Analysis of Atrial Fibrillation Knowledge Mastery and Influencing Factors Among Primary Healthcare Workers in Fengxian District, Shanghai (Post-Print)

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Date: 2022-07-09T00:00:00+00:00

Abstract

Background With the intensification of population aging, the prevalence of atrial fibrillation (AF) is increasing annually. Primary healthcare workers, serving as gatekeepers of community health, their mastery of AF knowledge is particularly crucial for standardized management.

Objective To investigate the mastery of AF-related knowledge among primary healthcare workers in Fengxian District, Shanghai, analyze its influencing factors, and provide a theoretical basis for subsequent training programs.

Methods A cross-sectional survey was conducted using a self-designed electronic questionnaire among medical staff at 21 community health service centers in Fengxian District, Shanghai from June to July 2021. The questionnaire encompassed four domains: general information, basic AF knowledge, anticoagulation therapy knowledge, and rhythm/rate control knowledge.

Results A total of 1383 valid questionnaires were collected. The respondents had a mean age of 36.9$±$8.8 years, with females comprising 82.1% (1135/1383) and general practitioners accounting for 36.5% (506/1383). The failure rates for the basic AF knowledge module, anticoagulation knowledge module, and rhythm/rate control knowledge module were 54.9% (759/1383), 97.7% (1351/1383), and 69.6% (963/1383), respectively. General practitioners demonstrated significantly superior performance across all three AF knowledge modules compared to medical staff in other positions (all P<0.0001). Logistic regression analysis revealed that being a general practitioner (OR=4.958) and professional title (primary OR=0.443, intermediate OR=0.580) were associated with scores in the basic AF knowledge module; age (OR=0.940) and being a

general practitioner (OR=5.243) were associated with scores in the anticoagulation therapy knowledge module; and being a general practitioner (OR=2.310), standardized training (OR=1.696), and having read AF guidelines within the past year (OR=2.118) were associated with scores in the rhythm/rate control knowledge module.

Conclusion The overall mastery of AF-related knowledge among primary healthcare workers is unsatisfactory, particularly regarding anticoagulation therapy. Targeted AF training should be strengthened specifically for primary healthcare workers who are not general practitioners, have lower professional titles, and have not undergone standardized training.

Full Text

Preamble

Analysis of Atrial Fibrillation-Related Knowledge and Its Influencing Factors Among Grassroots Medical Staff in Fengxian District, Shanghai

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Abstract

Background: With population aging intensifying, the prevalence of atrial fibrillation (AF) continues to rise annually. As health gatekeepers in the community, grassroots medical staff' s mastery of AF-related knowledge is particularly crucial for standardized management. **Objective:** To assess the level of AF-related knowledge among grassroots medical staff in Fengxian District, Shanghai, and analyze its influencing factors to provide a theoretical basis for subsequent training initiatives. **Methods:** A cross-sectional survey was conducted from June to July 2021 using a self-developed electronic questionnaire among medical staff at 21 community health service centers in Fengxian District, Shanghai. The questionnaire covered four aspects: general information, basic AF knowledge, anticoagulation therapy knowledge, and rhythm/heart rate control knowledge. **Results:** A total of 1,383 valid questionnaires were collected. Respondents had a mean age of 36.9 ± 8.8 years, 82.1% (1,135/1,383) were female, and 36.5% (506/1,383) were general practitioners. The failure rates for the basic AF

knowledge module, anticoagulation knowledge module, and rhythm/heart rate control knowledge module were 54.9% (759/1,383), 97.7% (1,351/1,383), and 69.6% (963/1,383), respectively. Compared with medical staff in other positions, general practitioners demonstrated significantly better knowledge across all three modules (all P values < 0.0001). Logistic regression analysis revealed that being a general practitioner (OR = 4.958) and professional title (primary: OR = 0.443; intermediate: OR = 0.580) were associated with basic AF knowledge module scores; age (OR = 0.940) and being a general practitioner (OR = 5.243) were associated with anticoagulation therapy knowledge module scores; and being a general practitioner (OR = 2.310), standardized training (OR = 1.696), and having read AF guidelines within one year (OR = 2.118) were associated with rhythm/heart rate control knowledge module scores. **Conclusions:** The overall mastery of AF-related knowledge among grassroots medical staff is unsatisfactory, particularly regarding anticoagulation therapy. Targeted AF training should be strengthened for non-general practitioners, those with lower professional titles, and staff who have not undergone standardized training.

Keywords: Grassroots; atrial fibrillation; knowledge; influencing factors

Funding: General Project of Shanghai Municipal Health Commission (202150046); Science and Technology Development Fund Project of Fengxian District, Shanghai (20211827); Community Medicine and Health Management Research Project of Shanghai Association of Integrative Medicine (2021-28)

Atrial fibrillation (AF), commonly referred to as "房颤," is one of the most prevalent tachyarrhythmias. Research indicates that the prevalence, incidence, and mortality rates of AF are increasing annually [1, 2]. In China, the number of AF patients has reached 8 million [3]; however, challenges such as low anticoagulation rates, insufficient awareness of disease risks, poor treatment adherence, and lack of continuous care for AF patients in general hospitals [4-6] have made standardized AF management extremely difficult. Communities serve as the primary living environment for residents, and effective management of community-based AF patients necessitates strong AF-related knowledge among grassroots medical staff. While existing studies have demonstrated suboptimal AF cognition among grassroots medical staff, these investigations have been limited by small sample sizes and a lack of scientific classification of AF knowledge domains. Most importantly, they have not explored influencing factors in depth [7], rendering them ineffective for guiding subsequent improvement efforts. This study aims to address this gap through more comprehensive research to identify factors associated with AF knowledge mastery among grassroots medical staff, thereby providing a theoretical foundation for strengthening community-based AF management.

1.1 Study Subjects

This study employed systematic sampling across all 21 community health service centers in Fengxian District, Shanghai. Using each grassroots medical staff member' s employee ID number, those with IDs that were multiples of three were selected as study subjects, including physicians, nurses, pharmacists, public health doctors, and other medical personnel (imaging, laboratory, traditional Chinese medicine, etc.). Exclusion criteria included inability to participate in the online survey due to equipment issues, vision, hearing, or other reasons.

1.2 Research Methods

From June to July 2021, an online survey was conducted among selected grassroots medical staff using a self-developed electronic questionnaire. The questionnaire comprised: General information: gender, age, education level, job position, years of service, professional title, prior experience in higher-level hospitals, completion of standardized general practice training, reading of AF guidelines within the past year, and participation in AF training within the past year; Basic AF knowledge: risk factors, symptoms and signs, diagnostic methods, classification, and hazards; Anticoagulation therapy knowledge: $CHADS_2$ score, CHA_2DS_2-VASc score, HAS-BLED score, indications for anticoagulation, INR target values, and warfarin antagonists; Rhythm/heart rate control knowledge: rhythm control targets, indications for electrical cardioversion, indications for ventricular rate improvement, medications for ventricular rate control, and need for anticoagulation before cardioversion. For the three AF knowledge modules, each correct answer received 2 points, while incorrect answers received 0 points. Total scores for each module were categorized into four grades: failing (<60% of total score), passing (60%-74% of total score), good (75%-84% of total score), and excellent ($ $85% of total score).

1.3.1 Questionnaire Reliability and Validity Assessment

Internal consistency analysis of the 16 items yielded a Cronbach' s α coefficient of 0.724, indicating acceptable internal consistency. Content validity was assessed separately for the three modules: basic AF knowledge, anticoagulation therapy knowledge, and rhythm/heart rate control knowledge. Seven experts with associate chief physician rank or higher were invited to evaluate the 16 items across the three modules. All items demonstrated item-level content validity index (I-CVI) values > 0.78. The scale-level content validity index based on universal agreement (S-CVI/UA) for the three modules was 0.80, 0.83, and 0.80, respectively, while the scale-level content validity index based on average calculation (S-CVI/Ave) was 0.975, 0.979, and 0.975, respectively, confirming good content validity for all three modules.

1.3.2 Survey Administration

The electronic questionnaire was distributed through the Fengxian District Health Workers Association to medical affairs directors at each institution, who then disseminated it to relevant medical staff. Prior to the survey, researchers provided a one-session training session for medical affairs directors on questionnaire completion and addressed related questions. Informed consent was presented on the first page of the electronic questionnaire, and participants could only proceed after selecting "agree." The system prompted respondents regarding missing items and prevented submission of incomplete questionnaires. Questionnaires were considered invalid if five consecutive questions in any of the three AF knowledge modules had identical responses.

1.4 Data Analysis

Statistical analysis was performed using SPSS 24.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Ordered multinomial or binary logistic regression analyses were conducted with the score grades of the basic AF knowledge module, anticoagulation therapy knowledge module, and rhythm/heart rate control knowledge module as dependent variables. Independent variables included gender, age, education level, general practitioner status, years of service, professional title, prior experience in higher-level hospitals, completion of standardized general practice training, reading of AF guidelines within the past year, and participation in AF training within the past year. Statistical significance was set at $P < 0.05$.

2.1 Basic Characteristics of Study Subjects

A total of 1,393 individuals were enrolled, and 1,383 valid questionnaires were collected, yielding a valid response rate of 99.3% (1,383/1,393). Among the 1,383 respondents, 506 (36.5%) were general practitioners, 441 (31.8%) were nurses, 117 (8.4%) were pharmacists, 115 (8.3%) were public health doctors, and 204 (24.7%) were other personnel. The majority were female (1,135, 82.1%) with a mean age of 36.9 ± 8.8 years. Most had a bachelor' s degree or higher (1,002, 72.4%), and 650 (46.9%) held intermediate-level professional titles or higher. Only 188 (13.5%) had completed standardized general practice training, while 204 (14.7%) had prior experience in higher-level hospitals.

2.2 Score Distribution Across AF Knowledge Modules

The score distributions for the three AF knowledge modules are presented in Table 1 . The passing rate for all three modules was below 50%, with the anticoagulation therapy knowledge module showing the lowest passing rate at only 2.3%. Knowledge mastery varied significantly across different job positions, with general practitioners demonstrating significantly better performance across all three modules compared to other medical staff.

2.3.1 Basic AF Knowledge Module

Using the total score of the basic AF knowledge module (categorized into four grades: failing, passing, good, and excellent) as the dependent variable, correlation analysis was performed between age, years of service, and professional title. The results showed a strong correlation between age and years of service (correlation coefficient = 0.914, P < 0.0001); therefore, years of service was excluded. An ordered multinomial logistic regression analysis was conducted with gender, age, education level, general practitioner status, professional title, prior experience in higher-level hospitals, completion of standardized general practice training, reading of AF guidelines within the past year, and participation in AF training within the past year as independent variables. The parallel lines test yielded ^{2} = 33.793, P = 0.140, confirming the proportional odds assumption. The model goodness-of-fit test showed ^{2} = 277.797, P < 0.0001, indicating statistical significance. The results revealed that "general practitioner" and "professional title" were independent factors associated with basic AF knowledge module scores. See Table 2 .

2.3.2 Anticoagulation Therapy Knowledge Module

Due to the extremely low proportion of respondents achieving good or excellent scores in the anticoagulation therapy knowledge module (<1%), the total score was dichotomized into pass/fail categories for binary logistic regression analysis. Using the same independent variables as in Table 2, univariate logistic regression analysis first identified age, education level, general practitioner status, prior experience in higher-level hospitals, completion of standardized general practice training, reading of AF guidelines within the past year, and participation in AF training within the past year as influencing factors. Significant variables were then entered into multivariate logistic regression analysis. The model goodness-of-fit test showed ^{2} = 36.741, P < 0.0001, indicating statistical significance. The results demonstrated that "age" and "general practitioner" were independent influencing factors for anticoagulation therapy knowledge. See Table 3 .

2.3.3 Rhythm/Heart Rate Control Knowledge Module

The proportion of respondents achieving excellent scores in the rhythm/heart rate control knowledge module was extremely low (0.8%). The parallel lines test for ordered multinomial logistic regression yielded ^{2} = 774.554, P < 0.001; therefore, the score categories were restructured into three grades—failing, passing, and good/excellent (combining the original good and excellent categories)—for ordered multinomial logistic regression analysis. Using the same independent variables as in Table 2, the parallel lines test yielded ^{2} = 7.457, P = 0.877, confirming the proportional odds assumption. The model goodness-of-fit test showed ^{2} = 150.432, P < 0.0001, indicating statistical significance. The results indicated that "general practitioner," "standardized training," and "reading AF guidelines" were independent influencing factors for rhythm/heart rate control

knowledge module scores. See Table 4 .

3 Discussion

This study represents one of the largest investigations of AF-related knowledge among grassroots medical staff in China, covering all community health service centers in Fengxian District, Shanghai. Compared with previous research, the most significant difference lies in the more diverse study population, which includes not only general practitioners but also nurses, pharmacists, public health doctors, and other grassroots medical personnel. Although general practitioners constitute the main force in delivering primary healthcare, as family doctor team construction matures, other team members also bear important responsibilities for maintaining residents' health [8]. Nurses, pharmacists, and public health doctors serve as essential partners to general practitioners, playing important roles in health education, follow-up, and compliance correction for patients with chronic diseases such as AF. Therefore, their mastery of AF-related knowledge directly impacts the ability to achieve standardized AF management at the grassroots level. In this sense, this study offers certain innovative value.

3.1 Suboptimal Mastery of AF-Related Knowledge Among Grassroots Medical Staff in Fengxian District

The results reveal that the overall mastery of AF-related knowledge among grassroots medical staff in Fengxian District, Shanghai, is concerning. The passing rates for all three AF knowledge modules were below 50%, with the anticoagulation therapy knowledge module showing an extremely low passing rate. These findings are consistent with studies by Li Bo, Cheng Lei, and Ni Lan, all of which demonstrated that grassroots medical staff, including general practitioners, have limited understanding of AF anticoagulation therapy [7, 9, 10]. This may be related to the fact that most Shanghai community health centers currently lack AF anticoagulation drugs such as warfarin and cannot perform coagulation function tests, which may affect the motivation of grassroots medical staff to learn relevant knowledge.

3.2 Factors Influencing AF Knowledge Mastery Among Medical Staff in Fengxian District

Compared with other grassroots medical staff, general practitioners demonstrated better mastery of basic AF knowledge (OR = 4.958), anticoagulation knowledge (OR = 5.243), and rhythm/heart rate control knowledge (OR = 2.310) (all $P < 0.05$). This is understandable, as general practitioners, as clinical physicians, have the most frequent and direct contact with AF patients, affording them more opportunities for both theoretical learning and clinical practice than other grassroots medical personnel. However, this does not imply that non-general practitioners need not learn AF-related knowledge. In 2016, the European Society of Cardiology and the European Association for Cardio-Thoracic

Surgery proposed establishing a patient-centered integrated management team that includes not only physicians but also nurses, pharmacists, preventive care personnel, imaging technicians, and family doctor assistants [11, 12]. Building such a team to effectively manage AF patients requires every member to understand AF-related knowledge.

Medical staff with higher professional titles demonstrated greater mastery of general AF knowledge compared with those with lower titles, consistent with findings from other studies [7]. Current medical profession promotion evaluation criteria primarily include education level, clinical workload, research project involvement, and publication record [13]; thus, higher professional titles generally indicate stronger comprehensive abilities and correspondingly greater mastery of AF-related knowledge. Ye Yawen' s study on nurses' AF cognition also showed that nurses' AF knowledge level was associated with age, education, professional title, and work experience [14], as professional titles typically increase with age, education level, and years of service. Older staff with longer tenure usually hold higher professional titles and accumulate more clinical experience, leading to better knowledge mastery. This study also found that age was a factor associated with anticoagulation therapy knowledge module scores, with older staff achieving higher scores, echoing previous findings regarding professional titles.

This study further demonstrated that medical staff who completed standardized training had better mastery of rhythm/heart rate control knowledge compared with those without such training. Similarly, Liu Jianxin' s study showed that standardized-trained general practitioners in Shenzhen exhibited superior disease diagnosis and treatment capabilities, knowledge acquisition skills, and doctor-patient communication abilities, and were more likely to obtain institutional positions, external learning opportunities, and organizational recognition after employment [15]. Deng Jiao' s study on nurses also revealed that standardized training improved nurses' theoretical examination scores, interpersonal communication skills, clinical competence, and practical abilities [16]. These findings collectively affirm the effectiveness and significance of China' s standardized training policy for medical personnel and support continued policy refinement.

Reading guidelines and participating in training are important methods for medical staff to learn clinical knowledge and enhance skills, representing primary pathways for continuing medical education. Zhao Yuan' s study suggested that physicians' suboptimal AF cognition may be related to low familiarity with guidelines, indicating that guideline study is an influencing factor [17].

In summary, the overall mastery of AF-related knowledge among grassroots medical staff in Fengxian District urgently requires improvement. Current efforts should focus on strengthening training for grassroots medical staff, particularly those with lower professional titles and without standardized training. Non-general practitioner personnel also require enhanced AF-related education. Relevant institutions can improve overall AF knowledge levels among grassroots medical staff through various forms of AF knowledge training and guideline

study.

3.3 Limitations of This Study

This study has several limitations. First, it only compared AF cognition between general practitioners and non-general practitioners among grassroots medical staff, without further examining differences across various job positions, thus limiting generalizability to non-general practitioner roles. Second, the study did not investigate whether grassroots healthcare institutions have access to anticoagulation drugs and coagulation function testing capabilities, which may also influence medical staff' s AF-related knowledge. Future research should address these aspects.

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