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ORIGINAL RESEARCH

A Cross-Sectional Study on Chinese Geriatricians' Knowledge, Attitudes, and Practices Regarding Oral Anticoagulants for Atrial Fibrillation Patients

Yiwen Chen, Yinghui Liang, Mingzhao Qin, Qian Liu

Department of Geriatrics, Beijing Tongren Hospital, Capital Medical University, Beijing, 100730, People's Republic of China

Correspondence: Mingzhao Qin, Department of Geriatrics, Beijing Tongren Hospital, Capital Medical University, Beijing, 100730, People's Republic of China, Email 13683371884@163.com

Purpose: Anticoagulants are regularly used to manage atrial fibrillation, but the decision-making styles of geriatricians regarding oral anticoagulants in atrial fibrillation in China are poorly known. This study aimed to evaluate the knowledge, attitudes, and practices of geriatricians regarding the use of oral anticoagulants in elderly patients with non-valvular atrial fibrillation.

Patients and Methods: In late 2023, 210 geriatricians participated in an online survey assessing their knowledge, attitudes, and practices related to anticoagulation therapy. The survey included questions designed to gauge understanding and application of guidelines in treating elderly patients with atrial fibrillation.

Results: The findings revealed an average knowledge score of 9.84 out of 14 among participants, indicating a need for improvement. Attitude and practice scores were higher, averaging 45.76 and 44.48 out of 55, respectively. Notably, the multivariate analysis showed that geriatricians aged ≤ 40 years, those practicing outside Beijing, and those in non-public tertiary hospitals demonstrated lower levels of knowledge. Additionally, there was a positive correlation between higher knowledge and favorable attitudes toward anticoagulation, while more experience (5–10 years) and better knowledge were associated with proactive clinical practices.

Conclusion: The study underscores the necessity to enhance education and training for geriatricians, focusing on younger professionals and those in particular regions and hospital types. By improving knowledge and awareness, the management of anticoagulation therapy for elderly patients with atrial fibrillation can be optimized, ultimately benefiting patient care and outcomes within this vulnerable population.

Keywords: attitude, knowledge, practice, atrial fibrillation, anticoagulants

Introduction

The incidence of atrial fibrillation (AF) and mortality increase with age.[1,2] Standardized anticoagulant treatment reduces the risk of thrombosis, prevents cardiovascular and cerebrovascular events, and improves prognosis.[3,4] Still, as the risk of ischemia increases with age, the risk of bleeding increases as well. Hence, doctors, as clinical decision-makers, need to balance the ischemia and bleeding risks. In recent years, direct oral anticoagulants (DOACs) (ie, non-vitamin K antagonist oral anticoagulants) have gradually replaced traditional warfarin as the first-line choice for anticoagulant therapy. Although the application of DOACs participates in better management of coagulation in AF, the anticoagulation treatment rate of the Chinese population of patients with AF is only 28.7% in big cities (22.2% with warfarin and 6.5% with DOACs)[5] or 5.9% in rural areas (none taking DOACs).[6]

Various factors can affect the physicians' prescription patterns. Nicholls et al[7] surveyed 149 geriatricians in Canada and concluded that the experience of patients with stroke but not taking warfarin might significantly impact decision-making and that physicians who had treated patients with stroke were more likely to prescribe warfarin.[7] In the United States of America, Saeed et al[8] showed that cardiologists were more concerned with the ischemic stroke risk in patients with AF, while primary care physicians were more concerned with the risk of bleeding. The GARFIELD study showed

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a global anticoagulant treatment rate of 60.3% in patients with AF but 28.7% in urban China.[5,9] In the Optimal Thromboprophylaxis in Elderly Chinese Patients with Atrial Fibrillation (ChiOTEAF) registry, which provides contemporary management strategies among older adult Chinese patients with AF in the era of DOACs, the use of anticoagulants was low (38%).[10]

Knowledge, attitude, practice (KAP) study is a structured survey method that can be used to investigate and highlight the importance of knowledge, attitudes, and practices of geriatricians regarding oral anticoagulants in older adult patients with AF,[11,12] and such studies could help refine the understanding of the prescription patterns. Since anticoagulants are prescription drugs that must be used under a physician's advice, the KAP of physicians will directly influence the treatment adherence and compliance of the patients. Woo et al[13] showed that physicians in Singapore had a good knowledge of stroke in AF but that the translation into practice was suboptimal, especially among non-cardiologists. A study in China showed that patients with AF had a poor KAP toward oral anticoagulation.[14] Fuchs et al[15] reported that geriatricians, cardiologists, and general practitioners prescribe oral anticoagulants differently. Two previous studies did not have a multifaceted survey specific to geriatricians.[7,15]

Therefore, this study aimed to investigate geriatricians' KAP regarding oral anticoagulants in older adult patients with AF. The results could provide KAP areas in need of strengthening.

Materials and Methods

Study Design and Participants

This web-based cross-sectional study was conducted in November and December 2023 and included doctors working in geriatrics who volunteered to participate. Doctors in training, regulatory training, or internship were excluded. This study was approved by the Ethics Committee of the author's hospital. Written informed consent was obtained from all participants.

Procedures

The questionnaire was self-designed and based on the 2024 ESC Guidelines for the diagnosis and management of AF developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS), Assessment and Mitigation of Bleeding Risk in AF and Venous Thromboembolism, and the Expert Consensus on Antithrombotic Therapy in the Older Adults over 75 Years of Age.[16] It was modified based on the input from 10 experts (five in the cardiovascular field and five in geriatrics). A small pre-test (34 copies) was conducted before the formal launch, revealing a Cronbach's α of 0.866, suggesting good internal consistency.

The final questionnaire included four dimensions: 1) demographic characteristics of the participants, including gender, age, education, years of work, previous profession, location, type of institution, and professional title; 2) knowledge dimension, which included 14 questions about oral anticoagulant therapy in older adults patients with AF, with correct answers scored 1 point and incorrect or unclear scored 0 points; 3) the attitude dimension, which included 11 questions, all using a 5-point Likert scale ranging from very positive (5 points) to very negative (1 point); 4) the practice dimension, which included 14 questions, with questions 1–11 also using a 5-point Likert scale, ranging from always (5 points) to never (1 point). Higher scores meant better knowledge and more positive attitudes and practices. A modified Bloom's cutoff was used for evaluating the KAP: On the maximum possible score, 0–50% for poor/negative, 51–69% for moderate/neutral, and 70–100% for good/positive.[17] For the multivariable analysis, using a trichotomized system would yield too-small groups. Therefore, a modified Bloom's criterion was used to dichotomize the participants' KAP into poor (0–69%) and good (70–100%) for the multivariable analysis.[18,19]

An online questionnaire was constructed using the WeChat-based Questionnaire Star applet, and a QR code was generated to collect data via WeChat. A convenience sampling method was used. The head of each hospital's geriatric department was contacted to explain the purpose of this study and to ensure that all respondents were geriatricians. Initially, a total of 282 geriatricians who met the inclusion and exclusion criteria were contacted to issue questionnaires. It was emphasized that attention to detail was needed when completing the questionnaire. The QR code of the questionnaire was sent by WeChat or Email with their consent, and then distributed to the geriatricians in the department to be

completed voluntarily. In order to ensure the quality and completeness of the questionnaire results, each IP address could only be used once to submit a questionnaire, and answering all items was mandatory. Members of the research team checked all questionnaires for completeness, internal coherence, and reasonableness. For example, age was self-reported, but practicing physicians cannot be younger than 25, and it is doubtful that a physician is still practicing past 80 years old. Incomplete questionnaires were excluded. In order to further verify the validity of the questionnaire, the factor analysis for each question[20] was performed (Figure S1 and Tables S1 and S2).

Sample Size

The minimum sample size was determined using the method for quantitative surveys,[21] ie, 5–10 times the number of survey items. Since there were 39 KAP items, the minimal sample size was 195.

Statistical Analysis

The statistical analysis software was SPSS 22.0 (IBM Corp., Armonk, N.Y., USA). The continuous variables were described as means ± standard deviations (SDs) and analyzed using Student's *t*-test and one-way ANOVA. The categorical variables were described using n (%). Logistic regression was used to perform univariable and multivariable analyses of the practice dimension. The results were expressed as odds ratios (ORs) and 95% confidence intervals (CIs). ORs > 1 indicated a positive association, while ORs < 1 indicated a negative association. The cutoff value was determined as the 70th percentile of the score distribution. The variance inflation factor (VIF) was used to determine the presence of multicollinearity. A VIF of 1 indicates no multicollinearity, while a VIF >5 indicates a high risk of multicollinearity. A two-sided $P < 0.05$ was considered significantly different.

Results

Characteristics of the Participants

A total of 218 geriatricians completed questionnaires, of which 8 were considered invalid because of the abnormal age values. Finally, 210 valid questionnaires (geriatricians aged 40.37 ± 8.63 years, with 42 males) were included for analysis. Cronbach's α for all valid questionnaires was 0.720, and the Kaiser-Meyer-Olkin was 0.764 (P<0.001).

KAP Scores

Among them, 53 (25.2%) were PhD/MD. The mean knowledge, attitude, and practice scores were 9.84 ± 2.25 (possible range: 0~14), 45.76 ± 4.17 (possible range: 11~55), and 44.48 ± 6.10 (possible range: 11~55), respectively (Table 1). The distribution of the KAP scores among the participants was presented in Figure 1.

Table 1 Baseline Characteristics and KAP Scores

	N=210	Knowledge score		Attitude Score		Practice Score	
		Mean ± SD	P	Mean ± SD	P	Mean ± SD	P
Total		9.84 ± 2.25		45.76 ± 4.17		44.48 ± 6.10	
Gender			0.691		0.074		0.641
Male	42 (20.0)	9.71 ± 2.22		46.79 ± 3.60		44.88 ± 7.54	
Female	168 (80.0)	9.87 ± 2.27		45.50 ± 4.27		44.38 ± 5.71	
Age, years	40.37 ± 8.63		0.293		0.733		0.109
≤30	21 (10.0)	9.33 ± 2.11		46.05 ± 3.54		45.92 ± 4.86	
30-40	89 (42.4)	9.70 ± 2.14		45.49 ± 4.33		45.16 ± 6.53	
>40	100 (47.6)	10.07 ± 2.37		45.93 ± 4.18		43.58 ± 5.85	
Education			<0.001		0.001		0.255
Bachelor's	72 (34.3)	8.65 ± 2.20		44.28 ± 3.85		45.44 ± 6.81	
Master	85 (40.5)	10.29 ± 2.07		46.58 ± 3.73		44.03 ± 6.27	
PhD/ MD	53 (25.2)	10.72 ± 1.95		46.45 ± 4.76		43.91 ± 4.56	

(*Continued*)

Table 1 (Continued).

	N=210	Knowledge score		Attitude Score		Practice Score	
		Mean ± SD	P	Mean ± SD	P	Mean ± SD	P
Years of work			0.354		0.603		0.038
<5 years	35 (16.7)	9.83 ± 1.87		45.83 ± 3.37		46.74 ± 4.29	
5-10 years	53 (25.2)	9.53 ± 2.33		45.26 ± 4.81		43.61 ± 7.26	
11-15 years	35 (16.7)	9.54 ± 2.31		45.40 ± 4.21		45.51 ± 5.52	
≥16 years	87 (41.4)	10.15 ± 2.32		46.17 ± 4.06		43.69 ± 5.93	
Previous profession			<0.001		<0.001		0.166
Cardiovascular	58 (27.6)	10.67 ± 2.11		46.59 ± 4.26		43.66 ± 5.96	
Digestive	8 (3.8)	8.38 ± 2.33		45.00 ± 2.56		48.50 ± 1.44	
Endocrine	6 (2.9)	10.00 ± 1.67		42.83 ± 2.86		45.94 ± 1.95	
Rheumatology/Hematology	9 (4.3)	9.44 ± 3.05		43.22 ± 3.53		45.20 ± 6.39	
Respiratory/Critical Care	8 (3.8)	7.38 ± 1.30		44.38 ± 2.62		44.98 ± 9.27	
Geriatrics	118 (56.2)	9.79 ± 2.11		46.08 ± 3.94		44.63 ± 6.14	
Renal disease	3 (1.4)	7.00 ± 2.65		36.33 ± 7.23		37.44 ± 4.53	
Location			0.148		0.121		0.263
Beijing Region	164 (78.1)	9.96 ± 2.32		45.99 ± 4.28		44.73 ± 5.90	
Non-Beijing Region	46 (21.9)	9.41 ± 1.96		44.91 ± 3.70		43.59 ± 6.75	
Type of institution			<0.001		<0.001		<0.001
Public primary hospital	31 (14.8)	8.16 ± 2.13		44.42 ± 3.41		47.08 ± 6.25	
Community hospital	21 (10.0)	7.76 ± 1.76		43.67 ± 2.80		46.87 ± 8.46	
Public secondary hospital	5 (2.4)	7.20 ± 2.17		39.60 ± 2.30		36.00 ± 4.04	
Public tertiary hospital	144 (68.6)	10.58 ± 1.89		46.47 ± 4.26		43.80 ± 5.45	
Other	9 (4.3)	10.00 ± 2.18		47.33 ± 3.16		45.63 ± 3.27	
Professional title			0.076		0.427		0.092
Primary	46 (21.9)	9.78 ± 2.06		45.46 ± 3.64		44.91 ± 6.70	
Intermediate	78 (37.1)	9.44 ± 2.35		45.44 ± 4.40		45.42 ± 6.29	
Senior	86 (41.0)	10.23 ± 2.22		46.21 ± 4.23		43.40 ± 5.46	

Knowledge

The question with the highest correct scores was item "K8. Older adults with multiple comorbidities and multiple medications need to adopt individualized methods for atrial fibrillation management to reduce the risk of

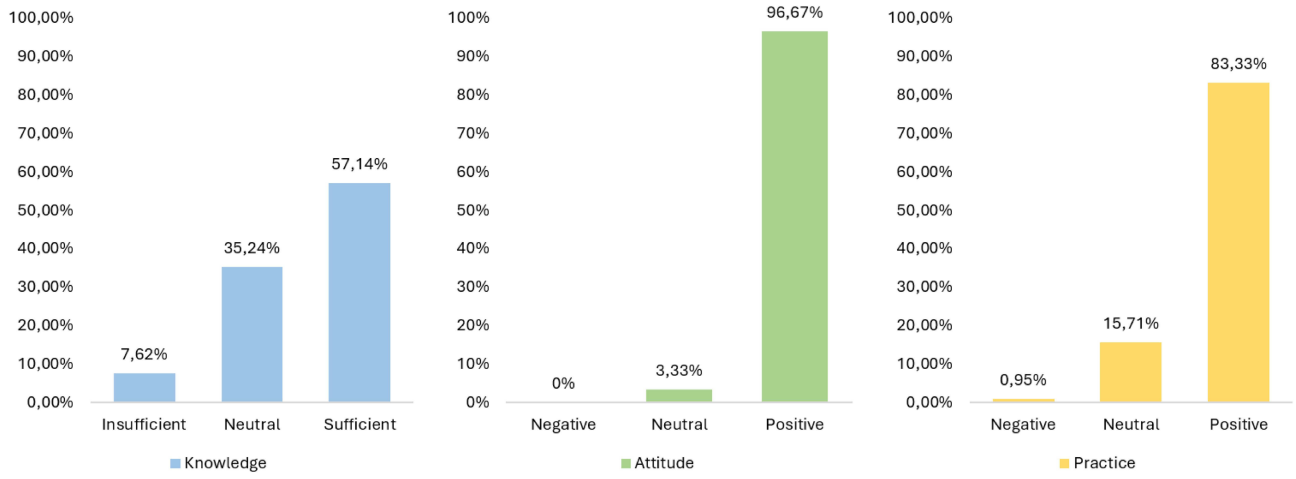

Figure 1 Distribution of the knowledge, attitude, and practice (KAP) scores among geriatricians toward oral anticoagulants in patients with atrial fibrillation.

interaction between disease-disease, disease-drugs, and drugs-drugs", with a correct rate of 98.6%. The question with the lowest correct score was "K9. Providing stroke prevention for those with CHA2DS2-VASc ≥ 1 (males) and ≥ 2 (females), assessing the bleeding risk according to the HAS-BLED score, and considering whether to use medication" with a correct rate of 27.1%. The scores of all other knowledge items were in between. Of note, 91.9% of the geriatrics were right about the features of AF, 92.9% for the use of DOACs, 57.6%-85.7% for the indications of NOAC, 55.2% for the use of aspirin in AF, 65.7% for the concomitant use of traditional Chinese medicine, 87.1% for the selection of the proper prediction tool in Asians, 61.4% for the follow-up of the patients, 87.6% for the adequate identification of NOACs, and 29.5%-72.4% for the contraindications (Table S3).

Attitude

The question with the highest percentage of "strongly agree" was item "A1. Patients should be regularly reassessed for stroke and bleeding risk, informed of changes in their treatment decisions, and potential modifiable bleeding risk factors should be resolved. (P)", with 179 (85.2%) respondents strongly agreeing. Moreover, the question with the highest percentage of "strongly disagree" was "A5. Patients with an insufficient dosage of DOAC will not have a high risk of ischemic stroke. (N)", with 37 (17.6%) respondents strongly disagree (Table S4).

Practice

The question with the highest proportion of participants selecting "very important" was "P5. History of previous bleeding (P)" with 40.08%, while the question with the highest proportion of participants choosing "very small" was "P3. Type of atrial fibrillation (P)", with 10.0% of participants. Most participants felt that a tumor history affected the use of anticoagulants, with a mean practice score of 3.93 ± 0.89. Positive fecal occult blood significantly affected prescribing decisions, with a mean practice score of 4.27 ± 0.92. Anemia significantly affected the choice of oral medication for the patients, with a mean practice score of 4.11 ± 0.84. Most participants considered that weakness had a large or even greater impact, with a mean score of 3.77 ± 0.96. Most participants also felt that a history of falls significantly impacted oral anticoagulants, with a mean practice score of 4.06±0.94 (Table S5). In response to the twelfth question of the practice dimension, "Does the prescription include anticoagulants?", 201 of the 211 participants (95.1%) answered "yes". Among the 211 physicians surveyed, 119 (56.5%) recommended using rivaroxaban. Of those who recommended rivaroxaban, the highest percentage (25.2%) prescribed a daily dose of 15 mg. Regarding the thirteenth question in the practice dimension, "Does the prescription include anticoagulants?" 201 out of the 211 participants (95.1%) responded positively. Among the physicians surveyed, 79 (37.4%) recommended the use of rivaroxaban, and the most prescribed daily dose was 15 mg (17.6% of physicians who recommended rivaroxaban) (Table S6).

Multivariable Analysis

All VIFs were <5, indicating the absence of multicollinearity (Table S7). The multivariable logistic regression analysis revealed that age ≤30 years (OR = 0.060, 95% CI: 0.006–0.645, P = 0.020), age 30–40 years (OR = 0.178, 95% CI: 0.040–0.786, P = 0.023), non-Beijing region (OR = 0.326, 95% CI: 0.121–0.876, P = 0.026), and non-public tertiary hospital (OR = 0.162, 95% CI: 0.044–0.595, P = 0.006) were all independently and negatively (because of ORs < 1) associated with adequate knowledge (Figure 2A and Table S8). Knowledge (OR = 1.362, 95% CI: 1.121–1.653, P = 0.002) was independently and positively (because of OR > 1) associated with a positive attitude (Figure 2B and Table S8). Knowledge (OR = 0.791, 95% CI: 0.659–0.950, P = 0.012) and 5–10 years of working experience (OR = 0.147, 95% CI: 0.038–0.567, P = 0.005) were independently and negatively (ORs < 1) associated with proactive practice (Figure 2C and Table S8).

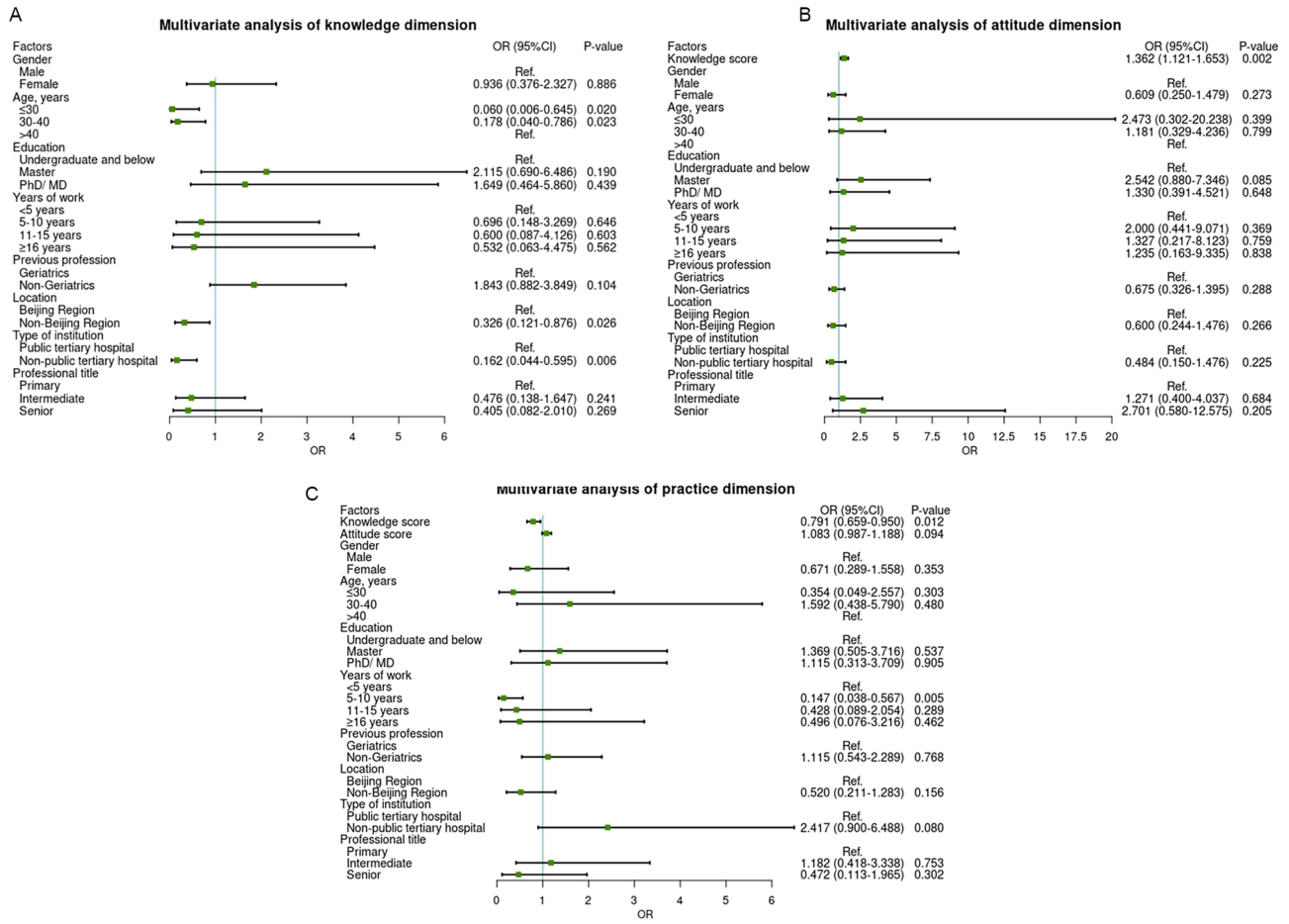

Figure 2 Multivariable logistic regression analysis. Forest map for (**A**) knowledge, (**B**) attitude, and (**C**) practice scores.

Discussion

Some previous studies reported some KAP-related information about AF and stroke prevention, but none specifically investigated geriatricians' KAP regarding oral anticoagulants in older adult patients with AF. Physicians in Singapore were reported to have a good knowledge of stroke risk in patients with AF, but the translation into practice was suboptimal, especially among non-cardiologists.[13] Fuchs et al[15] reported that oral anticoagulant prescription patterns among geriatricians, cardiologists, and general practitioners, but did not examine the KAP. Two previous studies did not have a multifaceted survey specific to geriatricians.[7,15] According to the study results, there is a significant knowledge gap among geriatricians regarding the use of oral anticoagulants in older adult patients with AF, despite generally positive attitudes and practices. The study found that adequate knowledge was associated with factors such as the geriatrician's age, location, and type of institution. In addition, positive attitudes toward using oral anticoagulants were associated with a higher level of knowledge. The study also found that proactive practice was associated with knowledge and years of work experience. Younger geriatricians (≤ 40 years), those practicing outside Beijing, or those working in non-public tertiary hospitals were associated with poor knowledge scores. In addition, higher knowledge levels were associated with a favorable attitude toward anticoagulation therapy, and more experience (5–10 years) was associated with more proactive practices. Surprisingly, knowledge was inversely associated with practice. The present study was not designed to determine the exact causes of that inverse association. It could be related to a discrepancy between the knowledge of guidelines and recommendations and practice dictated by experience more than by guidelines. Additional studies are necessary to examine the issue. Still, knowledge was positively associated with attitude.

Of note, 42.9% of the participants considered that aspirin can be used for stroke risk management in patients with AF, which is wrong. Indeed, aspirin is significantly less effective than anticoagulants.[22,23] For most patients with AF and at least one additional stroke risk factor (eg, as determined by CHA2DS2-VASc score), guidelines recommend anticoagulant

therapy, not aspirin. Aspirin may be considered only for those at the very lowest risk, but even in these cases, its benefit is minimal and often not justified given the potential for bleeding.[23–25] In addition, warfarin therapy, while effective for preventing blood clots, has several significant drawbacks, including high variability in patient response due to genetics, age, weight, and comorbidities, and numerous interactions with drugs and foods that complicate its use.[26,27] This study was not focused on aspirin or warfarin, but future studies could delve deeper into their related knowledge.

Few studies investigated the KAP of geriatricians on oral anticoagulants in older adult patients with AF. Physicians in different departments have previously treated oral anticoagulants in older adult patients with AF with varying perceptions. However, no survey has been conducted specifically for geriatricians. Vasishta et al[28] conducted a questionnaire survey of geriatricians and specialists (cardiologists, gastroenterologists, diabetologists, and endocrinologists, among others) to compare the attitudes of the two groups of physicians toward anticoagulation in older adult patients with AF. The results suggested that when considering warfarin, geriatricians may give more consideration to disability, falls, cerebrovascular, and life expectancy issues, among others. In contrast, specialists believe the benefits of warfarin outweigh the risks. Therefore, it is even more important to understand the attitudes of geriatricians in this group of diseases with a high prevalence in older adults. King et al[29] surveyed geriatricians and cardiologists, and both types of physicians would use different anticoagulants for different conditions of AF. At the same time, the gerontological perspective from the 2020 ESC Guidelines indicates the specific use of the drugs that should be used with a risk of frailty, cognitive impairment, falls, and bleeding, helping in clinical decision-making to provide optimal individualized treatment.[30] It can be observed that when treating patients with AF, geriatricians choose anticoagulants based on the individual needs and circumstances of older adult patients. A recent Delphi study showed discrepancies in the opinions of cardiologists, internists, geriatricians, and hematologists regarding the use of DOACs; the panel suggested that DOACs should be considered as a first choice for patients with AF, independently of bleeding risk.[31] In patients > 85 years and with AF, the panels agreed the DOACs should be given based on the Summary of Product Characteristics criteria and in cases where vitamin K antagonists are difficult to manage and pose safety risks. In addition, 97% of the panel participants said that they do not use DOACs in such patients.[31]

The multivariable logistic regression analysis showed that aged < 30 years (OR = 0.060) and aged 30–40 years (OR = 0.178) were independently and negatively associated with knowledge (both ORs are < 1 when compared with age > 40), indicating that younger physicians had poorer knowledge of anticoagulant therapy compared with older ones. Hence, improving the knowledge of younger physicians could translate into better attitudes since the knowledge scores were independently associated with the attitude scores. Continuous education activities should be designed and tested to improve the knowledge of oral anticoagulants in AF among physicians, especially younger physicians. Such activities could include reading materials, seminars, webinars, podcasts, and lectures. The results of the present study could provide some material for the design of such activities.

Geriatricians place a greater emphasis on the functional status of older adult patients, as this factor has significant implications for health and treatment decisions. The functional status of older adult patients encompasses various aspects, including physical activity levels, cognitive function, social interactions, and daily living skills. These factors are closely related to anticoagulation therapy, but insufficient research exists to understand their relationships. Studies indicate that geriatricians often consider functional status a better predictor of health outcomes among older adult patients than age alone. Patients with mobility limitations or impaired cognitive function may be more prone to injuries or difficulties in medication management. It was also felt that the cardiac care team and geriatric nurses needed to work together to draft an interdisciplinary care plan.[32] It is crucial to manage anticoagulation therapy because dosages and medication choices may need to be adjusted based on the patient's functional status. Another important consideration is that older adult patients typically require multiple drugs simultaneously to manage various chronic conditions. It can lead to increased complexity in drug interactions and medication management. Geriatricians and family physicians working together are vital in assisting physicians in optimizing medication regimens to ensure optimal patient outcomes.[33]

This study has several strengths and limitations. The questionnaire was self-designed based on recognized guidelines, but it was designed based on local policies and practices, limiting generalizability. Although Cronbach's α was evaluated and the content and face values were examined, the questionnaire did not undergo a formal validation process. In addition, how the performance of the questionnaire translates into clinical practice, particularly the knowledge part, remains unknown since it was not specifically examined in the present study. For example, some physicians may not know the exact dosing or creatine clearance cutoffs, but they can look for them easily during practice. It will have to be examined in

future studies. Therefore, not answering the questions correctly may not be equal to poor clinical performance or patient outcomes. The study's findings may help to improve patient outcomes by identifying areas where education and interventions can be targeted to improve geriatricians' understanding of oral anticoagulation in older adult patients with AF.

However, there are limitations to the study. Firstly, the survey only included a small number of geriatricians, which may not represent the entire population of geriatricians in the region or country. Secondly, although the KAP survey used in the study had a high Cronbach's α coefficient, its validity may need to be further tested and validated by other institutions, as it was specifically designed for this study. Thirdly, the study relied on self-reported data, which may be subject to recall bias or social desirability bias. Fourthly, the exposure to continuous medical education was not collected and could not be analyzed. Fifthly, external validation, interviews, and direct observation were lacking. These limitations should be considered when interpreting the study's results.

Conclusion

In conclusion, the study found that geriatricians had positive attitudes and appropriate practices but lacked adequate knowledge when using oral anticoagulants in older adult patients with AF. Age, location, and type of institution were associated with knowledge, while a positive attitude and proactive practice correlated with greater knowledge. These findings underscore the variability in how geriatricians manage this situation and suggest the need for practice enhancement and support programs to improve medication strategies.

Data Sharing Statement

All data generated or analyzed during this study are included in this published article.

Ethics Approval and Consent to Participate

All procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. This study was approved by the Ethics Committee of Beijing Tongren Hospital, Affiliated to Capital Medical University, and informed consent was obtained from all participants. All methods were carried out in accordance with relevant guidelines and regulations.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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