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STUDY OF STROKES IN AF PATIENTS

Cardiology

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ABSTRACT

Background: Atrial fibrillation (AF) is a significant contributor to the occurrence of ischemic stroke. Unidentified individuals with AF do not have the stroke prevention benefits provided by oral anticoagulants. We acquired a current estimation of the proportion of individuals with atrial fibrillation who were diagnosed with the condition at the time of their stroke. **Methods:** This study involved the surveillance of a cohort consisting of 284 individuals aged 65 to 95 years, during a duration of one year. It is important to note that none of the participants had been previously diagnosed with atrial fibrillation or stroke. The study encompassed individuals between the ages of 65 and 95. All participants were subsequently monitored for the development of atrial fibrillation following their involvement in the study. **Results:** The prevalence of stroke associated with atrial fibrillation (AF) During the course of a 12-month ascertainment period, a total of 284 patients who experienced new stroke events were enrolled. Out of the total sample size, 243 individuals experienced their first-ever stroke, while 41 individuals had previously experienced a stroke. In total, 90.8% (258 out of 284) of individuals were admitted to a hospital, while the remaining 9.2% (26 out of 284) received treatment within the community. The prevalence of stroke in individuals with atrial fibrillation (AF) exhibited a gradual rise as age advanced. Within the stroke patient population, it was observed that AF-associated stroke constituted 13.9% (11 out of 83) of strokes in individuals below the age of 65. In contrast, this proportion increased to 41.7% (55 out of 132) among those aged 75 years or older, and further rose to 46.2% (21 out of 45) among individuals aged 85 years or older. **Conclusions:** One in five AF-related strokes in our sample had no pre-stroke AF diagnosis. Standard rhythm monitoring detected AF easily. Most newly diagnosed AF patients had pre-stroke risk high enough for anticoagulation. Our findings suggest screening for AF before stroke. Former transient AF patients may need further screening.

KEYWORDS

Atrial Fibrillation; Stroke; Neurocognitive Impairment; Risk Management; Screening

INTRODUCTION

Atrial fibrillation (AF) is a significant contributor to the occurrence of ischemic stroke, and the use of oral anticoagulants (OACs) has been shown to be highly successful in the prevention of stroke in patients with AF [1, 2]. Nevertheless, individuals who have undiagnosed atrial fibrillation (AF) will not have the opportunity to reduce their risk of stroke by using oral anticoagulants (OACs). During the 1980s, Wolf et al. conducted a study which revealed that approximately 24% of strokes associated with atrial fibrillation (AF) were observed in individuals who had not been previously diagnosed with AF. The study conducted by Wolf utilized the primary cohort of the Framingham heart study, encompassing stroke cases that were collected from 1950 to 1980. Numerous facets pertaining to the epidemiology of atrial fibrillation (AF) as well as the clinical management of individuals afflicted with AF have undergone transformations since that time. The association between AF and stroke has gained widespread acceptance [4]. Moreover, there has been an increase in the awareness of AF among both physicians and patients. This, coupled with the rise in life expectancy, has led to a greater likelihood of age-related AF development [5]. Additionally, various therapies that effectively reduce the risk of stroke, such as statins [6] and antihypertensives [7], are commonly utilized. Furthermore, the utilization of novel anticoagulants such as apixaban, dabigatran, edoxaban, and rivaroxaban, which are more convenient to administer compared to warfarin and exhibit comparable efficacy and safety profiles, has the potential to expand the population of atrial fibrillation (AF) patients eligible for appropriate oral anticoagulant therapy [8]. The objective of the present study was to acquire an accurate and up-to-date estimation of the proportion of ischemic strokes related to atrial fibrillation that are initially diagnosed when patients exhibit symptoms of an ischemic stroke. Consequently, this percentage will enable the estimation of the prospective advantages of conducting AF screening.

MATERIALS AND METHODS

This study involved the surveillance of a cohort consisting of 284 individuals aged 65 to 95 years, during a duration of one year. It is important to note that none of the participants had been previously diagnosed with atrial fibrillation or stroke. The study encompassed individuals between the ages of 65 and 95. All participants were subsequently monitored for the development of atrial fibrillation following their involvement in the study. The main focus of this analysis was the result of ischemic stroke. Additional secondary outcomes examined in this study were cognitive impairment, cardiovascular outcomes such as major adverse cardiovascular events (MACEs), and all-cause mortality. The hypothesis posited that patients with a high risk for atrial fibrillation (AF) prior to its diagnosis would have a higher incidence of stroke, cognitive impairment, and all-cause mortality.

The inclusion criteria encompassed individuals who experienced a recent occurrence of either an ischemic or haemorrhagic stroke within the designated ascertainment period. Patients diagnosed with transient ischemic attack (TIA) were deliberately excluded from our study, as were patients who were categorised as having experienced a stroke or TIA according to the International Classification of Diseases, Tenth Revision (ICD-10).

Statistical Analyses

Parametric and non-parametric univariate comparisons of continuous variables were conducted utilizing the Student's t-test and the Wilcoxon rank sum test, respectively, as deemed appropriate. The y2 test was utilized to do comparisons of categorical data. A comparative analysis was conducted utilizing Kaplan-Meier curves and the log rank test to assess the recurrence and survival rates between stroke patients with atrial fibrillation (AF) and those without AF. The researchers conducted multivariable linear regression analysis in order to identify the independent variables that influence functional outcome.

RESULTS

The prevalence of stroke associated with atrial fibrillation (AF) During the course of a 12-month ascertainment period, a total of 284 patients who experienced new stroke events were enrolled. Out of the total sample size, 243 individuals experienced their first-ever stroke, while 41 individuals had previously experienced a stroke. In total, 90.8% (258 out of 284) of individuals were admitted to a hospital, while the remaining 9.2% (26 out of 284) received treatment within the community. Brain CT or MRI was conducted in 93.5% (265/284) of the patients, while an additional 1.9% (6/284) had access to data regarding the pathological subtype through coroner records or autopsy reports. A total of 183 out of 284 patients, accounting for 64.6%, underwent carotid imaging using either duplex ultrasonography or magnetic resonance angiography. An electrocardiogram (ECG) was conducted on 87.3% (248 out of 284) of the participants, while 24-hour cardiac rhythm monitoring was conducted on 54.9% (156 out of 284) of the participants. In total, 91.6% (260 out of 284) of the participants underwent either electrocardiogram (ECG) or cardiac monitoring. The majority of cases in which cardiac monitoring was not utilized were

either handled within the community or resulted in fatality prior to receiving medical intervention (n = 17). Atrial fibrillation (AF) was observed in 31.2% (88 out of 284) of all newly occurring stroke events and in 28.7% (69 out of 242) of all initial strokes. At the time of the index stroke, 54.2% (48 out of 88) of the participants had a pre-existing diagnosis of atrial fibrillation (AF). Atrial fibrillation (AF) was identified in 45.8% (40 out of 88) of the patients during their initial hospitalization, with the exception of only one patient. The average time it took to diagnose AF was 3.2 days. The occurrence of paroxysmal atrial fibrillation (AF) was observed in 32.2% (28 out of 88) of patients who had both AF and stroke. The crude incidence rate of all strokes associated with atrial fibrillation (including first-ever and prior strokes, both ischemic and hemorrhagic) was 60 per 100,000 person-years of observation, with a 95% confidence interval ranging from 52 to 70. The crude incidence rate of all first-ever strokes associated with atrial fibrillation (AF) was 47 per 100,000 person-years, with a 95% confidence interval (CI) ranging from 40 to 56. Additionally, the crude incidence rate of first-ever strokes associated with AF specifically classified as ischemic was 42 per 100,000 person-years, with a 95% CI ranging from 35 to 51 (see Figure 1).

Among the cohort, a total of 24 out of 284 patients, accounting for 8.5%, did not undergo either electrocardiography (ECG) or cardiac monitoring. A sensitivity analysis was conducted to investigate the impact on the calculated incidence rates by considering the potential under-detection of atrial fibrillation (AF) in this specific subgroup. It was assumed that the occurrence of AF-associated stroke in untested patients would be consistent with the observed rate in tested patients. The present analysis yielded a calculated crude incidence rate of 69 per 100,000 person-years (95% CI = 60–79) for all strokes associated with atrial fibrillation.

The prevalence of stroke in individuals with atrial fibrillation (AF) exhibited a gradual rise as age advanced. Within the stroke patient population, it was observed that AF-associated stroke constituted 13.9% (11 out of 83) of strokes in individuals below the age of 65. In contrast, this proportion increased to 41.7% (55 out of 132) among those aged 75 years or older, and further rose to 46.2% (21 out of 45) among individuals aged 85 years or older. The topic of interest pertains to the subtypes of atrial fibrillation (AF) and stroke. As anticipated, there was a significantly greater prevalence of ischemic infarcts observed in patients with atrial fibrillation (AF) (80 out of 88) in comparison to those without AF (90.4% vs. 76.1%, p = 0.001). Nevertheless, a total of 9% (8 out of 88) of strokes associated with atrial fibrillation (AF) were classified as haemorrhagic. Among these cases, 7.3% (7 out of 88) were identified as primary intracerebral haemorrhage, while 1.7% (1 out of 88) were categorized as subarachnoid haemorrhage. Out of the total sample size of 8, half (50%, 4/8) of the events were classified as spontaneous, while the other half (50%, 4/8) were observed in patients who were undergoing oral anticoagulation therapy. The pathological subtype of the stroke in one patient with atrial fibrillation (AF) was indeterminate.

According to the categorization system established by the Oxfordshire Community Stroke Project scheme [11], the presence of atrial fibrillation (AF) was found to be correlated with a greater occurrence of total and partial anterior circulation infarct syndromes, while demonstrating a lower incidence of lacunar infarct syndromes ($p < 0.001$).

According to the TOAST system's classification of subtypes, a total of 79% (127 out of 160) of the cases were categorized as cardio-embolic. The remaining cases (n = 33) were categorized as unknown or undetermined, such as instances where two or more causes are identified.

The topic of interest pertains to risk factors and medications. After excluding patients with haemorrhagic stroke, it was observed that individuals with AF-associated ischaemic stroke were of an older age (mean age 76.6 vs. 68.4 years, $p < 0.001$) and had higher prevalence of coronary artery disease (p = 0.002), while exhibiting lower rates of current smoking compared to the non-AF cohort ($p < 0.001$). The occurrence of prior stroke and transient ischemic attack (TIA) was found to be more prevalent in the cohort of stroke patients with atrial fibrillation (AF). Based on the aforementioned observation, it was found that 21.9% (35 out of 160) of patients who experienced AF-associated ischaemic stroke had previously suffered a stroke prior to their initial presentation. In contrast, only 12.8% (19 out of 149) of patients in the non-AF ischaemic stroke cohort had a history of prior stroke. This difference was found to be statistically significant (p = 0.01).

In the cohort of individuals who experienced ischaemic stroke associated with atrial fibrillation (AF), it was observed that 54.4% (43 out of 80) had a pre-existing diagnosis of AF.

Table 1. Clinical characteristics of patients with ischaemic stroke, with and without AF

Characteristic	With AF (n = 80)	Without AF (n = 149)	p value
Mean age 8 SD, years	76.68±10.8	68.48±14.3	<0.001
≥65 years	69 (86.9)	94 (63.4)	<0.001
≥75 years	50 (61.9)	56 (39.9)	<0.001
≥85 years	20 (25.6)	16 (11.1)	<0.001
Female gender	42 (53.1)	69 (46.3)	NS
Risk factors			
Diabetes mellitus1	7 (9.4)	22 (15.0)	NS
Hypertension1	48 (60.1)	75 (52.6)	NS
Hyperlipidaemia1	36 (45.9)	53 (37.0)	NS
Current smoking	13 (16.3)	52 (35.2)	<0.001
Prior coronary artery disease1	52 (32.9)	56 (19.7)	0.002
Prior stroke1	17 (21.9)	19 (12.8)	0.01
Prior TIA1	16 (19.6)	18 (12.1)	<0.04
Prestroke medication			
Antiplatelet1	40 (50)	54 (36.3)	0.04
Antithrombotic	14 (18.2)	5 (3.7)	<0.001
Antihypertensive1	55 (68.2)	71 (47.8)	<0.001
Lipid-lowering therapy1	25 (31.4)	33 (22.3)	0.04
Stroke severity <72 h			
Median NIHSS (n = 397)	6 (IQR 3–13)	4 (IQR 2–8)	0.008
Mean MRS 8 SD1	3.881.4	3.081.7	<0.001

Figures in parentheses are percentages unless specified otherwise. SD = Standard deviation; NS = non-sig- nificant; IQR = 25–75% interquartile range. 1 3–6% of data missing.

Only 27.6% (12 out of 43) of the individuals who experienced the qualifying stroke were under warfarin therapy at the time of the stroke. Prior to the onset of ischaemic stroke, an additional 55.2% (24 out of 43) of individuals were utilizing antiplatelet medication. Among these, 82.8% (18 out of 43) were taking either antiplatelet or warfarin therapy, or a combination of both (two patients). Conversely, 17.2% (7 out of 43) of individuals did not receive any form of anti-thrombotic therapy. Of the patients who had a confirmed diagnosis of atrial fibrillation (AF) at the time of their stroke, 28.7% (12 out of 43) had experienced a prior stroke. Interestingly, only 32% (4 out of 12) of these individuals were receiving warfarin treatment. In comparison to individuals who experienced non-AF stroke, those with atrial fibrillation (AF) exhibited significantly higher rates of pre-stroke utilization of antiplatelet, antihypertensive, and lipid-lowering therapies ($p < 0.05$ for all comparisons).

The Impact of Stroke Severity on Disability In order to mitigate the impact of previous instances of stroke on the severity and disability associated with stroke, the present study exclusively focuses on patients who have experienced their first-ever ischemic stroke. There was no discernible disparity in pre-stroke magnetic resonance spectroscopy (MRS) measurements between patients with atrial fibrillation (AF) and those without AF who experienced their initial episode of ischaemic stroke. Nevertheless, individuals diagnosed with atrial fibrillation (AF) exhibited more severe acute neurological impairment in comparison to those with non-AF stroke (with a median National Institutes of Health Stroke Scale (NIHSS) score of 6 versus 4, p = 0.008; as shown in Table 1). In the cohort of patients with ischaemic stroke, the presence of atrial fibrillation (AF) was found to be correlated with a gradual rise in the percentage of individuals experiencing more severe strokes. Specifically, the distribution of stroke severity based on the National Institutes of Health Stroke Scale (NIHSS) scores was as follows: 29.7% of patients had an NIHSS score between 0 and 4, 38.1% had a score between 5 and 9, 43.8% had a score between 10 and 14, and 615 had a score of 15 or higher.The p-value for the trend is less than 0.0001. When the experiment was repeated solely

for the first-ever stroke, a comparable outcome was observed (p = 0.001; fig. 2). In a similar vein, the AF stroke cohort exhibited a higher degree of acute functional disability (median MRS 4 vs. 3, p < 0.001; table 1).

The AF stroke cohort exhibited comparable patterns and levels of functional recovery when compared to the non-AF group, as depicted in Figure 3. The average functional improvement, as assessed by the Modified Rankin Scale (MRS), within the period of 72 hours to 90 days following a stroke, was found to be 0.5 in both the atrial fibrillation (AF) and non-AF first-ever ischemic stroke cohorts. Nevertheless, individuals who experienced a stroke with atrial fibrillation (AF) exhibited more severe impairment at 7, 28, and 90 days after the incident compared to those who had a stroke without AF (p < 0.001 for all comparisons;). There were no significant disparities observed in terms of 90-day case fatality or recurrence rates between the stroke groups with atrial fibrillation (AF) and those without AF, as indicated in Table 2.

The present study employs a multivariable analysis to examine the predictors of 90-day disability.

To account for the potential confounding effect of prestroke disability, we stratified the patients based on their prestroke Rankin score. Subsequently, we conducted a multivariable analysis to investigate the potential factors that could predict the functional outcome of ischaemic stroke patients at 90 days. In the cohort of individuals with a baseline Modified Rankin Scale (MRS) score of zero prior to experiencing a stroke, the presence of atrial fibrillation (AF) was found to be significantly correlated with an unfavorable functional outcome at 90 days, as indicated by an MRS score of 13 (p = 0.001). The study found that there was a 2.1-fold increase in the odds of experiencing a poor functional outcome in individuals with AF, with a 95% confidence interval ranging from 1.3 to 3.7. Nevertheless, in the context of a multivariable linear regression model that accounted for age, gender, NIHSS, diabetes mellitus, hypertension, coronary artery disease, warfarin, and lipid-lowering treatment, the inclusion of AF as a predictor revealed that only age (p < 0.001, β = 0.05) and NIHSS (p < 0.001, β = 0.18) significantly predicted functional outcome at 90 days. This finding suggests that the association between AF and disability is likely influenced by the impact of early stroke severity. Upon conducting further analyses on the subset of 260 patients who underwent ECG or cardiac monitoring, it was observed that our findings remained consistent and did not undergo any alterations.

Table 2. presents the case fatality and early stroke recurrence rates of ischemic stroke in individuals both with and without atrial fibrillation (AF).

Case fatality	AF (n = 80)	No AF (n = 149)	p value
7 days	6 (7.5)	10 (6.4)	0.7
28 days	12 (15.0)	18 (12.1)	0.4
90 days	18 (23.1)	24 (16.4)	0.09
Recurrent stroke			
7 days	2 (2.0)	4 (2.4)	0.7
28 days	4 (4.4)	12 (4.0)	0.6
90 days	4 (5.0)	10 (7.1)	0.09

Figures in parentheses are percentages.

DISCUSSION

In a comprehensive prospective study, a substantial prevalence of stroke associated with atrial fibrillation was observed at a population-wide scale. We employed rigorous methods for case ascertainment that involved overlapping approaches, along with meticulous clinical characterization of each patient. This allowed us to present a comprehensive analysis of stroke cases associated with atrial fibrillation (AF) in a substantial proportion (approximately 7%) of the Irish population. In order to mitigate potential bias in these studies, it is crucial to incorporate individuals receiving community-based treatment and the elderly population, as they face a heightened risk of stroke associated with atrial fibrillation. It is worth noting that these groups are frequently excluded from hospital and clinical trial registries [9]. Approximately 10% of the patients included in our study received treatment in the community, while 16% of the participants were aged 85 or older. These findings indicate a notable level of ascertainment within these specific demographic groups. The data at our disposal enable precise estimation of the present burden of stroke associated with atrial fibrillation in the Irish population. After accounting for variations in population size, our research outcomes can potentially facilitate the estimation of incidence rates in different populations. This, in turn, can serve as a reference point for conducting geographic comparisons and analyzing trends over a specific period.

The incidence of stroke associated with atrial fibrillation (AF) in our study population is significantly greater than what has been documented in prior research. In North Dublin, AF was detected in approximately one third of all newly occurring stroke cases, whereas earlier studies have reported rates ranging from 15% to 24% [10, 11, 12]. This discrepancy may be attributed, in part, to variations in research methodologies, specifically pertaining to the characterization and identification of atrial fibrillation (AF) across different studies. In contrast to previous studies that categorized stroke associated with atrial fibrillation (AF) as only those occurring in individuals with a pre-existing AF diagnosis, our study employed a more inclusive definition. This definition encompassed stroke cases involving individuals with a prior AF diagnosis, newly detected AF at the time of stroke onset, and paroxysmal AF identified within the subsequent three months. The inclusion of newly detected atrial fibrillation (AF) at the onset of stroke was supported by compelling evidence from the Framingham study. This evidence suggests that newly detected AF tends to persist in the majority of cases, indicating that it may play a causative role in stroke rather than being a consequence of it [13]. Likewise, there is evidence indicating that paroxysmal atrial fibrillation (AF) may present a significant risk for stroke, comparable in magnitude to the risk associated with chronic AF [14, 15]. In our cohort, it was observed that a significant proportion (33.3%) of stroke patients with AF had paroxysmal AF, suggesting a noteworthy association with stroke risk. This association may have been underestimated in previous research studies [16].

The study encompassed a majority of patients, specifically over 95%, who underwent brain imaging or autopsy procedures. This enabled a precise identification of the pathological subtype in a significant proportion of the patients. It was discovered that a proportion of patients diagnosed with atrial fibrillation (AF) experienced haemorrhagic stroke, with approximately ten percent of the patients being affected. Furthermore, it was observed that only fifty percent of these cases were linked to the administration of warfarin therapy. Other researchers have also observed a similar finding (17). The etiology of hemorrhagic stroke in atrial fibrillation (AF) patients who do not receive warfarin remains uncertain. The observed phenomenon may suggest a greater occurrence of risk factors associated with haemorrhagic stroke in elderly patients with atrial fibrillation (AF), including hypertension, the use of antiplatelet medications, or cerebral amyloid angiopathy. This observation underscores the necessity for enhanced methodologies in order to stratify the risk of patients for warfarin therapy in atrial fibrillation, with a particular focus on the elderly population.

Prior research has indicated a higher degree of disability in strokes associated with atrial fibrillation (AF) when compared to strokes not associated with AF [18, 19]. Nevertheless, there has been a lack of clarity regarding whether this occurrence can be attributed to advanced age and the presence of other medical conditions, or if it is a result of more severe strokes in patients with atrial fibrillation. In alignment with previous research, our findings indicate that atrial fibrillation (AF) is correlated with advanced age, poorer functional status prior to stroke, and more severe stroke symptoms compared to strokes not associated with AF. Consequently, individuals with AF experience higher levels of disability within the initial three days following stroke onset [12, 18]. Through the utilization of serial Rankin score measurements, it was determined that patients with atrial fibrillation (AF) experienced a comparable rate of improvement in stroke outcomes compared to those without AF. However, it was observed that AF patients still exhibited a higher degree of disability at the 3-month mark. Upon controlling for prestroke disability, our analysis revealed that both age and the National Institutes of Health Stroke Scale (NIHSS) were significant independent predictors of functional outcome. The higher β-coefficient observed in our multivariable model in relation to NIHSS suggests that stroke severity played a significant role in determining unfavorable functional outcome. While there was no observed correlation between AF and an increased occurrence of early recurrent stroke, our cohort demonstrated a significant association between AF and late stroke recurrence. The prevalence of a previous occurrence of stroke or transient ischemic

attack (TIA) was nearly two times higher in the group of individuals who experienced stroke associated with atrial fibrillation (AF). Recurrent stroke exhibits a higher correlation with increased disability, mortality rates, and healthcare expenditures when compared to initial stroke occurrences. Of particular concern is the observation that a mere 32% of patients who had a history of atrial fibrillation (AF) and had previously experienced a stroke were receiving warfarin treatment at the time of their subsequent ischemic stroke. There are various factors that play a role in the decision to not prescribe warfarin to patients with atrial fibrillation (AF). These factors include the preferences of the patients themselves, their age and any other existing medical conditions they may have, as well as factors related to the physicians involved, such as their specialty training [20]. The data presented in our study emphasize the significance of enhancing strategies aimed at maximizing the rates of warfarin prescription. This is particularly crucial for individuals who have experienced a previous stroke or transient ischemic attack (TIA), as they are at the greatest risk of experiencing a recurrent event [21]. The present study is not devoid of certain limitations. Despite the fact that a significant percentage (more than 90%) of participants underwent electrocardiogram (ECG) or cardiac rhythm monitoring, it is important to acknowledge the potential for undetected cases of atrial fibrillation (AF), which may result in an underestimation of the prevalence of AF-associated stroke. In our sensitivity analysis, we examined the potential consequences of underascertainment. Considering the elevated occurrence of additional risk factors for stroke, such as hypertension, among individuals with atrial fibrillation (AF), it is plausible that certain stroke incidents in the AF-associated stroke group may not be solely ascribed to AF.

When considering the findings in relation to prior research, our data provide evidence for the notion that stroke associated with atrial fibrillation (AF) can be regarded as a distinct pathophysiological and clinical entity. This type of stroke exhibits a specific profile characterized by its severity, frequent recurrence, and significant impact on functional abilities. The data we have collected also indicates that stroke associated with atrial fibrillation (AF) may be more prevalent than previously believed. It appears to occur in approximately one third of all cases of ischemic stroke in our population, when AF is broadly defined to include prior, new, and paroxysmal occurrences. There is a potential for significant advancement in stroke prevention at a population level, as the opportunistic screening of elderly individuals for atrial fibrillation (AF) is both feasible and cost-effective [22]. There is a substantial body of evidence that consistently demonstrates the significant efficacy of warfarin therapy in the prevention of stroke in patients with atrial fibrillation (AF), as observed in both randomized trials and real-world clinical settings [23]. A recent study conducted in France, which focused on the general population, discovered a decline in the occurrence of stroke associated with atrial fibrillation (AF). This decrease is believed to be attributed to advancements in the utilization of antithrombotic therapy, as indicated by previous research studies [24, 25]. Nevertheless, international data reveal that the implementation rates of warfarin therapy for atrial fibrillation (AF) in clinical practice are low, even among individuals who are at the greatest risk for stroke [26]. Enhancements in health systems, such as the implementation of multidisciplinary atrial fibrillation (AF) clinics and the utilization of targeted opportunistic screening, have the potential to enhance the detection of AF, individualized risk assessment, and the rates of warfarin treatment [22]. Although additional assessment is necessary, these methods have the potential to result in substantial reductions in the prevalence of stroke caused by atrial fibrillation (AF) within populations.

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