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Evaluating The Hatch Score For Predicting Progression To Sustained Atrial Fibrillation In ED Patients With New Atrial Fibrillation

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Abstract

Objectives—Atrial fibrillation (AF) is often first detected in the emergency department (ED). Not all AF patients progress to sustained AF (i.e., episodes lasting > 7 days), which is associated with increased morbidity. The HATCH score stratifies patients with paroxysmal AF according to their risk for progression to sustained AF within 1-year. The HATCH score has previously never been tested in ED patients. We evaluated the accuracy of the HATCH score to predict progression to sustained AF within 1-year of initial AF diagnosis in the ED.

Methods—We conducted a retrospective cohort study of 253 ED patients with new onset AF and known rhythm status for 1-year following the initial AF detection. The exposure variable was the HATCH score at initial ED evaluation. The primary outcome was rhythm status at 1-year following initial AF diagnosis. We constructed a receiver operating characteristic (ROC) curve and calculated the area under the curve (AUC) to estimate the HATCH score's accuracy of predicting progression to sustained AF.

Results—Overall, 61/253 (24%) of patients progressed to sustained AF within 1-year of initial detection, and the HATCH score ROC AUC was 0.62 (95% CI: 0.54 to 0.70).

Conclusions—Among ED patients with new onset AF, the HATCH score was a modest predictor of progression to sustained AF. Because only 2 patients had a HATCH > 5, this previously recommended cut-point was not useful in identifying high-risk patients in this cohort. Refinement of this decision aid is needed to improve its prognostic accuracy in the ED population.

Keywords

atrial fibrillation; epidemiology; prediction; progression

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CONFLICTS OF INTERESTS

None

INTRODUCTION

In 2010, an estimated 2.7 to 6.1 million Americans had atrial fibrillation (AF), and that number is expected to double by 2050 [1-3]. AF is associated with a 4-fold increase in the risk of stroke, 3-fold increase in the risk of heart failure, and 1.5–1.9 increased risk of death [4-7]. AF is often first detected in the emergency department (ED) [8]. The choice between rate versus rhythm control in patients with new onset AF is often determined by the patient's hemodynamic stability, comorbid conditions, the patient's and physician's preferences, and the clinician's ability to confidently confirm AF duration less than 48 hours or exclude the presence of an atrial thrombus by transesophageal echocardiogram[8-11]. However, a patient's risk for progressing to sustained AF, defined as persistent or permanent AF lasting greater than 7 days, has historically not been evaluated in the ED because there are no validated tools to estimate this risk. de Vos et al derived the HATCH score as a clinical prediction tool to identify patients at increased risk for progression to sustained AF at 1-year follow-up among AF patients hospitalized or evaluated in cardiology clinics[12]. Nearly 50% of individuals with a HATCH score greater than 5, and only 6% of patients with a HATCH score of 0 progressed to sustained AF within 1-year [12]. de Vos et al suggested that the HATCH score could guide physicians in deciding between AF treatment options including “potentially harmful drugs and interventions including cardioversion and ablation may be avoided in patients with a high HATCH score” [12]. We evaluated the predictive capability of the HATCH score for predicting progression to sustained AF in a cohort of ED patients with new onset AF.

METHODS

Study Design

We performed a secondary analysis of a retrospective cohort comprised of consecutive patients 18 years of age with a primary or supporting International Classification of Diseases (ICD), Ninth Revision, ED discharge diagnosis of AF between August 1, 2005 and July 31, 2008.

Study Setting and population

The study was conducted at a single urban, academic, tertiary care referral center with an adult ED annual census of approximately 55,000 patients. The detailed methodology for the original investigation has been previously reported [8]. Briefly, we constructed the original cohort using a query of our electronic medical record archives and identified all patients aged 18 years or older and with a primary or supporting International Classification of Diseases, Ninth Revision (ICD-9) ED discharge diagnosis of AF or atrial flutter treated in the adult ED between August 1, 2005, and July 31, 2008. The original cohort's inclusion criteria required documented evidence of AF or atrial flutter on an ED electrocardiogram or rhythm strip, as well as documented vital signs (tachycardia, dyspnea) or symptoms (palpitations, chest pain, shortness of breath, weakness, lightheadedness, presyncope, or syncope) consistent with symptomatic AF [8]. Patients were excluded when our electronic medical record review determined that AF was unrelated to the chief complaint and did not require evaluation in the ED. In instances when patients had multiple ED visits during the study period, we included only their first ED visit in the analysis[8]. Two investigators systematically reviewed the electronic medical record of each patient included in the cohort while adhering to strict chart review methodology guidelines [13]. For this investigation of the HATCH rule, we selected subjects from the original AF cohort if new onset AF was diagnosed during the index ED visit and the patient's rhythm status 1-year after the index ED visit was known based on medical records review. Individuals who reported a prior

diagnosis of AF or had documentation in the medical record of previous AF episodes were excluded.

Study Protocol

The investigation's primary outcome was the progression to sustained AF within 1-year among ED patients with new onset AF. Two investigators independently reviewed each subject's medical record and determined whether the patient met criteria defining progression to sustained AF within 1-year of diagnosis. Disagreements in classifications were resolved by consensus between the 2 primary reviewers, with a third investigator available to adjudicate any conflicts in outcome classification. Reviewers were not blinded to the study's objective or the outcomes of interest. The original retrospective cohort database recorded all of the data necessary to calculate the HATCH score through a detailed, structured review of each individual's medical record [8]. The medical center's institutional review board approved this study.

We evaluated only patients with new onset AF who also had a known rhythm status for a minimum of 1-year after diagnosis. See Figure 1 for a detailed listing of the selection of participants. We classified patients as cases if patients with new onset AF progressed to sustained AF within 1-year. Consistent with the HATCH derivation study methodology and the American College of Cardiology/American Heart Association/European Society of Cardiology AF guidelines, we defined the clinical AF types as paroxysmal (AF episodes that terminated spontaneously and lasted fewer than 7 days) or as sustained (AF episodes that lasted longer than 7 days and did not self-terminate; thus, encompassing both persistent and permanent AF subtypes)[12, 14]. As in the original HATCH derivation study, we considered both persistent and permanent AF as sustained AF [12]. We calculated the HATCH score for each patient based on the data available at the time of their ED evaluation when AF was first detected. As in the derivation study for HATCH, the primary exposure variable in our analysis was the HATCH score, calculated from demographic and medical history data (e.g., patient had a documented history of heart failure, hypertension or prior stroke at the time of ED visit when new onset AF was diagnosed) available at the time of the patient's index evaluation[12]. The HATCH score is an ordinal scale ranging from 0 to 7 points and is calculated based on the following formula: $1 \times (\text{Hypertension}) + 1 \times (\text{Age} > 75 \text{ years}) + 2 \times (\text{Transient ischemic attack or stroke}) + 1 \times (\text{Chronic obstructive pulmonary disease}) + 2 \times (\text{Heart failure})$ [12].

The primary outcome was progression to sustained AF within 1-year of the ED diagnosis of new onset AF. We reviewed supporting clinical documentation, including cardiology and arrhythmia inpatient and outpatient consultations, electrocardiograms, cardiology clinic notes, ED records, hospital admission notes, and discharge summaries to determine whether each patient progressed to sustained AF. We prioritized objective and definitive evidence of AF rhythm status (e.g., electrocardiograms, cardiac monitor rhythm strips, Holter monitor reports, echocardiogram and cardiac stress test reports) over less reliable and subjective physical examination documentation of the presence or absence of an irregular rhythm. Medical history and medication use classification was based upon available information in the medical record at the time when the patient was diagnosed with new onset AF in the ED.

Data Analysis

This investigation's primary outcome variable was the dichotomous distinction of whether AF had progressed to sustained AF within 1-year of the index ED evaluation. We reported the proportion of patients within each of the eight HATCH score categories (0 points to 7 points) who progressed to sustained AF. We constructed a receiver operating characteristic (ROC) curve and reported area under the curve (AUC) with a 95% confidence interval (CI)

as a measure of the accuracy of HATCH to predict progression to sustained AF. We also performed a sensitivity analysis to measure the potential impact of excluding patients who had unknown rhythm status at 1 year. We constructed ROC curves and reported the AUC under the following 3 additional scenarios: 1) including all patients with unknown rhythm status at 1 year in the cohort as having progressed to sustained AF; 2) including all patients with unknown rhythm status at 1 year in the cohort and randomly assigning half of the patients to having progressed to sustained AF; 3) including all patients with unknown rhythm status at 1 year in the cohort as none progressing to sustained AF. Statistical analyses were performed with Stata 11.2 (College Station, TX, USA) and IBM SPSS, Version 21.0 (Armonk, NY).

RESULTS

The current analysis included 253 ED patients diagnosed with new onset AF and who had known rhythm status at 1-year follow-up from the index ED visit. The median (interquartile range [IQR]) age of the patients was 67 (IQR 55, 78) years and 96 (38%) were women. The baseline characteristics for the patients in the cohort stratified by progression to sustained AF are reported in the Table 1. The 2 reviewers reached agreement regarding the development of sustained AF in all cases. Overall, 61 (24%) patients progressed to sustained AF within 1-year of the index ED visit. Of the patients who progressed to sustained AF, 28 (46%) patients had permanent AF (no record of return to sinus rhythm) and 33 (54%) had persistent AF. Figure 2 reports the prevalence of HATCH scores 0 through 7 and the proportion of patients with each score who progressed to sustained AF. Of patients with a HATCH score of 0, 18.8% of patients progressed to sustained AF within 1-year of the index ED visit. The HATCH score's ROC AUC was 0.62 (95% CI: 0.54 to 0.70) (Figure 3).

We performed a sensitivity analysis that included the 43 (14%) of patients who were excluded for unknown rhythm status at 1-year follow-up under 3 scenarios: 1) we assigned all the lost to follow-up patients as progressing to sustained AF; 2) randomly assigned 50% of the lost to follow-up progressing to sustained AF; and 3) assigned none of the lost to follow-up as progressing to sustained AF. The AUC (95% CI) for those groups were AUC = 0.50 (95% CI: 0.43 to 0.58), AUC = 0.55 (95% CI: 0.47 to 0.63) and AUC = 0.64 (95% CI: 0.56 to 0.72), respectively.

DISCUSSION

In a historical cohort of ED patients with new onset AF, the HATCH score was a modest predictor of progression to sustained AF within 1 year. The AUC in our validation study was 0.62 (95% CI: 0.54 to 0.70), slightly less than the original derivation study's AUC of 0.675 (95% CI: 0.632 to 0.718) [12]. The original study included 1219 patients, 178 (15%) progressed to sustained AF [12]. In contrast to our study, only 165 (14%) of the original HATCH derivation cohort were patients with new onset AF [12]. This is the first study to validate the HATCH score in ED patients and in a cohort of only patients with new onset AF. Potpara et al evaluated the HATCH score in 346 patients with lone AF and a mean follow-up of 12 years and found that the HATCH score's predictive ability was similar to our study (C-statistic = 0.6)[15]. Tang et al reported in an abstract that the HATCH score was not an independent predictor of AF recurrence in 608 consecutive patients who underwent circumferential pulmonary veins ablation [16]. Neither of these studies specifically evaluated the HATCH score as it was developed, that is, to predict progression to sustained AF in patients with paroxysmal or new onset AF at 1-year follow-up [12]. The original HATCH study's primary author evaluated the rate of AF progression (defined as change from paroxysmal to sustained AF) at 12 months in 2137 patients with recent-onset AF [17]. Similar to our study, 15% of the cohort progressed to sustained AF with increased

AF progression rates in patients with higher HATCH scores[17]. The follow-up of de Vos et al investigation, however, was unable to validate the HATCH score because an individual's history of COPD, one of the HATCH elements, was not included in the registry's case report form[17].

In the original HATCH derivation study, de Vos reported that nearly 50% of patients with a HATCH score > 5 progressed to sustained AF, compared with only 6% of patients with a score of 0 [12]. Only 2 patients in our cohort had a HATCH score > 5, limiting the utility of using a HATCH score > 5 as a criterion for identifying patients at high risk for progressing to sustained AF in our ED population. This investigation found that sustained AF developed in nearly 1 in 5 patients with a HATCH score of 0. We did find that the prevalence of progression to sustained AF increased with higher HATCH scores. The ED physician's decision to choose rate or rhythm control is complicated and as a result varies significantly among clinicians[8, 9, 11]. Although ED cardioversion has been reported to be safe in the appropriate patients, there are risks associated with electrical cardioversion, pharmacologic cardioversion, and the often-required procedural sedation[9-11, 18]. The ability to accurately predict which patients are likely to progress to sustained AF following cardioversion may reduce the number of failed cardioversions. We are hopeful that ongoing and future AF investigations will usher in a more personalized ED approach to AF management that considers individual risk for short term adverse events, the likelihood of response to rhythm control, the associated risk of progression to sustained AF, and predicted response to common pharmacologic therapies based on patient genotype[19-21].

LIMITATIONS

The study analyzed an observational cohort and therefore is subject to the inherent limitations of such studies. Information regarding rhythm status was extracted from the electronic medical record. However, 2 experienced investigators independently reviewed the medical records and came to consensus regarding the development of sustained AF in every case. Despite this, it is possible that missing or incorrectly reported data on patient comorbidities and AF status might bias our results. As reported in Figure 1, 43 (14%) patients did not have a known rhythm status at 1-year follow-up from the index ED visit and were excluded. We acknowledge that these excluded patients might significantly alter our results had their 1-year rhythm status been known. We performed a sensitivity analysis to examine the potential impact on the HATCH performance under three possible scenarios and found that the 95% CI for the AUC overlapped. The HATCH rule performed best under the scenario when none of these excluded patients progressed to sustained AF at 1-year. Given that the excluded patients were younger and had lower HATCH scores, this improved performance would be expected. Likewise, the HATCH rule performed worse when all these patients were assigned to progressing to sustained AF at 1-year for the same rationale. When a random half of the lost to follow-up patients were assigned to sustained AF, the HATCH rule performed only slightly worse at predicting progression to sustained AF. A review of the United States Social Security Death Index found that 3 of the 43 excluded patients died within 1 year of their index ED visit. The retrospective study design and the absence of medical records on these patients prevents us from determining whether these patients progressed to sustained AF and how they might have impacted the HATCH score performance. Asymptomatic episodes of persistent AF not documented in the medical record may have been misclassified as non-persistent AF, and patients intermittently reverting into undocumented sinus rhythm may have been misclassified as having sustained AF. Definitively capturing such episodes is nearly impossible without fitting all AF patients with a Holter monitor or implanted loop recorder for 7-day periods. Using the information available to clinicians making the determination between sustained and non-sustained AF, we closely examined both inpatient and outpatient records to determine AF classification.

Patient management at the time of their initial AF diagnosis or subsequent medical visits during the first year might influence the primary outcome. The initial ED management with rate or rhythm control did not appear associated with progression to sustained AF, although this study was not powered to evaluate this outcome. This study was conducted in the adult ED at a single tertiary university-affiliated referral center, which may introduce selection and referral bias and may limit applicability to patients treated in other settings.

CONCLUSION

Among ED patients with new onset AF, the HATCH score was only modestly predicted progression to sustained AF within 1-year. Further refinement of this decision aid is needed to improve its accuracy prior to incorporation into the acute management of AF in the ED.

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REFERENCES

1. Go AS, Hylek EM, Phillips KA, Chang Y, Henault LE, Selby JV, et al. Prevalence of diagnosed atrial fibrillation in adults: national implications for rhythm management and stroke prevention: the AnTicoagulation and Risk Factors in Atrial Fibrillation (ATRIA) Study. *JAMA*. 2001; 285:2370–2375. [PubMed: 11343485]
2. Miyasaka Y, Barnes ME, Gersh BJ, Cha SS, Bailey KR, Abhayaratna WP, et al. Secular trends in incidence of atrial fibrillation in Olmsted County, Minnesota, 1980 to 2000, and implications on the projections for future prevalence. *Circulation*. 2006; 114:119–125. [PubMed: 16818816]
3. Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, et al. Heart disease and stroke statistics--2012 update: a report from the American Heart Association. *Circulation*. 2012; 125:e2–e220. [PubMed: 22179539]
4. Benjamin EJ, Wolf PA, D'Agostino RB, Silbershatz H, Kannel WB, Levy D. Impact of atrial fibrillation on the risk of death: the Framingham Heart Study. *Circulation*. 1998; 98:946–952. [PubMed: 9737513]
5. Wang TJ, Larson MG, Levy D, Vasan RS, Leip EP, Wolf PA, et al. Temporal relations of atrial fibrillation and congestive heart failure and their joint influence on mortality: the Framingham Heart Study. *Circulation*. 2003; 107:2920–2925. [PubMed: 12771006]
6. Wolf PA, Abbott RD, Kannel WB. Atrial fibrillation as an independent risk factor for stroke: the Framingham Study. *Stroke*. 1991; 22:983–988. [PubMed: 1866765]
7. Miyasaka Y, Barnes ME, Gersh BJ, Cha SS, Bailey KR, Abhayaratna W, et al. Incidence and mortality risk of congestive heart failure in atrial fibrillation patients: a community-based study over two decades. *Eur Heart J*. 2006; 27:936–941. [PubMed: 16399778]
8. Barrett TW, Martin AR, Storrow AB, Jenkins CA, Harrell FE Jr, Russ S, et al. A clinical prediction model to estimate risk for 30-day adverse events in emergency department patients with symptomatic atrial fibrillation. *Ann Emerg Med*. 2011; 57:1–12. [PubMed: 20728962]
9. Scheuermeyer FX, Grafstein E, Stenstrom R, Innes G, Heslop C, Macphee J, et al. Thirty-Day and 1-Year Outcomes of Emergency Department Patients With Atrial Fibrillation and No Acute Underlying Medical Cause. *Ann Emerg Med*. 2012 In Press. Epub 2012/06/29.
10. Stiell IG, Birnie D. Managing recent-onset atrial fibrillation in the emergency department. *Ann Emerg Med*. 2011; 57:31–32. [PubMed: 21183083]

11. Stiell IG, Clement CM, Brison RJ, Rowe BH, Borgundvaag B, Langan T, et al. Variation in management of recent-onset atrial fibrillation and flutter among academic hospital emergency departments. *Ann Emerg Med.* 2011; 57:13–21. [PubMed: 20864213]
12. de Vos CB, Pisters R, Nieuwlaat R, Prins MH, Tieleman RG, Coelen RJ, et al. Progression from paroxysmal to persistent atrial fibrillation clinical correlates and prognosis. *J Am Coll Cardiol.* 2010; 55:725–731. [PubMed: 20170808]
13. Gilbert EH, Lowenstein SR, Koziol-McLain J, Barta DC, Steiner J. Chart reviews in emergency medicine research: Where are the methods? *Ann Emerg Med.* 1996; 27:305–308. [PubMed: 8599488]
14. Fuster V, Ryden LE, Cannom DS, Crijns HJ, Curtis AB, Ellenbogen KA, et al. ACC/AHA/ESC 2006 guidelines 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 European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Revise the 2001 Guidelines for the Management of Patients With Atrial Fibrillation). *J Am Coll Cardiol.* 2006; 48:854–906. [PubMed: 16904574]
15. Potpara TS, Stankovic GR, Beleslin BD, Polovina MM, Marinkovic JM, Ostojic MC, et al. A 12-year follow-up study of patients with newly diagnosed lone atrial fibrillation: implications of arrhythmia progression on prognosis: the Belgrade Atrial Fibrillation study. *Chest.* 2012; 141:339–347. [PubMed: 21622553]
16. Tang RDJ, Liu X, Long D, Yu R, Ma C. Can Hatch Score Predict Recurrence Of Atrial Fibrillation After Catheter Ablation? *Heart.* 2010; 96(Suppl 3):A176–A177.
17. de Vos CB, Breithardt G, Camm AJ, Dorian P, Kowey PR, Le Heuzey JY, et al. Progression of atrial fibrillation in the REgistry on Cardiac rhythm disORDers assessing the control of Atrial Fibrillation cohort: clinical correlates and the effect of rhythm-control therapy. *Am Heart J.* 2012; 163(5):887–893. [PubMed: 22607868]
18. Decker WW, Stead LG. Selecting rate control for recent-onset atrial fibrillation. *Ann Emerg Med.* 2011; 57:32–33. [PubMed: 21183084]
19. Barrett TW, Storrow AB, Jenkins CA, Harrell FE Jr, Miller KF, Moser KM, et al. Atrial fibrillation and flutter outcomes and risk determination (AFFORD): design and rationale. *J Cardiol.* 2011; 58:124–30. [PubMed: 21820279]
20. Parvez B, Vaglio J, Rowan S, Muhammad R, Kucera G, Stubblefield T, et al. Symptomatic response to antiarrhythmic drug therapy is modulated by a common single nucleotide polymorphism in atrial fibrillation. *J Am Coll Cardiol.* 2012; 60:539–545. [PubMed: 22726630]
21. Parvez B, Chopra N, Rowan S, Vaglio JC, Muhammad R, Roden DM, et al. A common beta1-adrenergic receptor polymorphism predicts favorable response to rate-control therapy in atrial fibrillation. *J Am Coll Cardiol.* 2012; 59:49–56. [PubMed: 22192668]
22. Gage BF, van Walraven C, Pearce L, Hart RG, Koudstaal PJ, Boode BS, et al. Selecting patients with atrial fibrillation for anticoagulation: stroke risk stratification in patients taking aspirin. *Circulation.* 2004; 110:2287–2292. [PubMed: 15477396]

Figure 1.
Detailed description of selection of cohort and classification of patients as cases and controls.

Figure 2.

The number of patients by HATCH score (bars) and percentage of patients with each score who progressed to sustained atrial fibrillation within 1-year (line).

Figure 3.

Receiver-operator characteristic (ROC) curve of the HATCH score for prediction of progression to sustained atrial fibrillation within 1-year among individuals with new onset atrial fibrillation in the emergency department.

Table 1
Baseline Characteristics Of Patients At Time Of New Onset Atrial Fibrillation In The Emergency Department

Variable	Number of non-missing values	All Patients (N=253)	No AF Progression (N=192)	AF Progression (N=61)
Age (Years)	253	67 (55, 78)	66 (54, 76)	68 (58, 80)
Women	253	96 (38%)	70 (37%)	26 (43%)
Caucasian (non-Hispanic)		203 (80%)	149 (77%)	54 (89%)
Caucasian (Hispanic)		2 (1%)	2 (1%)	0
African-American		43 (17%)	37 (19%)	6 (10%)
Asian		1 (0.5%)	1 (0.5%)	0
Body mass index (kg/m ²)	131	27 (24, 32)	26 (24, 31)	28 (25, 34)
Echocardiogram & electrocardiogram characteristics				
Left atrial size (mm)	212	41 (35, 46)	39 (34, 46)	44 (40, 49)
Ventricular rate (when AF)	225	118 (98, 142)	118 (99, 144)	112 (89, 134)
Duration of Current Episode (days)	200	1 (1, 2)	1 (1, 2)	3 (1, 7)
Hypertension *	253	164 (65%)	124 (65%)	40 (66%)
Coronary artery disease *	253	67 (27%)	51 (27%)	16 (26%)
Diabetes mellitus *	253	54 (21%)	41 (21%)	13 (27%)
Valvular heart disease *	253	28 (11%)	21 (11%)	7 (12%)
Heart failure *	253	41 (16%)	25 (13%)	16 (26%)
Chronic obstructive pulmonary disease *	253	36 (14%)	26 (14%)	10 (16%)
Prior cerebrovascular accident or transient ischemic attack *	253	30 (12%)	18 (9%)	12 (20%)
Renal insufficiency *	253	24 (10%)	19 (10%)	5 (8%)
Lone AF	253	73 (29%)	58 (30%)	15 (25%)
CHADS ₂ score ^	248	1 (1, 2)	1 (0, 2)	2 (1, 3)
HATCH score	253	2 (1, 2.5)	1 (1, 2)	2 (1, 3)
Underwent electrical cardioversion during hospitalization following new onset AF diagnosis	252	33 (13%)	23 (12%)	10 (16%)
Treated with Antiarrhythmic Medications in ED following new onset AF diagnosis	253	8 (3%)	7 (4%)	1 (2%)
Treated with Rate Control Medications in ED following new onset AF diagnosis	253	173 (68%)	137 (71%)	36 (59%)

N is the number of non-missing values. Data is reported as Frequencies and percentages or median with interquartile range in parentheses, respectively.

* Patient had reported history of characteristic at their index emergency department visit when new onset AF was diagnosed.

^ CHADS2 score defined as: 1 point is given for any of the following conditions: **C**, congestive heart failure; **H**, hypertension; **A**, age ≥ 75 years old; **D**, diabetes mellitus; and **S**, stroke which receives 2 points [22].