Assessment of baseline characteristics and risk factors among Emergency Department patients presenting with recent onset atrial fibrillation: a retrospective cohort study

F. BUCCELLETTI[1], S. DI SOMMA[2], P. IACOMINI[1], A. GALANTE[3], F. PUGLIESE[4],
F. ALEGIANI[5], G. BERTAZZONI[6], D. MARSILIANI[1], A. CARROCCIA[1], A. GRANATO[1],
G. CALABRÒ[1], J.M. LEGRAMANTE[3], G. ZUCCALÀ[1], F. FRANCESCHI[1]

[1]Emergency Medicine, School of Medicine, Catholic University of the Sacred Heart, Rome, Italy
[2]Emergency Medicine, Second School of Medicine, "Sapienza" University, Rome, Italy
[3]Emergency Medicine, University of "TorVergata", Rome, Italy
[4]Emergency Medicine, Sandro Pertini Hospital, Rome, Italy
[5]Emergency Medicine, Fatebenefratelli-Isola Tiberina Hospital, Rome, Italy
[6]Emergency Medicine, First School of Medicine, "Sapienza" University, Rome, Italy

Abstract. – BACKGROUND: The Cardioversion of Atrial Fibrillation in Emergency (CAFE) study was an observational, retrospective, multicenter study focusing on patients with recent onset atrial fibrillation (AF) seen in six different Emergency Departments (ED) of Rome, Italy.

AIM: The aim of this study was to present the baseline characteristics and risk factors of the patients enrolled to the CAFE study.

MATERIALS AND METHODS: We retrospectively reviewed 3085 eligible patients diagnosed with recent onset AF in any of the EDs between January 2008 and December 2009. Inclusion criteria required documented ICD-9 primary discharge/admission diagnosis of AF in the ED and stable hemodynamic conditions at presentation (systolic blood pressure > 90 mmHg). Exclusion criteria were permanent AF or an ongoing acute coronary syndrome.

RESULTS: Median age was 71 years (interquartile ranges, 62-78 years) and 50.8% were men. Palpitations was the most common symptom at ED presentation and was present in 73.5% of the study subjects. Hypertension was the most prevalent comorbidity, affecting 59.3% of the patients evaluated, and the presence of previous episode(s) of AF was also common (52.3%). Regarding home treatment, the drugs most prescribed were antiplatelets (31.2%) and diuretics (25.2%). A $CHADS_2$ score of 0 was found in 814 patients (26.4%), while a $CHADS_2$ score of 1 was reported in 1114 patients (36.1%). Finally, a $CHADS_2$ score ≥ 2 was reported in 1157 patients (37.5%).

CONCLUSIONS: The present study represents an important snapshot of demographics, comorbidities, risk factors and anticoagulation management about patients with recent onset AF. Disparities were noted in anticoagulation management, suggesting that this is still a main problem among patients with AF.

Key Words:
   Atrial fibrillation, Heart failure, Antiplatelet, Hypertension.

Introduction

Atrial fibrillation (AF) is the most commonly managed dysrhythmia in the Emergency Department (ED)[1,2], affecting more than 2.3 million adults in 2001[3] and accounting for 0.8% of all ED visits in the United States[4]. The prevalence of AF is 0.4% in general population and approximately 10% in those aged 80 years and over[5-7]. Its prevalence is expected to reach an increase up to 5.6 million individuals affected by 2050[3,8]. This makes AF a major public health problem[9], also considering that during the past 20 years hospital admissions for AF increased by 66%, with total health care costs estimated between 6 and 26 billion dollars[10-16].

AF increases long-term risk of stroke, heart failure and all-cause mortality, with an overall mortality rate for AF patients that is approximately double compared to patients in normal sinus rhythm[17-22]. Advanced age, essential hypertension, diabetes and cardiovascular disease are risk factors associated with developing AF[18,23-26].

AF is usually diagnosed in patients presenting to the ED complaining of new onset of signs and

symptoms, such as dyspnea, tachycardia, chest pain, palpitations, weakness or syncope, consistent with symptomatic AF[27]. Recent onset AF is defined as a first-detected or recurrent episode of atrial fibrillation lasting less than 48 hours. Despite the recent publication of international guidelines[28], the ED management of recent onset AF remains controversial, due to the few existing data on AF in ED population and the variation in management among EDs[29-31].

The aim of this study is to present the baseline characteristics and risk factors of the patients enrolled to the CAFE study.

Materials and Methods

Study Design

The Cardioversion of Atrial Fibrillation in Emergency (CAFE) initiative was an observational, retrospective, multicenter trial focusing on patients with recent onset AF seen in six different EDs of Rome, Italy. The study has been approved by the Institutional Review Board of our University Hospital.

Study Setting and Population

Briefly, the CAFE initiative involved six hospitals located in Rome, Italy, specifically four academic centers and two community hospitals, and consisted of a retrospective data gathering on patients diagnosed with recent onset AF in any of the EDs from January 1st, 2008, to December 31st, 2009. Inclusion criteria required documented ICD-9 primary discharge/admission diagnosis of AF in the ED and stable hemodynamic conditions at presentation (systolic blood pressure >90 mmHg). Exclusion criteria were permanent AF or an ongoing acute coronary syndrome.

Study Protocol

An electronic spreadsheet (Microsoft Excel, 2007; Microsoft Corporation, Redmond, WA, USA) collected detailed patient data including demographics, symptoms at presentation, comorbidities, home treatment, ED treatment, cardioversion in the ED and the final ED disposition. Stroke risk was estimated for each visit based upon the widely accepted $CHADS_2$ score[28]. The $CHADS_2$ risk score includes the following variables: heart failure (one point), hypertension (one point), age over 75 years (one point), diabetes (one point), history of stroke or transient ischemic attack (two point). Therefore, the score produces results from 0 (low risk) to 6 (high risk).

Two investigators (PI and DM) reviewed all patients' electronic medical record following strict chart review, previous published guidelines[32]. They identified elegible patients from the original study database.

Statistical Analysis

Baseline clinical characteristics of patients enrolled in the CAFE initiative is described only for eligible patients. Continuous variables were summarized using medians and interquartile ranges; categorical variables were summarized using frequencies and percents. $CHADS_2$ risk score was calculated for each patient at each ED visit, and was reported as frequencies and percents. Missing values for risk factors were assigned a value of 0. Patient characteristics were compared using the Pearson Chi-square test for categorical variables. All statistical analyses were carried out using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA).

Results

Between January 2008 and December 2009, 3217 were enrolled in the original cohort. For the purpose of this study, the final analysis was performed on 3085 eligible patients with recent onset AF.

Baseline characteristics. Table I presents the baseline characteristics for the 3085 patients included in the final analysis. In this study, median age was 71 years (interquartile ranges, 62-78 years) and fifty point eight percent were men. Palpitations was the most common symptom at ED presentation and was present in 73.5% of the study subjects, followed by dyspnea (18.8%) and chest pain (16.5%), while syncope was the least common on presentation (4.4%). Hypertension was the most prevalent comorbidity, affecting 59.3% of the patients evaluated, but the presence of previous episode(s) of AF was also common (52.3%). Regarding home treatment, the drugs most used were antiplatelets (31.2%), diuretics (25.2%), angiotensin receptor blockers (ARBs, 24.8%), Beta-blockers (23.2%) and angiotensing converting enzyme-inhibitors (ACE inhibitors, 21.5%). Antiarrhythmics were among the drugs least used by patients arriving to the ED with recent onset AF.

Risk factors for stroke. Stroke risk among the study population was estimated according to $CHADS_2$ score[28]. Table II shows the frequency of

Table I. Baseline characteristics of the patients included in the study.

	Total (n = 3085)
Demographics	
Median age	71 (62-78)
Male gender	1568 (50.8%)
Signs and symptoms at presentation	
Palpitations	2266 (73.5%)
Dyspnea	579 (18.8%)
Chest pain	508 (16.5%)
Weakness	387 (12.5%)
Syncope	136 (4.4%)
Signs of acute heart failure*	232 (7.5%)
Comorbidities	
History of coronary artery disease	450 (14.6%)
Hypertension	1830 (59.3%)
Diabetes mellitus	377 (12.2)
Chronic heart failure	219 (7.1%)
Previous stroke/TIA	141 (4.6%)
Thyroid disease	420 (13.6%)
Previous episode(s) of AF	1613 (52.3%)
Mechanical heart valve	80 (2.6%)
Renal failure (on dyalisis treatment)	35 (1.1%)
Hepatic cirrhosis	13 (0.4%)
Neoplasia (under active oncology treatment)	127 (4.1%)
COPD	103 (3.3%)
Home treatment	
Propafenone	264 (8.6%)
Flecainide	215 (7.0%)
Amiodarone	163 (5.3%)
Beta-blockers	717 (23.2%)
Calcium channel blockers	326 (10.6%)
ACE inhibitors	664 (21.5%)
ARBs	765 (24.8%)
Diuretics	778 (25.2%)
Warfarin	475 (15.4%)
Antiplatelets	961 (31.2%)
Thyroid hormone replacement drugs	439 (14.2%)
Digoxin	129 (4.2%)

ACE: Angiotensin converting enzyme; ARB: Angiotensin receptor blocker; COPD: Chronic obstructive pulmonary disease; TIA: Transient ischemic attack. *Signs of acute heart failure: dyspnea at rest, or peripheral pitting edema, or rales on auscultation, or signs of pulmonary edema on chest X-ray study.

the $CHADS_2$ score points present at ED visits before diagnosis. A $CHADS_2$ score of 0 was found in 814 patients (26.4%), while a $CHADS_2$ score of 1 was reported in 1114 patients (36.1%). Finally, a $CHADS_2$ score ≥ 2 was reported in 1157 patients (37.5%). Table III presents $CHADS_2$ score of patients who were assuming or not antiplatelet therapy at time of ED visit. Antiplatelet agents were prescribed in 156 patients (5.1%) with $CHADS_2$ score of 0, in 346 patients (11.2%) with

$CHADS_2$ score of 1, and in 449 patients (14.9%) with $CHADS_2$ score ≥ 2. On the contrary, antiplatelet agents were not prescribed in 658 patients (21.3%) with $CHADS_2$ score of 0, in 768 patients (24.9%) with $CHADS_2$ score of 1, and in 698 patients (22.7%) with $CHADS_2$ score ≥ 2. Table IV shows $CHADS_2$ score of patients in treatment or not with oral anticoagulation therapy at time of ED visit. Vitamin K antagonists were prescribed in 90 patients (2.9%) with $CHADS_2$ score of 0, in 168 patients (5.4%) with $CHADS_2$ score of 1, and in 217 patients (7.1%) with $CHADS_2$ score ≥ 2. Vitamin K antagonists were not prescribed in 724 patients (23.5%) with $CHADS_2$ score of 0, in 946 patients (30.7%) with $CHADS_2$ score of 1, and in 940 patients (30.5%) with $CHADS_2$ score ≥ 2. The differences among the different groups and subgroups were all statistically significant ($p < 0.0001$).

Discussion

The baseline clinical characteristics of patients participating in the CAFE study provide an unique view of patients with recent onset AF diagnosed in a large city as Rome. Although it was not the purpose of our analysis, the results suggest that our study subjects do not differ from the global population for clinical characteristics as age, presence of comorbidities and cardiovascular risk factors[18,33,34].

In this study, the majority of patients had at least one cardiovascular risk factor. The most prevalent accompanying comorbidity in patients with recent onset AF was hypertension (59.3% of total patients), but the presence of previous episode(s) of AF was also common (52.3% of total patients). The most common symptom on ED presentation was palpitations, complained by 73.5% patients, a result in line with previous studies[33,35].

Table II. Descriptive frequencies for $CHADS_2$ score on Emergency Department visits.

$CHADS_2$ score category	Total (n = 3085)
0	814 (26.4%)
1	1114 (36.1%)
2	828 (26.8%)
3	219 (7.1%)
4	84 (2.7%)
5	24 (0.8%)
6	2 (0.1%)

Table III. Antiplatelet agents and CHADS$_2$ score at baseline visit.

CHADS$_2$ score	No antiplatelets (n = 2124)	Antiplatelets (n = 961)	Total (n = 3085)	p
0	658 (21.3%)	156 (5.1%)	814 (26.4%)	< 0.0001
1	768 (24.9%)	346 (11.2%)	1114 (36.1%)	< 0.0001
2	496 (16.1%)	322 (10.8%)	828 (26.8%)	< 0.0001
3	135 (4.4%)	84 (2.7%)	219 (7.1%)	< 0.0001
4	46 (1.5%)	38 (1.2%)	84 (2.7%)	< 0.0001
5	19 (0.6%)	5 (0.2%)	24 (0.8%)	< 0.0001
6	2 (0.1%)	0 (0.0%)	2 (0.1%)	< 0.0001

p value for the difference between no antiplatelets and antiplatelets groups; Pearson Chi-square test.

Stroke prevention is one of the main treatment goals in patients with AF. In this study, we used as risk stratification index to predict stroke the guidelines-recommended CHADS$_2$ score, which is initial, rapid and easy-to-remember[28]. According to this score, patients with a CHADS$_2$ score of 0 are classified as at low risk of stroke, and either aspirin, or no antiplatelet therapy may be used. Patients with a CHADS$_2$ score of 1 are classified as at intermediate risk of stroke, and either aspirin or a vitamin K antagonist may be used; patients with a CHADS$_2$ score $\geq$ 2 are classified as at high risk of stroke, and a vitamin K antagonist is preferred. Among our study population, 814 patients (26.4%) were included in the low risk category (CHADS$_2$ = 0), 1114 patients (36.1%) were included in the intermediate risk category (CHADS$_2$ = 1), and 1157 (37.5%) were classified as at high risk of stroke (CHADS$_2$ $\geq$ 2).

Management of anticoagulation in patients with AF is a main problem worldwide, and in this sense our findings are very similar to those of earlier studies[36,37]. In our cohort, only 217 patients (7.1%) classified as at high risk of stroke (CHADS$_2$ $\geq$ 2) were taking a vitamin K antagonist, whereas 698 patients (22.7%) included in

the same category were not taking any vitamin K antagonist. Furthermore, 90 patients (2.9%) classified as at low risk of stroke (CHADS$_2$ = 0) were taking a vitamin K antagonist at the time of ED visit. Another treatment pattern that differed from the guidelines' recommended treatment was found in 449 patients (14.9%) classified as at high risk, who were prescribed with antiplatelet therapy.

This study has several limitations. Firstly, important variables not recorded by the ED physicians might have missed; for instance, vascular disease was not systematically recorded and, thus, was impossible to calculate the CHA$_2$DS$_2$-VASc score for each patient. CHA$_2$DS$_2$-VASc score (28) is a more comprehensive risk factor-based approach to calculate stroke risk in patients with AF and, therefore, is especially indicated in low and intermediate risk categories. Secondly, our cohort consisted only of ED patients with recent onset AF diagnosis. This inclusion criteria introduces a significant selection bias, not reflecting the total population of patients with AF, such as those with permanent AF. Third, we did not have data on the risk of bleeding. Therefore, we could not draw any definite conclusion about

Table IV. Vitamin K antagonists (VKA) and CHADS$_2$ score at baseline visit.

CHADS$_2$ score	No VKA (n = 2610)	VKA (n = 475)	Total (n = 3085)	p
0	724 (23.5%)	90 (2.9%)	814 (26.4%)	< 0.0001
1	946 (30.7%)	168 (5.4%)	1114 (36.1%)	< 0.0001
2	696 (22.6%)	132 (4.3%)	828 (26.8%)	< 0.0001
3	161 (5.2%)	58 (1.9%)	219 (7.1%)	< 0.0001
4	67 (2.2%)	17 (0.6%)	84 (2.7%)	< 0.0001
5	15 (0.5%)	9 (0.3%)	24 (0.8%)	< 0.0001
6	1 (0.0%)	1 (0,0%)	2 (0.1%)	< 0.0001

p value for the difference between no VKA and VKA groups; Pearson Chi-square test.

neither anticoagulation management nor assessment of bleeding risk (i.e. HAS-BLED score, **H**ypertension – **A**bnormal kidney and/or liver function – **S**troke – **B**leeding – **L**abile INR – **El**derly – **D**rugs and/or alcohol)[28], and further analyses are needed. Finally, the observed differences between some groups may not be clinically relevant, although they were statistically significant because of the large number of patients studied. In this sense, before drawing any conclusion, further and deeper analyses of these data are needed.

Conclusions

The present analysis of the baseline clinical characteristics of patients included in the CAFE study represents an important snapshot of demographics, comorbidities, risk factors and anticoagulation management. In this study, palpitations was the most common symptom at ED presentation in patients with recent onset AF, whereas hypertension was the most prevalent comorbidity present in this population. Furthermore, the majority of patients had at least one cardiovascular risk factor and, consequently, a CHADS$_2$ score of at least 1. Disparities were noted in anticoagulation management, suggesting that this is still a main problem among patients with AF.

References

1) LI H, EASLEY A, BARRINGTON W, WINDLE J. Evaluation and management of atrial fibrillation in the emergency department. Emerg Med Clin North Am 1998; 16: 389-403.

2) CONNORS S, DORIAN P. Management of supraventricular tachycardia in the emergency department. Can J Cardiol 1997; 13(Suppl A): 19A-24A.

3) GO AS, HYLEK EM, PHILLIPS KA, CHANG Y, HENAULT LE, SELBY JV, SINGER DE. 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.

4) MCDONALD AJ, PELLETIER AJ, ELLINOR PT, CAMARGO JR CA. Increasing US emergency department visit rates and subsequent hospital admissions for atrial fibrillation from 1993 to 2004. Ann Emerg Med 2008; 51: 58-65.

5) SUDLOW M, THOMPSON R, THWAITES B, RODGERS H, KENNY RA. Prevalence of atrial fibrillation and eligibility for anticoagulants in the community. Lancet 1998; 352: 1167-1171.

6) RYDER KM, BENJAMIN EJ. Epidemiology and significance of atrial fibrillation. Am J Cardiol 1999; 84: 131-138.

7) STEWART S, HART CL, HOLE DJ, MCMURRAY JJ. Population prevalence, incidence, and predictors of atrial fibrillation in the Renfrew/Paisley Study. Heart 2001; 86: 516-521.

8) BENJAMIN EJ, CHEN PS, BILD DE, MASCETTE AM, ALBERT CM, ALONSO A, CALKINS H, CONNOLLY SJ, CURTIS AB, DARBAR D, ELLINOR PT, GO AS, GOLDSCHLAGER NF, HECKBERT SR, JALIFE J, KERR CR, LEVY D, LLOYD-JONES DM, MASSIE BM, NATTEL S, OLGIN JE, PACKER DL, PO SS, TSANG TS, VAN WAGONER DR, WALDO AL, WYSE DG. Prevention of atrial fibrillation: report from a National Heart, Lung, and Blood Institute workshop. Circulation 2009; 119: 606-618.

9) SAVELIEVA I, CAMM AJ. Clinical trends in atrial fibrillation at the turn of the millennium. J Intern Med 2001; 250: 369-372.

10) LE HEUZEY JY, PAZIAUD O, PIOT O, SAID MA, COPIE X, LAVERGNE T, GUIZE L. Cost of care distribution in atrial fibrillation patients: the COCAF study. Am Heart J 2004; 147: 121-126.

11) FRIBERG J, BUCH P, SCHARLING H, GADSBPHIOLL N, JENSEN GB. Rising rates of hospital admissions for atrial fibrillation. Epidemiology 2003; 14: 666-672.

12) WATTIGNEY WA, MENSAH GA, CROFT JB. Increasing trends in hospitalization for atrial fibrillation in the United States, 1985 through 1999: implications for primary prevention. Circulation 2003; 108: 711-716.

13) CHARLEMAGNE A, BLACHER J, COHEN A, COLLET JP, DIÉVART F, DE GROOTE P, HANON O, LEENHARDT A, PINEL JF, PISICA-DONOSE G, LE HEUZEY JY. Epidemiology of atrial fibrillation in France: extrapolation of international epidemiological data to France and analysis of French hospitalization data. Arch Cardiovasc Dis 2011; 104: 115-124.

14) KIM MH, JOHNSTON SS, CHU BC, DALAL MR, SCHULMAN KL. Estimation of total incremental health care costs in patients with atrial fibrillation in the United States. Circ Cardiovasc Qual Outcomes 2011; 4: 313-320.

15) MCDONALD AJ, PELLETIER AJ, ELLINOR PT, CAMARGO CA Jr. Increasing US emergency department visit rates and subsequent hospital admissions for atrial fibrillation from 1993 to 2004. Ann Emerg Med 2008; 51: 58-65.

16) COYNE KS, PARAMORE C, GRANDY S, MERCADER M, REYNOLDS M, ZIMETBAUM P. Assessing the direct costs of treating nonvalvular atrial fibrillation in the United States. Value Health 2006; 9: 348-356.

17) WOLF PA, ABBOTT RD, KANNEL WB. Atrial fibrillation: a major contributor to stroke in the elderly. The Framingham study. Arch Intern Med 1987; 147: 1561-1564.

18) KRAHN AD, MANFREDA J, TATE RB, MATHEWSON FA, CUDDY TE. The natural history of atrial fibrillation: incidence, risk factors, and prognosis in the Manitoba Follow-Up Study. Am J Med 1995; 98: 476-484.

19) WATTIGNEY WA, MENSAH GA, CROFT JB. Increased atrial fibrillation mortality: United States, 1980-1998. Am J Epidemiol 2002; 155: 819-826.

20) STEWART S, HART CL, HOLE DJ, McMURRAY JJ. A population-based study of the long-term risks associated with atrial fibrillation: 20-year follow-up of the Renfrew/Paisley study. Am J Med 2002; 113: 359-364.

21) SWEDBERG K, OLSSON LG, CHARLESWORTH A, CLELAND J, HANRATH P, KOMAJDA M, METRA M, TORP-PEDERSEN C, POOLE-WILSON P. Prognostic relevance of atrial fibrillation in patients with chronic heart failure on long-term treatment with beta-blockers: results from comet. Eur Heart J 2005; 26: 1303-1308.

22) LIP GY, WATSON T, SHANTSILA E. Anticoagulation for stroke prevention in atrial fibrillation: is gender important? Eur Heart J 2006; 27: 1893-1894.

23) BENJAMIN EJ, LEVY D, VAZIRI SM, D'AGOSTINO RB, BELANGER AJ, WOLF PA. Independent risk factors for atrial fibrillation in a population-based cohort. The Framingham Heart Study. JAMA 1994; 271: 840-844.

24) KANNEL WB, WOLF PA, BENJAMIN EJ, LEVY D. Prevalence, incidence, prognosis, and predisposing conditions for atrial fibrillation: population-based estimates. Am J Cardiol 1998; 82(8A): 2N-9N.

25) SCHNABEL RB, SULLIVAN LM, LEVY D, PENCINA MJ, MASSARO JM, D'AGOSTINO RB SR, NEWTON-CHEH C, YAMAMOTO JF, MAGNANI JW, TADROS TM, KANNEL WB, WANG TJ, ELLINOR PT, WOLF PA, VASAN RS, BENJAMIN EJ. Development of a risk score for atrial fibrillation (Framingham Heart Study): a community-based cohort study. Lancet 2009; 373(9665): 739-745.

26) SCHNABEL RB, ASPELUND T, LI G, SULLIVAN LM, SUCHY-DICEY A, HARRIS TB, PENCINA MJ, D'AGOSTINO RB SR, LEVY D, KANNEL WB, WANG TJ, KRONMAL RA, WOLF PA, BURKE GL, LAUNER LJ, VASAN RS, PSATY BM, BENJAMIN EJ, GUDNASON V, HECKBERT SR. Validation of an atrial fibrillation risk algorithm in whites and African Americans. Arch Intern Med 2010; 170: 1909-1917.

27) ALBONI P, BOTTO GL, BALDI N, LUZI M, RUSSO V, GIANFRANCHI L, MARCHI P, CALZOLARI M, SOLANO A, BAROFFIO R, GAGGIOLI G. Outpatients treatment of recent-onset atrial fibrillation with the "Pill-in-the-Pocket" approach. N Engl J Med 2004; 351: 2384-2391.

28) CAMM AJ, KIRCHHOF P, LIP GY, SCHOTTEN U, SAVELIEVA I, ERNST S, VAN GELDER IC, AL-ATTAR N, HINDRICKS G, PRENDERGAST B, HEIDBUCHEL H, ALFIERI O, ANGELINI A, ATAR D, COLONNA P, DE CATERINA R, DE SUTTER J, GOETTE A, GORENEK B, HELDAL M, HOHLOSER SH, KOLH P, LE HEUZEY JY, PONIKOWSKI P, RUTTEN FH. Guidelines for the management of atrial fibrillation: the Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). Eur Heart J 2010; 31: 2369-2429.

29) DEL ARCO C, MARTIN A, LAGUNA P, GARGANTILLA P. Analysis of current management of atrial fibrillation in the acute setting: GEFAUR-1 study. Ann Emerg Med 2005; 46: 424-430.

30) BUCCELLETTI F, DI SOMMA S, GALANTE A, PUGLIESE F, ALEGIANI F, BERTAZZONI G, GENTILONI SILVERI N, LEGRAMANTE JM, FRANCESCHI F. Disparities in management of new-onset atrial fibrillation in the emergency department despite adherence to the current guidelines: data from a large metropolitan area. Intern Emerg Med 2011; 6: 149-156.

31) STIELL IG, CLEMENT CM, BRISON RJ, ROWE BH, BORGUNDVAAG B, LANGHAN T, LANG E, MAGEE K, STENSTROM R, PERRY JJ, BIRNIE D, WELLS GA. Variation in management of recent-onset atrial fibrillation and flutter among academic hospital emergency departments. Ann Emerg Med 2011; 57: 13-21.

32) 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.

33) LEVY S, MAAREK M, COUMEL P, GUIZE L, LEKIEFFRE J, MEDVEDOWSKY JL, SEBAOUN A. Characterization of different subsets of atrial fibrillation in general practice in France: the ALFA study. The College of French Cardiologists. Circulation 1999; 99: 3028-3035.

34) NABAUER M, GERTH A, LIMBOURG T, SCHNEIDER S, OEFF M, KIRCHHOF P, GOETTE A, LEWALTER T, RAVENS U, MEINERTZ T, BREITHARDT G, STEINBECK G. The Registry of the German Competence NETwork on Atrial Fibrillation: patient characteristics and initial management. Europace 2009; 11: 423-434.

35) VINSON DR, HOEHN T, GRABER DJ, WILLIAMS TM. Managing emergency department patients with recent-onset atrial fibrillation. J Emerg Med 2012; 42: 139-148.

36) GO AS, HYLEK EM, PHILLIPS KA, BOROWSKY LH, HENAULT LE, CHANG Y, SELBY JV, SINGER DE. Implications of stroke risk criteria on the anticoagulation decision in nonvalvular atrial fibrillation: the Anticoagulation and Risk Factors in Atrial Fibrillation (ATRIA) study. Circulation 2000; 102: 11-13.

37) FERRO D, LOFFREDO L, POLIMENI L, VIOLI F. Underuse of oral anticoagulants in patients with nonvalvular atrial fibrillation in Italy. Intern Emerg Med 2007; 2: 24-28.