Factors Associated with Anticoagulation Initiation for New Atrial Fibrillation in an Urban Emergency Department

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Objective: To explore factors associated with anticoagulation (AC) initiation after atrial fibrillation (AF) diagnosis.

Design: Retrospective cohort study.

Setting: Urban medical center.

Patients: Adults with emergency department (ED) diagnosis of new onset AF from 1/1/2017-1/1/2020 discharged home.

Methods: We compared patients initiated on AC, our primary outcome, to those not initiated on AC. Stroke, major bleeding, and AC initiation within 1 year of visit were secondary outcomes. We hypothesized that minority race and non-English language preference are associated with failure to initiate AC.

Results: Of 111 patients with AF, 88 met inclusion criteria. Mean age was 65 (SD 15); 47 (53%) were women. 49 (56%) patients were initiated on AC. Age (61 vs 68 years; P=.02), non-English language (28% vs 10%; P=.03), leaving ED against medical advice (AMA) (36% vs 14%; P=.04), and CHA^2DS^2-VASc score of 1 (41% vs 6%; P<=.001) were associated with no AC initiation. There were no associations between patient-reported race/ethnicity and AC. Cardiology consultation (83.67% vs 30.78%; P<.0001) and higher median CHA^2DS^2-VASc score (3[2-4]) vs. 2[1-4]; P=.047) were associated with AC. Of 73 patients with follow-up data at 1 year, 2 (8%) not initiated on AC had strokes, 2 (4%) initiated on AC had major bleeds, and 15 (62.5%) not initiated on AC in the ED subsequently were initiated on AC.

Conclusion: More than half of ED patients with new AF eligible for AC were initiated on it. Work to improve AC utilization among patients with new AF who left AMA from ED and those who prefer to communicate in a non-English language may be warranted. *Ethn Dis*. 2022;32(4):325-332; doi:10.18865/ed.32.4.325

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Introduction

Atrial fibrillation (AF) is the most common cardiac rhythm disturbance, affecting more than 43.6 million people.[1] Patients with AF frequently present to the emergency department (ED) due to discomfort associated with palpitations and shortness of breath related to AF.[2] Despite the fact that the ED represents an important place to initiate anticoagulation (AC) among patients with AF for secondary stroke prevention, a retrospective cohort study in Ontario, Canada found that of nearly 2,000 patients with new onset AF discharged from the ED, only 19% were initiated on AC.[3] A smaller US study found that 53% of ED patients with AF were discharged home without appropriate AC.[4]

Factors associated with failure to initiate AC for patients with newly detected AF in the ED setting are uncertain. There are indeed racial/ethnic disparities in medical treatment of AF—in one study, for example, Blacks had higher odds of warfarin prescription at discharge compared with Whites, and lower rates of oral anticoagulation. Puerto Rican Hispanics were more likely to be discharged on an oral anticoagulant than aspirin.[5] Given these racial and ethnic differences, as well as differences in awareness regarding AF diagnosis[6] and rates of cardioversion to treat AF,[7] we hypothesized that

similar disparities may be evident in initiation of AC in the ED. We therefore sought to determine the rate of, and factors associated with, AC treatment at ED treat-and-release visits for patients with new onset AF in a large, multi-site single health care system. We hypothesized that non-White race, Hispanic ethnicity, and non-English language preference would be associated with failure to initiate AC. We focused on ED treat-and-release visits since, unlike patients admitted to the hospital, patients discharged directly to home remain at risk of subsequent adverse events and often lack detailed outpatient follow up plans.[8]

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Methods

Study Setting and Design

We conducted a retrospective cohort study of patients with newly diagnosed AF who were discharged to home or left against medical advice (AMA) from any of the four EDs at Montefiore Medical Center (MMC) from 1/1/2017 to 1/1/2020. MMC is a large, urban multisite health care system located in the Bronx, New York. The Bronx is home to 1.5 million individuals and is a majority minority population (44.7% White, 43.6% Black, 29.1% Hispanic).[9] More than 88% of ED discharges and admissions at MMC are residents of the Bronx.[10] Of the four EDs of MMC, two are attached to community hospitals, one is a stand-alone emergency center without medical trainees, and one is attached to a tertiary referral center. All EDs have a fully electronic medical record (EMR) system and are equipped with translator phones to communicate with non-English speaking patients.

Study Cohort

We identified all adult patients with newly diagnosed AF using homegrown health care surveillance software to capture patients with a primary ED discharge diagnosis of AF using ICD-10-CM code I48.0.[11] Diagnosis of new onset AF was confirmed with review of ECGs and other relevant data in the EMR by a single investigator (JS); all available EMR data, including that from encounters prior to index ED visit, was reviewed to confirm AF was not previously diagnosed. To define our final study cohort of AF patients eligible for AC at the time of ED arrival, we excluded: 1) patients already on anticoagulation at the time of ED arrival; 2) patients with a CHA^2DS^2-VASc score of 0; 3) patients who declined AC after discussion with ED provider based on documentation in the EMR; and 4) clear medical contraindication to AC. The CHA^2DS^2-VASc score is a well-validated tool to estimate stroke risk in patients with AF and includes the following stroke risk factors: congestive heart failure; hypertension; age >75 years; diabetes mellitus; prior stroke; TIA or thromboembolism; vascular disease; age 65-74 years; and female sex.[12] We excluded patients with CHA^2DS^2-VASc score of zero from our final study cohort based on the 2014 American Heart Association (AHA) guidelines. These guidelines do not recommend AC for patients with CHA^2DS^2-VASc score of 0; they note that there is uncertainty about the role of AC in patients with CHA^2DS^2-VASc score of 1 stating that "no antithrombotic therapy or treatment with oral anticoagulant or aspirin may be considered."[13] Based on the 2014 AHA guidelines, we included patients with CHA^2DS^2-VASc score of 1 in our final study cohort of patients eligible for AC at the time of ED arrival. The Albert Einstein College of Medicine/MMC's Institutional Review Board approved this study and granted a waiver of informed consent.

Covariates

Two investigators abstracted demographic, clinical, and facility

level factors from the EMR using a structured chart review process and a standardized abstraction form (JS and SL). Patients' gender, race, ethnicity, and preferred language were self-reported at the time of ED visit. A socioeconomic status (SES) score for each patient was defined using six variables representing dimensions of wealth, education, and income based on patients' home address zip code.[14] The SES score reflects the deviation of a patient's neighborhood SES from the mean SES of the population in New York State.

We abstracted prespecified covariates to describe the study cohort including medical history of hypertension, heart failure, hyperlipidemia, diabetes, ischemic stroke/transient ischemic attack, valvular heart disease, kidney disease, coronary artery disease/myocardial infarction, and recreational drug use, all of which allowed us to calculate the CHA^2DS^2-VASc score for each patient. We also collected the CHA^2DS^2-VASc score documented by the provider. We noted past use of NSAIDS, aspirin, and dual antiplate-

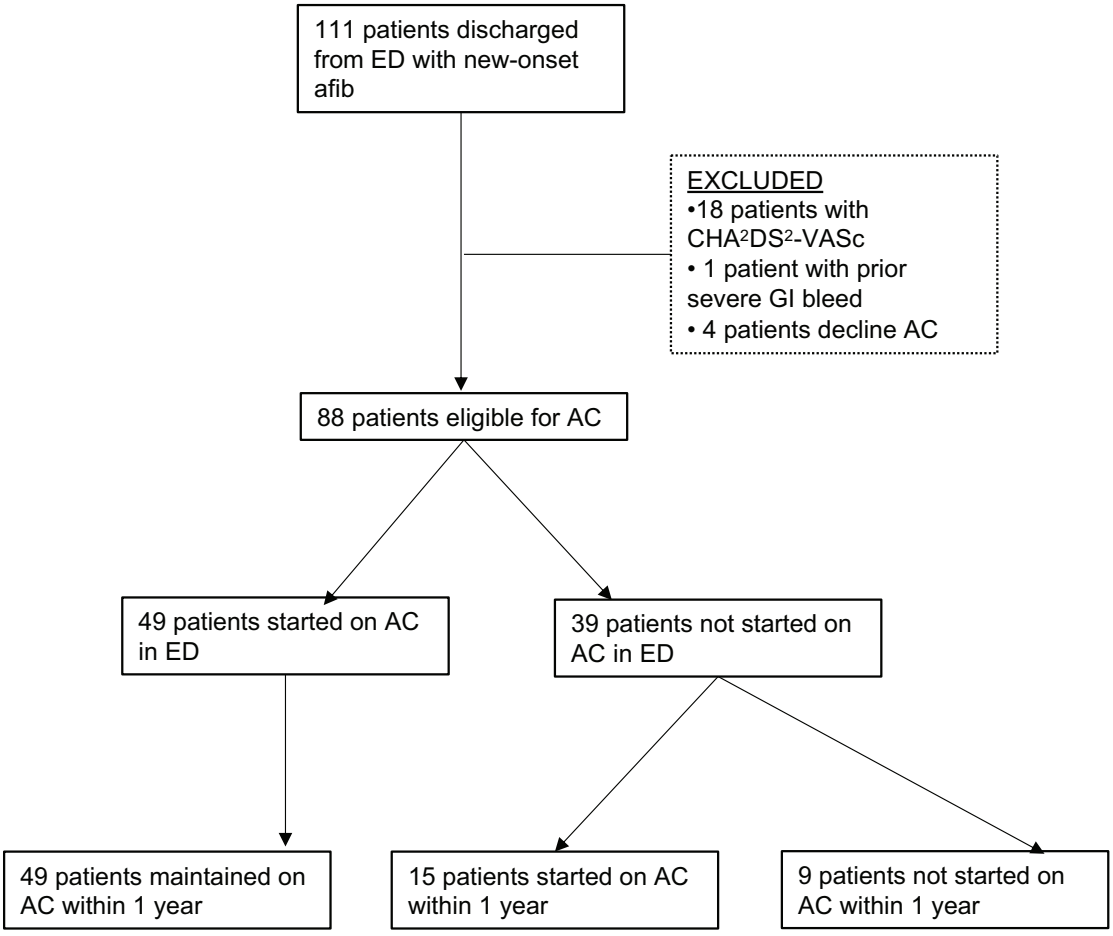

Figure 1. Study Flow

let therapy (aspirin and clopidogrel).

Relevant clinical data such as cardioversion attempted, discharge rhythm, and whether cardiology consultation was obtained were also abstracted for all study patients. In the subgroup of patients who were not initiated on AC, we noted any documentation by treating providers as to why AC was not initiated.

Study Outcomes

The primary study outcome was rate of AC initiation among our cohort of AF patients as documented in the EMR. We defined AC initiation as any indication in the EMR that AC was initiated at ED discharge including discharge medications and any information available in patients' discharge instructions. Secondary outcomes included ischemic stroke and major bleeding, including intracerebral hemorrhage, within 1 year of index ED visit. Stroke was defined as brain, spinal cord, or retinal cell death attributable to central nervous system infarction.[15] Major bleeding was defined as bleeding causing a fall in hemoglobin level of 20 g/L or more or leading to a transfusion of 2 or more units of red blood cells, bleeding that is symptomatic and occurs in a critical organ (intracranial, intravertebral, retroperitoneal, pericardial, intraarticular, intraocular, intramuscular and compartmental syndrome), or fatal bleeding.[16] All events within 1 year were ascertained by retrospective MMC EMR review.

Statistics

Standard descriptive statistics including proportions, means with standard deviations (SD), and medians with interquartile ranges (IQRs) were used to detail the study cohort. Comparisons between groups were performed using the *t* test for normally distributed continuous variables, the Mann-Whitney test for non-normally distributed continuous variables, and χ^2 test for all categorical variables unless cells were <5 in which case we used Fisher's exact test.

Patients with missing demographics or other covariate information were included in all analyses; no data were imputed for missing variables. All tests of comparison were two-sided and statistical significance

Table 1. Characteristics of ED discharges with new-onset AF who were not anticoagulated vs were anticoagulated, N=88

	AC, n=49	No AC, n=39	P
Age, mean (SD)	68.47 (12.16)	61.15 (16.63)	.02
Female sex, n (%)	24 (48.98)	32 (82.05)	.35
White non-Hispanic, n (%)	11 (22.45)	9 (23.08)	.94
Black Hispanic and Black non-Hispanic, n (%)	21(42.86)	12(30.77)	.35
Hispanic (White and Black), n (%)	10(20.41)	11(28.21)	.55
Non-English preferred language, n (%)	5 (10.20)	11 (28.21)	.03
Socioeconomic score,[a] mean (SD)	-2.21 (2.21)	-3.02 (3.33)	.20
Stroke, n (%)	6 (12.24)	4 (10.26)	1.00
CKD, n (%)	2 (4.08)	2 (5.13)	1.00
Prior major bleed, n (%)	1(2.04)	1 (2.56)	1.00
CAD/MI, n (%)	10(20.40)	3(7.69)	.13
NSAID use	6(12.24)	1 (2.56)	.095
Aspirin use	23 (46.94)	9 (23.07)	.021
Dual antiplatelet use	4 (8.16)	2 (0.51)	.575
Cardiology consult	41(83.67)	12(30.78)	<.0001
Discharge rhythm sinus	33(67.35)	16(41.03)	.041
Cardioversion attempted	4(8.16)	0	.13
AMA	7 (14.29)	14 (35.90)	.035
Median CHA^2DS^2-VASc	3 (2-4)	2 (1-4)	.047
CHA^2DS^2-VASc =1	3 (6.12%)	16 (41.03)	.0001
Median time in ED (IQR), h	24.9 (12.03-30.75)	7.53 (4.63-24.4)	.0002

AF, atrial fibrillation; CKD, chronic kidney disease; CAD/MI, coronary artery disease/myocardial infarction, NSAID, non-steroidal anti-inflammatory drug; AMA, against medical advice; ED, emergency department; IQR, interquartile ranges

a. No SES score available for 6 patients initiated on AC and 3 patients not initiated on AC

was set at α=.05. Stata/IC 14.2 for Windows was used for all analyses.

Results

We identified 111 consecutive patients with new-onset AF (Figure 1). A total of 23 patients initially identified were not considered eligible for AC after detailed chart review (18 with CHA^2DS^2-VASc score of 0, 1 with a prior major hemorrhage, and 4 who declined AC initiation after discussion with provider [Figure 1]). Thus, 88/111 (79.3%) patients were determined to be fully eligible for AC at index ED visit after detailed chart review and included in our final study cohort (Table 1).

Of the 88 patients fully eligible for AC, 49 (55.7%) were initiated on AC in the ED. 40 patients were ordered apixaban; 6 were ordered rivaroxaban; 1 was ordered each of lovenox, edoxaban, and warfarin. In the subgroup of 68 patients with CHA^2DS^2-VASc>1, 46 (67.6%) were initiated on AC. Being initiated on AC in the ED was associated with having a cardiology consultation 41(83.67%) vs 12(30.78%).; P<.0001) as well as having a higher median CHA^2DS^2-VASc score (3[2-4]) vs 2[1-4]; P=.047) in the fully eligible study cohort. There were no associations between patients' sex (24 [48.98% vs 32(82.05%]); P=.35), SES score (-2.21 [2.21] vs -3.02[3.33], P=.20), race (11[22.45%) White vs 21[42.86%] Black; P=.94) or ethnicity (10 [20.41%] Hispanic vs 39 (79.59%) non-Hispanic; P=.55), and AC initiation (Table 1).

Patients not initiated on AC were younger (61 [16.63] vs. 68 [12.16); P = .02) and had a non-English language preference (11 [28.21%] vs 5 [10.20%]); P=.03). More patients not initiated on AC had a CHA^2DS^2-VASc Score of 1 (16[41%] vs 3[6.1%]; P<.001). Leaving the ED AMA (14 [35.90%] vs 7 [16.33%]; P=.04, was also associated with not being initiated on AC (Table 1).

Comparing patients who left against medical advice (n=21) to those who did not (n=67), no significant differences in demographic or clinical factors were found (data not shown).

Reasons for not initiating AC among the 39 eligible patients included: deferring decision to another provider in 13 (33.3%); CHA^2DS^2-VASc miscalculated as zero in 5 (12.8%); CHA^2DS^2-VASc of 1 in 5 (12.8%); relative medical contraindications in 4 (10.3%); and patients leaving the hospital against medical advice (AMA) before being offered AC in 10 (25.6%) (Table 2). Relative medical contraindications included upcoming surgery, anemia, malignancy, and hyperthyroidism. In 2 (5.1%) cases, no reason was documented.

Secondary outcome data were available for 73 patients (24 of whom had not been discharged from the ED on AC and 49 of whom had been discharged from the ED with AC) (Table 3). By 1 year of index ED visit, an additional 15 patients were initiated on AC. Thus, among patients eligible for AC (n=88) at index ED visit, we identified a total of 64 (72.7%) who

Table 2. Reason why AC not initiated among eligible patients, N=39

Reason	n (%)
Deferred to another provider	13 (48.15)
CHA^2DS^2-VASc 1	5 (18.52)
CHA^2DS^2-VASc miscalculated as 0	5 (18.52)
Medical contraindication	4 (14.81)
AMA	10 (25.6)
No documented reason provided	2 (5.1)

Table 3. 1 Year follow-up data, N=73

	Initially discharged on AC, N=49	Not initially discharged on AC, N=24
Initiated on AC within 1 year n(%)	n/a	15 (62.5)
Stroke within 1 year n (%)	0	2 (8.33)
Bleed within 1 year n (%)	2(4.08)	0

had been initiated on AC by year 1 (Table 3). Within 1 year of follow-up, 2 patients who were not initially discharged from the ED on AC had strokes and 2 patients who had been initiated on AC had major bleeds.

Discussion

We found that slightly more than half of the 88 patients within our cohort who were eligible for AC for new-onset AF were initiated on AC during their ED visit. Within 1 year of index ED visit, nearly three quarters of AF patients seen in the ED had been initiated on AC.

We found that slightly more than half of the 88 patients within our cohort who were eligible for AC for new-onset AF were initiated on AC during their ED visit.

Our rate of AC initiation in the ED was higher than prior studies, though not all eligible patients were initiated on AC.[3,4] One possible reason for increased AC initiation rates in our study might be the high frequency of cardiology consultation (60%) in our cohort. Cardiology consultation in the ED has been significantly associated with AC initiation; a prior study found that 53% of ED patients with AF who were not seen by a cardiologist during their emergency room stay were discharged home without appropriate AC.[4] With cardiology consultation, emergency room providers are more likely to initiate anticoagulation in the ED based on reassurance that a provider will follow the patient as an outpatient for any adverse reactions or dose adjustments.[17]

We identified a few novel factors associated with failure to initiate AC in the emergency room setting included non-English language preference, AMA discharge, and CHA^2DS^2-VASc of 1. Unlike prior studies, we did not find clear evidence of racial or ethnic disparities in AC initiation but instead identified language barriers associated with under-treatment.[5-7] In the United States, about 9% of individuals have limited English proficiency (LEP).[18] Studies show that low health literacy is exacerbated by LEP, as individuals with LEP have greater difficulty obtaining and fully understanding health information.[19] Low health literacy has been associated with poor understanding of AF and its association with stroke.[20,21] Based on these data and our findings, ED-based interventions designed to better inform non-English speakers regarding AF and the role of AC in stroke prevention may be warranted. Similarly, strategies to reach out to patients who leave AMA may help to reduce stroke risk in patients with AF; patients who leave AMA have a higher rate of return ED visits and higher mortality.[22] Finally, our finding that patients with CHA^2DS^2-VASc score of 1 are less likely to be initiated on anticoagulation is in keeping with uncertainty regarding AC in this patient population.[13,23,24]

Study Limitations

There are several limitations of our study. Firstly, our sample size is small with results obtained from a four-site center in a large urban area of low socioeconomic status and therefore results may not be generalizable to other populations. Secondly, since the ICD-10 code we used to identify AF is not well-validated, we may have failed to capture some cases. Thirdly, it is not clear whether interpreter phones were consistently used, if family members were used as ad-hoc interpreters, and what language providers spoke with patients who indicated that their preferred language was not English. A fourth important limitation is that all conversations about initiating AC in the ED may not have been documented and some documented reasons for not initiating AC may be inaccurate. Similarly, the reasons for and details surrounding patients leaving AMA were not documented. Fifthly, we lack follow-up data on whether AC was continued after the index ED visit though our main study outcome was initiation of AC at index ED visit. Finally, our secondary outcome ascertainment is imperfect since we only captured events that occurred at an MMC facility. Of

note, there is no prior data about hospital crossover in our institution but based on prior research about hospital crossover in Manhattan that cites a 10% rate of hospital crossover for ED visits, we anticipate a similar number in the Bronx.[25]

Conclusion

We found that slightly more than half of patients with new onset AF were initiated on AC in the ED. Patients with non-English language preference, those who left AMA, and those not seen by cardiology consultation in the ED are potential targets for efforts to increase AC initiation.

Conflict of Interest

No conflicts of interest to report.

Author Contributions

Research concept and design: Seiden, Labovitz, Labovitz, Liberman; Acquisition of data: Seiden, Lessen, Liberman; Data analysis and interpretation: Seiden, Friedman, Liberman; Manuscript draft: Seiden, Lessen, Cheng, Labovitz, Labovitz, Liberman; Statistical expertise: Seiden, Liberman; Administrative: Lessen, Labovitz; Supervision: Liberman

References

1. Hindricks G, Potpara T, Dagres N, et al. 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS): The Task Force for the diagnosis and management of atrial fibrillation of the European Society of Cardiology (ESC) Developed with the special contributor the European Heart Rhythm Association (EHRA) of the ESC. *European Heart J.* 2021;42(5):373-498. https://doi.org/10.1093/eurheartj/ehaa612
2. Vinson DR, Hoehn T, Graber DJ, Williams TM. Managing emergency department patients with recent-onset atrial fibrillation. *J Emerg Med.* 2012;42(2):139-148. https://doi.org/10.1016/j.jemermed.2010.05.017
3. Atzema CL, Jackevicius CA, Chong A, et al. Prescribing of oral anticoagulants in the emergency department and subsequent long-term use by older adults with atrial fibrillation. *Canada Med Assoc J.* 2019;191(49):E1345-E1354. https://doi.org/10.1503/cmaj.190747
4. Scheuermeyer FX, Innes G, Pourvali R, et al. Missed opportunities for appropriate anticoagulation among emergency department patients with uncomplicated atrial fibrillation or flutter. *Ann Emerg Med.* 2013;62(6):557-565.e2. https://doi.org/10.1016/j.annemergmed.2013.04.004 [doi]
5. Sur NB, Wang K, Di Tullio MR, et al. Disparities and temporal trends in the use of anticoagulation in patients with ischemic stroke and atrial fibrillation. *Stroke*. 2019;50(6): 1452-1459. https://doi.org/10.1161/STROKEAHA.118.023959
6. Meschia JF, Merrill P, Soliman EZ, et al. Racial disparities in awareness and treatment of atrial fibrillation: the REasons for Geographic and Racial Differences in Stroke (REGARDS) study. *Stroke*. 2010;41(4):581-587. https://doi.org/10.1161/STROKEAHA.109.573907 PMID:20190000
7. Naderi S, Wang Y, Foody J. Abstract P002: Gender differences in atrial fibrillation hospitalizations. *Circulation*. 2014;129(suppl 1). https://doi.org/10.1161/circ.129.suppl_1.p002
8. Obermeyer Z, Cohn B, Wilson M, Jena AB, Cutler DM. Early death after discharge from emergency departments: analysis of national US insurance claims data. *BMJ.* 2017;356:j239. https://doi.org/10.1136/bmj.j239
9. *Quickfacts Bronx County NY.*; 2019. Last accessed August 22, 2022 from https://www.census.gov/quickfacts/fact/table/bronxcountynewyork/PST045219.
10. *New York State Prevention Agenda Community Service Plan 2019-2021* [report]. Montefiore Medical Center; 2019. Last accessed August 22, 2022 from https://www.montefiore.org/documents/communityservices/MMC-Community-Services-Plan-2019-2021.pdf.
11. Bellin E, Fletcher DD, Geberer N, Islam S, Srivastava N. Democratizing information creation from health care data for quality improvement, research, and education-the Montefiore Medical Center Experience. *Acad Med.* 2010;85(8):1362-1368. https://doi.org/10.1097/ACM.0b013e3181df0f3b
12. Lip GY, Nieuwlaat R, Pisters R, Lane DA, Crijns HJG. Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: the euro heart survey on atrial fibrillation. *Chest*. 2010;137(2):263-272. https://doi.org/10.1378/chest.09-1584 PMID:19762550
13. January CT, Wann LS, Alpert JS, et al. 2014 AHA/ACC/HRS guideline for the management of patients with atrial fibrillation: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines and the Heart Rhythm Society. *Circulation.* 2014;130(23):2071-2104. https://doi.org/10.1161/CIR.0000000000000040
14. Diez Roux AV, Merkin SS, Arnett D, et al. Neighborhood of residence and incidence of coronary heart disease. *N Engl J Med*. 2001;345(2):99-106. https://doi.org/10.1056/NEJM200107123450205 PMID:11450679
15. Sacco RL, Kasner SE, Broderick JP, et al. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke.* 2013;44(7):2064-2089. https://doi.org/10.1161/STR.0b013e318296aeca [doi]
16. Schulman S, Kearon C, and the Subcommittee on Control of Anticoagulation of the Scientific and Standardization Committee of the International Society on Thrombosis and Haemostasis. Definition of major bleeding in clinical investigations of antihemostatic medicinal products in non-surgical patients. *J Thromb Haemost.* 2005;3(4):692-694. https://doi.org/ 10.1111/j.1538-7836.2005.01204.x.
17. Barrett TW, Marill KA. Anticoagulation for emergency department patients with atrial fibrillation: is our duty to inform or prescribe? *Ann Emerg Med.* 2013;62(6):566-568. https://doi.org/10.1016/j.annemergmed.2013.05.027
18. Divi C, Koss RG, Schmaltz SP, Loeb JM. Language proficiency and adverse events in US hospitals: a pilot study. *Intl J Qual Health Care.* 2007;19(2):60-67. https://doi.org/10.1093/intqhc/mzl069
19. Leyva M, Sharif I, Ozuah PO. Health literacy among Spanish-speaking Latino parents with limited English proficiency. *Ambulatory Ped.* 2005;5(1):56-59. https://doi.org/10.1367/A04-093R.1
20. Obamiro KO, Chalmers L, Lee K, Bereznicki BJ, Bereznicki LRE. Anticoagulation knowledge in patients with atrial fibrillation: An Australian survey. *Intl J of Clin Practice.* 2018;72(3):e13072. https://doi.org/10.1111/ijcp.13072
21. Aronis KN, Edgar B, Lin W, Martins MAP, Paasche-Orlow MK, Magnani JW. Health literacy and atrial fibrillation: Relevance and future directions for patient-centred care. *European Card Rev.* 2017;12(1):52-57. https://doi.org/10.15420/ecr.2017:2:2
22. Geirsson OP, Gunnarsdottir OS, Bal-

dursson J, Hrafnkelsson B, Rafnsson V. Risk of repeat visits, hospitalisation and death after uncompleted and completed visits to the emergency department: a prospective observation study. *Emerg Med J.* 2013;30(8):662-668. https://doi.org/10.1136/emermed-2012-201129

23. Eckman MH, Singer DE, Rosand J, Greenberg SM. Moving the tipping point: the decision to anticoagulate patients with atrial fibrillation. *Circ: CVD Qual & Outcomes.* 2011;4(1):14-21. https://doi.org/10.1161/CIRCOUTCOMES.110.958108
24. Joundi RA, Cipriano LE, Sposato LA, Saposnik G. Ischemic stroke risk in patients with atrial fibrillation and CHA2DS2-VASc Score of 1. *Stroke.* 2016;(47):1364-1367. https://doi.org/10.1161/STROKEAHA.115.012609
25. Kern LM, Grinspan Z, Shapiro JS, Kaushal R. Patients' use of multiple hospitals in a major US city: implications for population management. *Popul Health Manag*. 2017;20(2):99-102. https://doi.org/10.1089/pop.2016.0021 PMID:27268133