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MULTIMEDIA REPORT

The gap between indicated and prescribed stroke prevention therapies in a high-risk geriatric population

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Abstract

Purpose The use of oral anticoagulation (OAC) in the elderly population with atrial fibrillation (AF) treated in long-term care (LTC) facilities is inconsistent. We examined the magnitude and sources of the gap between indicated and prescribed OAC in the elderly population with AF.

Methods We retrospectively scanned the electronic medical record (EMR) and pharmacy data of 25 LTC facilities in Ontario, Canada. The diagnosis of AF was drawn from EMR. Different attributable risk factors for possible failure to prescribe OAC were examined.

Results In total, 3378 active resident data were examined in the 25 LTC facilities. All the residents were ≥65 years old with mean age of 85 ± 8 years and 2449 (72%) were female. We identified 433 (13%) residents with AF with mean age 87 ± 7 years and mean CHADS2 score of 3 ± 1. Out of all residents with AF, 273 (63%) were on OAC therapy. Residents were mostly treated with warfarin ($N = 114$ (42%)), rivaroxaban ($N = 71$ (26%)) or apixaban ($N = 62$ (23%)) followed by dabigatran ($N = 26$ (10%)). Antiplatelet drugs as the only stroke prevention therapy were used in 88 (20%) residents, and 28 (6%) residents were on anticoagulation and antiplatelet drugs. Seventy-two (17%) residents were not on any antiplatelet or antithrombotic therapy. None of the potential attributable risks identified consistently correlated with the failure to prescribe indicated therapy.

Conclusions This data set suggests that 37% of eligible elderly LTC residents failed to receive recommended stroke prevention therapies.

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1 Introduction

Atrial fibrillation (AF) is the most common cardiac dysrhythmia, with an estimated risk of about 25% by 80 years of age [1]. AF is associated with significant morbidity and mortality related to ischemic stroke and the consequences of increased bleeding risk with oral anticoagulation (OAC) therapy [2].

Age is considered an important risk factor for stroke among patients with AF. The annual risk of stroke in age group 65–74 years is 2.1%, rising to 3.9% in the 75–85-year group [3, 4]. Nevertheless, the use of OAC therapy in the elderly population treated in long-term care (LTC) facilities is poorly studied. Although the guidelines for stroke prevention of atrial fibrillation recommend OAC for AF patient ≥65 years old [5],

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physicians tend to avoid OAC therapies in elderly population given the perception of high risk of bleeding [6].

'Care gap' refers to the failure to appropriately treat patients with AF with anticoagulation when indicated according to consensus conference guidelines [5]. Currently, the care gap literature does not generally focus only on the elderly, the group at highest risk for stroke, bleeding and potential contraindication for OAC.

We performed a retrospective analysis to assess the current magnitude and sources of the gap between indicated and prescribed use of OAC in the elderly with AF and to characterize the prevalence of different therapies for AF in this population. We also examined the potential sources of failure to prescribe appropriate anticoagulation.

2 Methods

LTC facilities in the province of Ontario, Canada, refer to government-regulated centers where elderly care is provided under continuous nursing supervision at intensity guided by the clinical status of the resident. Admission to a LTC facility is coordinated through a regional regulatory body that evaluates the residents' health status, preferences and suitability of available LTC facilities. Once admitted to a LTC, all medications are prescribed by the physicians working at the LTC facility, dispensed, whenever possible, by a single pharmacy provider and administered by or under the close supervision by nursing staff. In this study, all active resident profiles from 25 LTC facilities in Ontario, Canada, were retrospectively evaluated in May 2015, as part of a continuous quality improvement project. The LTC facilities were distributed across the province of Ontario located in urban, semi-urban centers and ranged from 60 to 242 beds with an average of 148 beds.

We included all residents ≥65 years old with diagnosis of AF as drawn from LTC electronic medical records (EMR). Records were merged with a pharmacy database, which was the sole provider of all medications for each resident. This research initiative was completed as part of a baseline assessment to be used for the expansion and spread of a quality improvement initiative supported by the LTC operator and reviewed by their privacy officer. This research initiative was reviewed and approved by home-level ethics review committees that participated in this quality improvement project. The data were gathered by health care providers within the circle of care, deidentified and only presented in aggregate.

The accuracy of the diagnostic label of AF given to residents was estimated by a complete chart review of a random sample of the cohort. We examined 20 charts to confirm the diagnosis of AF among residents reported to have AF; a similar review was performed for 20 residents that were reported not to have AF to demonstrate the accuracy of the specificity assertion. This was performed using the following tools: (1) ECG lab report results confirming diagnosis of AF, (2) consult note from specialist confirming diagnosis, (3) family physician's note/report with AF as a listed diagnosis, (4) nurse/allied health care note with AF as a listed diagnosis, and (5) EMR list of diagnoses that includes AF.

We collected all data available related to gender, diagnosis with congestive heart failure (CHF), previous stroke and use of ten or more drugs. Possible reasons for not prescribing OAC in AF were examined for potential correlation. These included the following: advance directive for no hospitalization, do-not-resuscitate order (DNR), dementia diagnosis, cognitive performance scale (CPS), activities of daily living self-performance hierarchy scale (ADL-HS) and changes in health, end-stage disease, signs, and symptoms (CHESS) scale. The later three scales are widely used as measures of health required as part of a mandatory health assessment used to determine government funding of the LTC facility. The CPS provides a validated measure of memory impairment, level of consciousness and executive function marking seven grades of impairment from intact ($CPS = 0$) to very severe impairment ($CPS = 6$). The ADL-HS also provides a score ranging from 0 to 6 for rate impairment of activities of daily living based on abilities around personal hygiene, toileting, locomotion and eating. Finally, the CHESS scale serves as a surrogate maker of frailty and provides a measurement of health instability and risk of serious health decline using a 6-point scale where 0 suggests no instability and higher scores to a maximum of 5 represent increasing unstable health states predictive of hospitalization and mortality. The CHESS scale was the closest available surrogate marker of frailty that was available in all the LTC facilities.

3 Statistical analysis

Effects of possible attributable covariates on OAC use are described as the numbers and corresponding percentages and 95% confidence intervals (95% CI). Attributable risks are dichotomized based on the literature as follows: cognitive impairment is defined as a cognitive performance scale of four or higher; residents were categorized as dependent if they scored three or higher on the activities of daily living score; the changes in health, end-stage disease, signs, and symptoms scale is dichotomized into a score of three or higher or a score less than three. CHADS2 score is dichotomized into a score of two or more or less than two. All analyses are performed with the use of the STATA version 13.1.

4 Results

4.1 Baseline characteristics

In total, 3378 active residents were assessed in the 25 LTC facilities. All the residents were ≥65 years old with mean age of 85 ± 8 years and 2449 (72%) were female.

We identified 433 (13%) AF residents with mean age of 87 ± 7 years (93% of the patients are >75 years) and 293 (68%) were female. Out of all the AF patients, 26% (113) were diagnosed with CHF and 33% (143) with previous stroke with overall mean CHADS2 score of 3 ± 1 (87% with CHADS2 score ≥2). In total, 90% (388) of the patients were using ten or more drugs. Advance directives for no hospitalization were reported in 67 (15%), for no resuscitation in 336 (78%) and dementia in 254 (59%) among all the patients with AF. The labeling assertion was found to be correct in 39 out of 40 charts assessed, and 20 out of 20 patients labeled as having AF were correctly identified; 19 out 20 patients labeled as not having AF were also found to be correct using the approach outlined in the methods. There were no significant clinical differences among those patients given warfarin, NOAC, aspirin or no anticoagulant on any attributes of the CHADS scale or any attributes of the other clinical measures.

Baseline characteristics of the included AF patients are shown in Table 1.

4.2 Care gap

Out of all the AF residents, 273 (63%) residents were on OAC therapy. The residents were mostly treated with warfarin (n = 114 (42%)), rivaroxaban (n = 71 (26%)) or apixaban (N = 62 (23%)) followed by dabigatran (n = 26 (10%)). Antiplatelet drugs as the only stroke prevention therapy were used in 88 (20%) residents, and 28 (6%) residents were on anticoagulation and antiplatelet drugs. Seventy-two (17%) residents were not on any antiplatelet or antithrombotic therapy.

Among all baseline characteristics, using ten or more drugs was the only statistically significant predictor of care gap among the AF patients on OAC in comparison to the AF patients who were not on OAC (93% (95% CI, 89–96) versus 84% (95% CI, 77–89); P = 0.002) (Table 2).

Advance directives for no hospitalization and no resuscitation orders were not different among the AF patients on OAC and patients who are not on OAC. More so, diagnosis of dementia, cognitive impairment (CPS ≥4), dependency (ADL-HS ≥3), or frailty as estimated by CHESS ≥3 or high CHADS2 ≥2 did not correlate with the failure to prescribe indicated OAC therapy (Fig. 1 and Supplemental Table S1).

5 Discussion

This study demonstrates the following important findings: (1) 37% of elderly with AF residing in the LTC failed to receive recommended stroke prevention therapies, (2) warfarin was the mostly common used anticoagulation therapy in the elderly patients while dabigatran is the least common anticoagulant compared to rivaroxaban and apixaban, and (3) lack of use of indicated therapy has no correlation to any measure of clinical status, cognitive function, frailty or code status.

5.1 Age, AF and OAC therapy

This is one of the first studies that highlights the care gap in elderly LTC residents with AF. We intentionally conducted a cohort that was enriched in the representatives that come to a long-term care facility and who, if atrial fibrillation is present, possess an unequivocal indication for anticoagulation. The
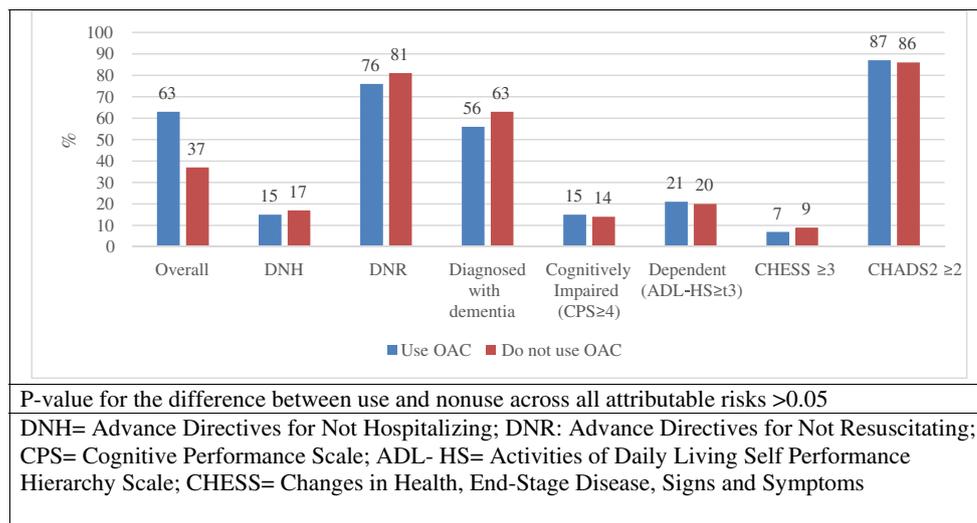
Table 1 Characteristics of AF patients

Baseline characteristics	% (n)
≥75 years	93 (402)
% Females	68 (293)
Diagnosed with CHF	26 (113)
Previous stroke	33 (143)
Use 10 or more drugs	90 (388)
Advance directives for not hospitalizing	15 (67)
Advance directives for not resuscitating	78 (336)
Dementia	59 (254)
Cognitively impaired (CPS ≥4)	15 (63)
Dependent (ADL-HS score ≥3)	21 (90)
CHESS score ≥3	8 (33)
CHADS2 score ≥2	87 (375)
Use of OAC	63 (273)

CPS cognitive performance scale, ADL-HS activities of daily living self-performance hierarchy scale, CHESS changes in health, end-stage disease, signs, and symptoms

Table 2 Use of OAC by patient characteristics, % (n)

	Use OAC		Do not use OAC	
	No.	% (95% CI)	No.	% (95% CI)
Overall	273	63 (58–67)	160	37 (33–42)
Age, ≥75 years	252	92 (88–95)	150	94 (89–97)
Sex, females	181	66 (60–72)	112	70 (62–77)
Diagnosed with CHF	73	27 (22–32)	40	25 (18–32)
Previous stroke	183	67 (61–72)	107	67 (59–74)
Using 10 or more drugs*	254	93 (89–96)	134	84 (77–89)

*P value for the difference between use and nonuse of OAC among patients using more than ten drugs = 0.002

Fig. 1 Use of OAC by possible attributable risks

P-value for the difference between use and nonuse across all attributable risks >0.05

DNH= Advance Directives for Not Hospitalizing; DNR: Advance Directives for Not Resuscitating; CPS= Cognitive Performance Scale; ADL- HS= Activities of Daily Living Self Performance Hierarchy Scale; CHESS= Changes in Health, End-Stage Disease, Signs and Symptoms

European Society of Cardiology and the Canadian Cardiovascular Society have both emphasized that anticoagulation needs to be a default recommendation for any-one over the age of 65, and therefore, we adapted that filter for this cohort [5]. As is, in the long-term care facilities in Ontario, the number of residents who are under the age of 65 is small; the amount of patients excluded for age criteria is small, 4.5% of the sample. The prevalence of AF increases exponentially with increasing age [7]. Friberg et al showed that the prevalence of AF increased with age from 8.6% at <60 years to ≥50% at >90 years. More so, patients with ischemic stroke and AF are older than those without AF (80.8 versus 73.9 years) [8]. Stroke related to AF has a 50% chance to be highly disabling [2]. OAC therapies have a major role in de-creasing the risk of stroke in AF patients and are associated with a 64% reduction in stroke with substantial reduction of all cause mortality [9].

In patients aged over 65 years and without other risk factors for stroke, warfarin decreases the annual risk of stroke from 2.1 to 0.7% and increases the risk of major bleeding by approximately 0.5% per year to 1.0% [5, 9, 10]. Despite this, 37% of elderly with AF residing in the LTC in this cohort failed to receive recommended stroke prevention therapies representing a significant care gap. None of the studied risk factors (other than using ten or more drugs) correlated with this significant gap in prescribing OAC therapy. One explanation could be related to the fact that this population was also at a higher risk of bleeding with a possible misperception of the relative significance of stroke outcomes. Many patients try to avoid using warfarin, a medication that requires regular monitoring and susceptibility to multiple drug interactions in this LTC population. These concerns should be mitigated with novel oral anticoagulation therapies now available with a better or equivalent safety profile in comparison to warfarin [11, 12]. In this cohort, 20% were on ASA as their stroke prevention therapy. This may be based on a presumption of improved safety. A recent a subgroup analysis from the AVERROES trial showed that patients >85 years with AF have a substantially greater benefit from anticoagulation with apixaban compared to ASA with no greater risk of haemor-rhage [13].

5.2 Care gap

The care gap literature in our patient population is limited. A few studies with relatively younger AF patients showed higher use of OAC therapies. In a recent Canadian study of AF patients with median age of 77 years, 79 and 88% of patients with a CHADS2 score of 0 and 1, respectively, were taking warfarin [14]. In a large-scale Japanese study, a total of 7937 AF patients (mean age 69.7 ± 9.9), more than 90%, were taking warfarin in the moderate- and high-risk group (CHADS2 score ≥2) [15]. The relatively lower use of OAC in our study may be related to the different population of the LTC environment beyond age group alone. In the Practice Innovation and Clinical Excellence (PINNACLE) study, care gap from an administrative data set showing increased OAC use with increasing CHADS risk score but never exceeded 50% [16]. There was no separate analysis available from the very old or those in LTC-type facilities only, where medication adherence is less likely a factor.

The decision to prescribe OAC in our group is complex and requires input from primary care physicians, patients and often surrogate decision makers. In a large study assessing the knowledge of stroke and bleeding risk assessment among primary care physicians, over- and underestimation of stroke and bleeding risk was evident [14]. Mahmud et al. supports the complexity and underuse of OAC in elderly AF patients as the use of warfarin in those >75 years old was three times less than in those <65 years.

More so, AF patients ≥75 years old were more likely to receive aspirin than those <65 years old [17].

Decisions to withhold anticoagulation are not generally stated; all the attributes explored did not have any explanatory power. Certainly, none of the variables we have measured which include frailty, cognitive function, dementia or advanced directives provide an explanation for the decision to withhold therapy, and that other factors such as anemia, patient preference, falls or other factors might have a role. The decision to withhold OAC therapy appears to be due to a misperception that stroke prevention is a nihilistic goal in this age group.

Our study highlights the significant care gap currently seen in practice and adequately described in the literature as the 'risk-treatment' paradox wherein patients who benefit the most from evidence-based care receive it the least [18]. The significant care gap in the elderly is contrary to current guidelines that recommend the use of OAC in older patients, and establishes a clear need for a quality improvement intervention to improve care.

6 Limitations

The retrospective nature and the relatively small number of AF patients in our study may limit our conclusions. Bleed risk scales are not available in this study cohort other than bleed risk attributable to age alone. The decision to give anticoagulation is a balance of risk and benefits in this high-risk cohort. Surrogates of overall risk of morbid events such as cerebral functioning, frailty or code status have no relationship to the decision to give or withhold anticoagulation. This supports our hypothesis that this decision is rather unclear. There may be other unmeasured covariates that do determine the decision to give or withhold anticoagulation which are not obtained from this study such as prior history of bleeding or fall risks. Resident and family goals/wishes around OAC treatment were not included in this analysis and may alter our results. The number of patients treated with both OAC and ASA is 6% out of the entire cohort. These patients presumably had cardiac or other vascular disease but could provide no further details on them. The absence of this data from a small subgroup of patients does not alter our results or conclusions. The reliance of our study on medical reports is a potential limitation. The diagnosis of AF depends highly on extensive monitoring, and patients with silent AF could be missed in our study.

7 Conclusions

This real-world data set suggested that 37% of the eligible elderly LTC residents fail to receive recommended stroke prevention therapies. Warfarin was the most common OAC therapy used in the elderly residents in the LTC facilities.

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