or obese						
No	1557 (47.83)	1063 (46.97)	516 (50.59)	502 (47.45)	651 (49.10)	0.345
Yes	1698 (52.17)	1200 (53.03)	504 (49.41)	556 (52.55)	675 (50.90)	

Discussion

This study, based on an 8-year analysis of hypertensive patients' medical-help-seeking behaviours in the community management system of Putuo District, identifies key patterns and trends in long-term medical-help-seeking behaviours. The findings reveal that only 39.48% of patients maintained regular medical-help-seeking behaviours at fixed healthcare facilities throughout the study period, while 14.86% never adhered to a regular medical-help-seeking behaviour schedule. Over the course of the observation, 11.86% of patients showed a gradual improvement in their medical-help-seeking behaviour regularity, ultimately meeting the criteria for regular medical-help-seeking behaviour by the end of the study. Conversely, 36.79% of patients exhibited a continuous decline in medical-help-seeking behaviour regularity, eventu-

Table 4
Analysis of influencing factors on the trajectories change of medical-help-seeking behaviour among different groups.

Risk factor	Sustained regular group vs Sustained irregular group		Slow decline group vs Sustained irregular group		U-shaped change group vs Sustained irregular group		Slow increase group vs Sustained irregular group	
	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P	OR (95%CI)	P
Female	1.23 [1.05,1.45]	0.012	1.23 [1.06,1.43]	0.007	1.00 [0.82,1.21]	0.979	1.10 [0.91,1.33]	0.334
Age≥75 years	1.66 [1.06,2.60]	0.025	1.33 [0.89,1.99]	0.161	1.50 [0.88,2.58]	0.138	1.18 [0.71,1.97]	0.524
Age 60-74 years	1.23 [0.79,1.91]	0.366	1.10 [0.74,1.64]	0.633	1.26 [0.73,2.15]	0.406	1.21 [0.73,2.02]	0.459
Overweight or obesity	1.11 [0.96,1.27]	0.152	1.08 [0.94,1.23]	0.273	0.94 [0.80,1.11]	0.478	1.08 [0.92,1.27]	0.359
Hypertension duration	0.89 [0.87,0.92]	0.000	0.88 [0.85,0.90]	0.000	0.93 [0.90,0.96]	0.000	0.96 [0.93,0.99]	0.009
Smoking	1.13 [0.80,1.58]	0.499	1.29 [0.94,1.78]	0.116	1.15 [0.77,1.70]	0.503	1.35 [0.92,1.97]	0.125
Alcohol consumption	1.16 [0.80,1.69]	0.427	1.12 [0.80,1.59]	0.507	1.11 [0.72,1.71]	0.645	1.43 [0.94,2.18]	0.097
Family history	0.86 [0.75,0.99]	0.037	0.86 [0.75,0.98]	0.027	0.97 [0.82,1.14]	0.696	0.99 [0.84,1.17]	0.916
History of diabetes	1.36 [1.12,1.65]	0.002	1.32 [1.09,1.59]	0.004	1.02 [0.80,1.30]	0.861	1.08 [0.85,1.36]	0.540
Regular activity	0.91 [0.71,1.16]	0.435	1.21 [0.97,1.51]	0.092	1.05 [0.80,1.39]	0.708	1.29 [0.99,1.68]	0.060
TIA history	1.73 [1.34,2.24]	0.000	1.43 [1.11,1.83]	0.005	1.40 [1.03,1.90]	0.031	1.29 [0.95,1.75]	0.106

ally shifting to an irregular medical-help-seeking behaviour pattern. According to national public health guidelines, patients are expected to receive at least four health management sessions annually.[7] Research has shown that follow-up visits of≥4 times per year positively influence blood pressure control.[8] However, the results from this study indicate that fewer than 40% of patients maintained regular medical-help-seeking behaviours over the long term.

From a community health management perspective, these findings highlight the challenge of encouraging and maintaining long-term regular medical-help-seeking behaviour. Additionally, as patients' conditions progress, their healthcare needs grow, which influences their medical-help-seeking behaviour. This underlines the importance of continuity in healthcare services. In response, Shanghai's "1+1+1" model—featuring a contract with one city-level hospital, one district-level hospital, and one community health centre—addresses the need for continuous care across different stages of illness. This model may offer a viable solution to ensure consistent care for chronic disease patients, such as those with hypertension.

Through an analysis of the characteristics of patients with different medical-help-seeking behaviours, it was found that women and elderly individuals, particularly those aged 75 and older, were more likely to maintain regular medical-help-seeking behaviours over the long term. This behavior is likely influenced by their higher health needs, increased disease sensitivity, and more fixed mobility patterns. Such individuals tend to adhere to regular medical-help-seeking behaviours at specific medical institutions over time.[9] This finding aligns with a survey conducted in Xiamen[4]. In contrast, a survey in Taiwan indicated that elderly individuals were more likely to have irregular medical-help-seeking behaviours.[10] This discrepancy could be attributed to differences in health insurance policies between the two regions.

The China National Plan for the Prevention and Control of Chronic Diseases (2017-2025), issued by the State Council in 2017, prioritizes the inclusion of chronic disease patients in family doctor contracted services and the establishment of long-term health management mechanisms.[11] Based on the results of this study, these policies appear to be well-suited for elderly and female patients. When combined with policies such as bidirectional referral and "extended prescriptions for chronic diseases," they can effectively meet the medical needs of these populations.[12]

The study also revealed that the duration of hypertension significantly influences long-term medical-help-seeking behaviours. Patients with a longer history of hypertension were more likely to exhibit irregular medical-help-seeking behaviours, while newly diagnosed patients tended to maintain regular medical-help-seeking behaviours. This may be due to newly diagnosed patients placing more emphasis on their condition, leading to better adherence to medical advice. However, after a period of treatment, when blood pressure is controlled or patients perceive themselves as "cured," they may no longer prioritize medical-help-seeking behaviours.[13] It is important to note that at the start of the observation period, the participants had relatively short disease durations. Therefore, changes in behavior over the eight-year period may have been influenced by other factors, warranting further analysis to identify these potential underlying influences.

When analyzing the relationship between long-term medical-help-seeking behaviour and family history, the study found that patients with a family history of hypertension were more likely to fall into the irregular medical-help-seeking behaviours group. To date, no similar findings have been reported. This observation may be influenced by the psychological factors of the patients or the medical-help-seeking behaviours of their relatives who share a family history. Patients' disease perceptions and healthcare management practices might be shaped by the behaviors of family members with similar conditions, which could explain the differences in the results observed in the study.[14] However, this hypothesis requires further exploration, and more comprehensive data is needed to fully understand the psychological and behavioral influences that family members may have on patients' medical adherence and healthcare practices.

The study revealed significant differences in long-term medical-help-seeking behaviours among patients with hypertension who also have diabetes or TIA. Specifically, patients with comorbidities tended to fall into the slow decline group, characterized by a shift from regular visits at a fixed healthcare facility to irregular medical-help-seeking behaviours across multiple institutions. This shift likely stems from the broader medical help these patients seek due to the presence of multiple health conditions. This finding aligns with a study in Xuzhou, which analyzed the status of tiered diagnosis and treatment for chronic diseases.[15] The medical-help-seeking behaviour of these patients often extends beyond local healthcare facilities, involving district, city, or even nationwide institutions. However, the data for this study was collected from district-level health platforms, which did not include visits to higher-level medical institutions. As a result, patients in this study appeared to display irregular medical-help-seeking behaviours. This highlights the need for further data that includes visits to city or national-level healthcare facilities for a more comprehensive understanding of the trend.

The study further examined the factors influencing the long-term transition in medical-help-seeking behaviour, revealing that female patients, those aged 75 and older, as well as those with diabetes or a history of TIA, were more likely to shift from irregular to more regular medical-help-seeking behaviours. Specifically, they tended to adopt either long-term regular or short-term regular patterns. This suggests that in the community management of hypertensive patients, resources should be prioritized for these groups. These resources may include health promotion efforts, creating a positive environment, strengthening institutional management, and improving patient experiences, all of which could accelerate the transition to more consistent medical-help-seeking behaviours.[16]

In contrast, patients with longer hypertension histories or a family history of the disease were more likely to maintain irregular medical-

help-seeking behaviours and showed less potential for transitioning to other medical-help-seeking patterns. This indicates that, during the management of these patients, the community faces a higher risk of losing them or having them change medical institutions. Therefore, it is crucial to develop more targeted health education, behavioral promotion methods, and alternative medical pathways to encourage these patients to adhere to regular medical-help-seeking behaviours and proper treatment.

The study has several limitations. First, since it relied on electronic health records from the Putuo District regional health system, it could not capture patients' medical-help-seeking behaviours outside the region. As a result, the consistency of patients' medical-help-seeking behaviours between regional and external healthcare settings remains unclear. Furthermore, the study focused on community-managed hypertensive patients, the majority of whom were elderly. This resulted in a limited sample of patients under 60 years old, meaning that medical-help-seeking behaviour data for younger hypertensive patients were not captured, potentially introducing bias. Given these constraints, the findings may not fully represent the broader population. To better understand the causes of long-term irregular medical-help-seeking behaviours and declining regularity in healthcare visits, a larger and more comprehensive dataset is needed for further analysis. For patients under 60, the limited accessibility of community-based health management makes it difficult to capture their medical-help-seeking behaviours, highlighting the need for alternative methods to gather data and conduct future research on their health management patterns.

In summary, regular medical-help-seeking behaviours for hypertensive patients require sustained attention. Effective management of these patients through family doctor contracted services should focus on three key aspects: patient health education, behavioral promotion, and medical services. These strategies are essential to guide and encourage patients to establish regular medical-help-seeking behaviours. Furthermore, local governments can promote consistent medical-help-seeking behaviours by shaping health policies, enhancing medical insurance services, and implementing healthcare performance evaluations. Such measures will encourage patients to maintain regular medical-help-seeking behaviour, slow the onset and progression of complications, reduce healthcare costs, and alleviate the social burden associated with hypertension.

Declarations

Not applicable.

Authors' other information

Not applicable.

Authors' contributions

Conceptualization, W.C.; Methodology, W.C. and T.J.; Data curation, Y.J. and C.N.; Formal analysis, G.Y. and D.B.; Funding acquisition, not applicable; Project administration, not applicable; Resources, not applicable; Supervision, S.L.; Validation, W.C. and T.J.; Writing—original draft, W.C.; Writing—review and editing, W.C. and T.J. All authors have read and agreed to the published version of the manuscript.

Ethical approval and consent to participate

This study was conducted strictly in accordance with ethical guidelines. In this study, we respect and protect the rights and privacy of participants, and ensure the confidentiality of their personal information.

Availability of data and materials

Not applicable.

Declaration of competing interest

All authors declare that there are no competing interests.

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Not applicable.

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