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Current presentation and management of 7148 patients with atrial fibrillation in cardiology and internal medicine hospital centers: The ATA AF study☆

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ABSTRACT

Background: Atrial fibrillation (AF) is associated with a high risk of stroke and mortality.
Aims: To describe the difference in AF management of patients (pts) referred to Cardiology (CARD) or Internal Medicine (MED) units in Italy.
Methods and results: From May to July 2010, 360 centers enrolled 7148 pts (54% in CARD and 46% in MED). Median age was 77 years (IQR 70–83). Hypertension was the most prevalent associated condition, followed by hypercholesterolemia (28.9%), heart failure (27.7%) and diabetes (24.3%). MED pts were older, more frequently females and more often with comorbidities than CARD pts.
In the 4845 pts with nonvalvular AF, a $CHADS_2$ score ≥2 was present in 53.0% of CARD *vs* 75.3% of MED pts ($p<.0001$). Oral anticoagulants (OAC) were prescribed in 64.2% of CARD *vs* 46.3% of MED pts ($p<.0001$); OAC prescription rate was 49.6% in $CHADS_2$ 0 and 56.2% in $CHADS_2$ score ≥2 pts. At the adjusted analysis patients managed in MED had a significantly lower probability to be treated with OAC.
Rate control strategy was pursued in 51.4% of the pts (60.5% in MED and 43.6% in CARD) while rhythm control was the choice in 39.8% of CARD *vs* 12.9% of MED pts ($p<.0001$).
Conclusions: Cardiologists and internists seem to manage pts with large epidemiological differences. Both CARD and MED specialists currently fail to prescribe OAC in accordance with stroke risk. Patients managed by MED specialists have a lower probability to receive an OAC treatment, irrespective of the severity of clinical conditions.

1. Introduction

Atrial fibrillation (AF) is the most common arrhythmia and is associated with a high risk of stroke, heart failure (HF) and increased mortality [1] determining a high burden of health care resources [2,3].

Current guidelines recommend oral anticoagulation (OAC) therapy for AF at moderate or high risk of stroke, and aspirin or no antithrombotic treatment for patients at low risk [4]. Several studies have demonstrated an underuse of OAC in high-risk AF patients, while different uses of antithrombotic treatment between cardiologists and noncardiologists have been scrutinized only in small surveys.

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Randomized studies indicate that there are no differences in long term outcome between rate control and rhythm control strategies [5] but scarce data are available on the arrhythmia strategy pursued in the real-life AF patients [6–11].

AntiThrombotic Agents in Atrial Fibrillation (ATA-AF) is a multicenter, observational study carried out in nonselected patients with AF referred to a representative sample of cardiology (CARD) and internal medicine (MED) units.

The primary objective of ATA-AF study was to describe the overall and provider-related differences in clinical profile, resources utilization, arrhythmia and antithrombotic strategies in a large population of patients with AF. The secondary objective was to assess the adherence to guidelines for the management of AF to detect areas where to improve standards of care and clinical research.

2. Materials and methods

ATA-AF was conducted by 360 hospital centers, 164 CARD and 196 MED. The centers were representative of the geographical distribution and of the level of complexity of the CARD and MED units in Italy (eTable 1).

All consecutive patients aged ≥18 years discharged with a documented primary or secondary diagnosis of AF and ambulatory patients were included in the study. AF could be diagnosed during the hospitalization/visit or in the 12 months before enrolment. The diagnosis of AF required confirmation by ECG or by a discharge summary. The recruitment period was 4 weeks. The only exclusion criterion was AF after acute coronary syndrome or cardiothoracic surgery (within one week from symptom onset or surgery) (eTable 2).

All patients gave written informed consent. All IRBs were notified according to the Italian rules for observational research. The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki as reflected in *a priori* approval by the institution's human research committee. The authors of this manuscript have certified that they comply with the Principles of Ethical Publishing in the International Journal of Cardiology.

2.1. Statistical analysis

Categorical variables were reported as percentages, while continuous variables as median and interquartile range (IQR). The study cohort was stratified according to admission to either a CARD or a MED unit and categorical variables were compared in a univariate analysis, with Chi-square test, while continuous variables were compared with T-test or Mann–Whitney U test. The trend of OAC prescription across age categories was analyzed using the Cochran–Armitage trend tests for categorical variables. A univariate analysis was performed in patients with nonvalvular AF, stratifying them according to OAC prescription. Baseline characteristics of the patients, need of assistance, cognitive deficit and/or dementia, cardiovascular risk profile, concomitant diseases, precipitating factors, type of AF, the individual components of the CHA_2DS_2-VASc score, ward and cause of admission and type of admission (hospitalization or outpatients visit) were compared in the univariate analysis. Further, a multivariable analysis (logistic regression model) was done to identify the independent predictors of nonprescription of OAC in patients with either nonvalvular or valvular AF. Variables significantly associated with OAC nonprescription in the univariate analysis and the individual components of the CHA_2DS_2-VASc score, even if not significant in the univariate analysis, were included in the logistic model. BMI and age were inserted in the logistic model as categorical, considering clinical cut-offs for the former, and the cut-offs of the CHA_2DS_2-VASc score for the latter. Results of the multivariable analyses were reported as adjusted odds-ratios with 95% confidence interval.

A p value <0.05 two sided was considered as significant. All the analyses were conducted with SAS software, version 9.2.

3. Results

3.1. Patient characteristics and setting of recruitment

Between May 3 and July 18, 2010, the 360 participating centers enrolled 7148 patients, 3862 in CARD (54.0%) and 3286 in MED (46.0%).

Patients hospitalized were 4815 (67.4%), 57.2% of the CARD and 79.3% of the MED patients. Most admissions were urgent (78.4%), more in MED than in CARD patients (94.8% *vs* 59.0%, p<.0001).

The primary diagnosis was AF in 47.1%, other cardiovascular reasons in 35.7% and noncardiovascular reasons in 17.2%.

Patients admitted in CARD had more frequently a primary diagnosis of AF (50.0% *vs* 18.5%) or other cardiovascular reasons (28.4% *vs* 9.5%), while those followed in MED had more often primary diagnosis of HF (26.9% *vs* 18.1%), stroke/TIA (7.1% *vs* 0.5%) or noncardiovascular reasons (38.1% *vs* 3.1%). The baseline demographic and clinical features of patients are summarized in Table 1. MED patients were significantly older, more frequently women, more often with a history of vascular disease, diabetes mellitus, HF, and/or left ventricular dysfunction (EF <40%) and noncardiovascular comorbidities. More MED patients had cognitive deficit/dementia and partial or full need of assistance or living in bed.

3.2. Characteristics of AF

AF during admission/visit was present in 87.7% of cases, more often in MED patients 91.8% *vs* CARD patients 84.2%, p<.0001. The type of AF according to the setting is depicted in Fig. 1.

Excluding patients at first episode of AF, a prior cardioversion was reported in 1/3 of cases (31.3%) more often in CARD than in MED patients (42.4% *vs* 17.3%, p<.0001). A prior ablation procedure was reported in 5.6% of CARD and only in 1.7% of MED patients (p<.0001).

The majority of patients (67.8%) had nonvalvular AF, 71.4% in MED *vs* 64.7% in CARD, p<.0001, whereas lone AF was present in a minority of cases (1.8%), more in CARD than in MED patients (2.9% *vs* 0.5%, p<.0001).

Diagnostics, procedures and pharmacological treatment at discharge are described in Table 2.

3.3. Rate and rhythm control

In the majority of patients (51.4%) a rate control strategy was applied; 27.4% had rhythm control, while in 21.2% of the patients the therapeutic strategy was undetermined.

The rhythm control strategy was adopted more frequently in CARD patients (39.8% *vs* 12.9%, p<.0001).

Patients undergoing the rhythm control strategy were younger, males and with less cardiovascular comorbidities than those undergoing rate control.

In the 1960 patients undergoing rhythm control, electrical cardioversion was performed or planned in 50.5% (CARD 55.9% *vs* MED 31.0%, p<.0001), pharmacological conversion performed or planned in 51.7% (CARD 45.9% *vs* MED 72.6%, p<.0001) and ablation performed or planned in 9.4% (CARD 10.9% *vs* MED 3.8%, p<.0001).

Table 1
Baseline characteristics of the patients.

Characteristics	Total (n. 7148)	Cardiology (n. 3862)	Internal medicine (n. 3286)	p
Age (years), median [IQR]	77 [70–83]	74 [66–80]	80 [74–86]	<.0001
Females, %	47.0	43.4	51.3	<.0001
Hypertension, %	75.2	74.7	75.8	0.27
Hypercholesterolemia, %	28.9	33.9	22.9	<.0001
Heart failure, %	27.7	24.5	31.5	<.0001
Diabetes, %	24.3	21.4	27.8	<.0001
Coronary artery disease, %	19.9	19.9	20.0	0.91
Valvular heart disease, %	33.1	36.2	29.5	<.0001
Prior stroke/TIA, %	14.6	9.7	20.5	<.0001
Peripheral embolism, %	2.0	1.4	2.8	<.0001
Peripheral artery disease, %	10.9	7.3	15.1	<.0001
Renal dysfunction, %	18.5	14.0	23.7	<.0001
COPD, %	20.8	16.0	26.6	<.0001
Anemia, %	15.8	7.7	25.3	<.0001
Cognitive deficit/Dementia, %	10.4	3.2	18.8	<.0001
Need of assistance				
No assistance, %	65.9	80.0	49.3	<.0001
Partial assistance, %	24.1	16.6	32.8	
24 h-assistance, %	6.2	2.4	10.7	
In bed, %	3.9	1.0	7.2	

IQR = interquartile range, TIA = transient ischemic attack, COPD = chronic obstructive pulmonary disease.

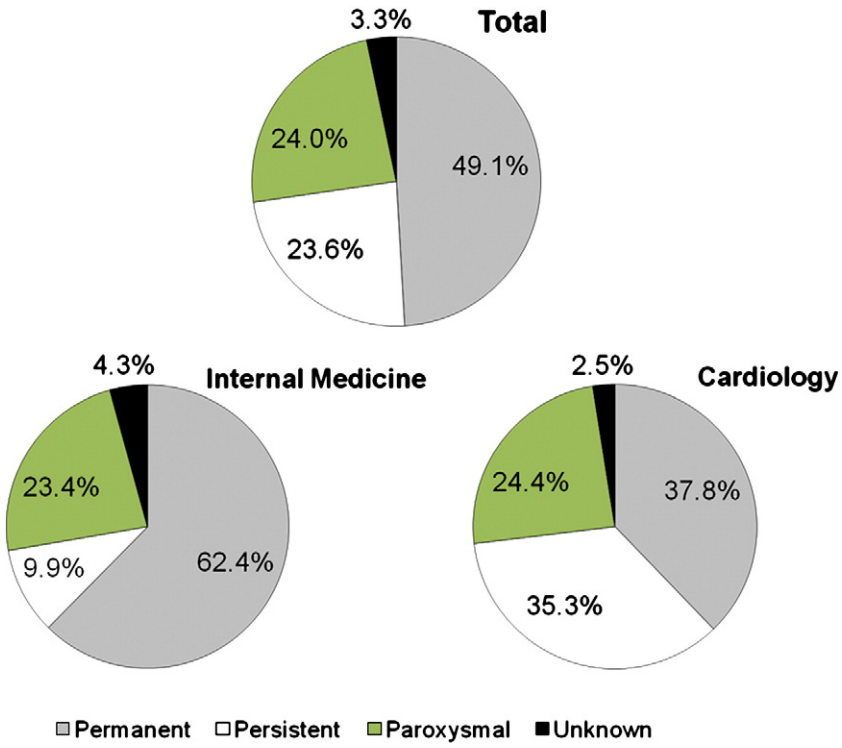

Fig. 1. Type of atrial fibrillation according to the setting.

3.4. Antithrombotic treatment

OAC was prescribed in 58.8% of the patients, antiplatelets in 34.1% and neither of these in 7.1%. In 86.7% of the patients treated with OAC this was the sole antithrombotic treatment, while in 13.3% OAC was associated with antiplatelets.

More CARD than MED patients received OAC (67.0% *vs* 49.1%, p<.0001), while more MED patients received antiplatelets (42.7% *vs* 26.7%, p<.0001) (Fig. 2).

In the entire study population, OAC prescription was influenced by gender (60.7% in males, *vs* 56.6% in females, p = .0003), age (66.2% in patients ≤75 years *vs* 53.1% in patients older than 75 years, p<.0001), type of AF (69.6% in persistent, 64.3% in permanent and only 37.4% in paroxysmal AF, p<.0001), and arrhythmia strategy (63.2% in rate control *vs* 59.7% in rhythm control, and 46.8% in undetermined strategy, p<.0001).

Table 2
Procedures performed during hospital stay and pharmacological treatment prescribed at discharge.

Procedures and drugs	Total (n. 7148)	Cardiology (n. 3862)	Internal medicine (n. 3286)	p
Echo, % (TE, %)	68.2 (4.3)	76.6 (6.6)	58.3 (0.8)	<.0001
Electrophysiological study, %	1.2	2.0	0.2	<.0001
Coronary angiography, %	3.0	5.0	0.6	<.0001
ECG Holter, %	8.7	11.1	5.9	<.0001
PM/ICD revision/implantation, %	3.4	6.0	0.3	<.0001
Amiodarone, %	15.6	20.3	10.1	<.0001
Propafenone, %	3.2	4.2	2.0	<.0001
Flecainide, %	4.2	6.9	1.1	<.0001
Sotalol, %	3.4	4.6	2.0	<.0001
Digitalis, %	24.0	20.2	28.5	<.0001
Betablockers, %	44.2	47.7	40.1	<.0001
ACE-I/ARBs, %	64.5	69.6	58.5	<.0001
Aldosterone blockers, %	15.9	14.3	17.7	<.0001
Diuretics, %	58.6	55.8	61.8	<.0001
Statins, %	24.2	28.5	19.2	<.0001
Oral antidiabetics, %	11.7	12.0	11.4	0.45

ACE-I = angiotensin-converting enzyme inhibitors, ARBs = angiotensin II receptor blockers, TE = transesophageal.

3.5. Nonvalvular AF

Among the 4845 patients with nonvalvular AF, OAC was prescribed in 55.5% (64.2% CARD and 46.3% MED, p<.0001), antiplatelets in 35.8% and in 8.7% neither of these.

The mean $CHADS_2$ score was 2.1 ± 1.3 with a significant difference between CARD (1.7 ± 1.2) and MED patients (2.4 ± 1.3); p<.0001. The $CHADS_2$ levels in the different wards are shown in Fig. 3. A CHA_2DS_2-VASc ≥2 was present in 93.7% of MED and in 81.6% of CARD patients (p<.0001).

The overall OAC prescription was not different in patients with $CHADS_2 = 1$ and $CHADS_2 \geq 2$ while was inferior but still substantial in patients with $CHADS_2$ 0 (Fig. 4). The trend in OAC prescription was similar for CHA_2DS_2-VASc score (55.8%, 56.0%, and 47.4% for

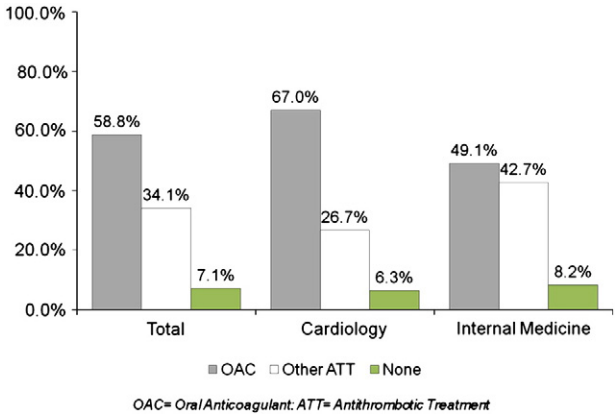

Fig. 2. Antithrombotic treatment in the total population of patients and by setting of enrollment.

scores ≥2, 1 and 0). The rate of prescription of OAC by age is reported in Fig. 5.

Out of 4845 patients with nonvalvular AF, 2155 were not treated with OAC. The reasons for nonprescription were a nonindication in 42.1%, a contraindication in 48.6%, while other reasons (mainly patient refusal and difficulty to obtain a stable INR) accounted for 9.3% of patients. The most frequent reported contraindications were advanced age/alcohol/psychosis (50.4%), current bleeding (13.0%), recent or planned surgery (10.4%), procedures at risk of bleeding (5.7%), hematic dyscrasia (7.3%), risk of traumatism (2.7%), risk of bleeding (7.0%) and poor compliance (2.2%). Independent predictors of nonprescription of OAC in patients with nonvalvular AF are reported in Fig. 6. In this multivariable analysis (logistic regression model) the referral to a MED unit was associated with a 22% increase in the risk for not being prescribed with OAC (OR 1.22, 95% CI 1.04–1.43, p = 0.015).

3.6. Patients with valvular AF

In 2303 patients with valvular heart disease (40.8% managed in MED and 59.2% in CARD), permanent AF was recorded in 57.6%, persistent in 21.3%, paroxysmal in 12.6% and a first episode was detected in 5.9%. In 2.6% of the patients the definition of the type of AF was not possible. Oral anticoagulants were prescribed in 65.6% of these patients. The independent predictors of nonprescription of OAC in patients with valvular heart disease are listed in Table 3. As expected, to have a permanent or persistent AF and the presence of a prosthetic valve were significantly associated with OAC prescription while, also in these patients, an advanced age and to be managed in MED unit resulted as an independent predictor of nonprescription of OAC therapy. Specifically, patients managed in MED had a 31% risk higher to be not prescribed with an OAC.

4. Discussion

ATA-AF prospectively analyzed the clinical characteristics and management of unselected hospitalized or ambulatory patients with AF in CARD and MED settings over a whole country.

Patients with AF have multiple comorbidities, mainly hypertension present in almost three quarters of the patients. Older age, vascular and nonvascular comorbidities, except hypertension and coronary artery disease, were significantly more prevalent in MED patients.

The vast majority of both CARD and MED patients had at least one risk factor for stroke according to the $CHADS_2$ [12] or CHA_2DS_2-VASc score [13], and at least one risk factor for OAC-related bleeding according to the HAS-BLED score [14].

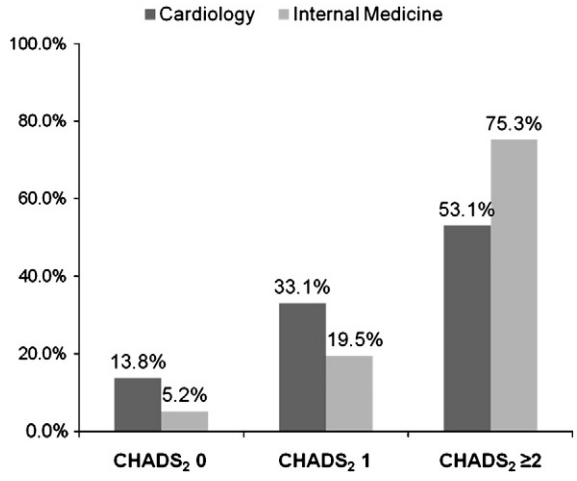

Fig. 3. Level of $CHADS_2$ score in cardiology and internal medicine patients.

Lone AF was observed only in 1.8% of patients, a much lower rate than that reported (7%) in the pooled analysis of AF trials [15] and of that reported in Euro Heart Survey [6] (10.2%) and other contemporary surveys [between 7.6% and 11% [16,17]], probably due to the more advanced age of patients in our registry.

Different from other registries, we observed a very high rate of persistent/permanent AF. This could be explained by the fact that information were collected non in a specialist field but in a community CARD and MED setting.

Patients cared by CARD and MED look very different also for the different relevance of the arrhythmia as primary reason of hospitalization or outpatient visit (65% in CARD and only 26% in MED).

4.1. Rate and rhythm control

AF ablation is still rarely performed in our patients with AF. This figure is much lower than that showed in a recent study in which ablation was indicated in about 15% of patients [18].

Overall the rate control strategy was adopted twice than the rhythm control strategy, different from other surveys where a rhythm control strategy was adopted in most patients [6,18]. This difference in favor of the rate control was much higher in MED units.

It is noteworthy that apparently in over one fifth of cases the arrhythmia strategy was undetermined, particularly in MED patients. We believe that this reflects the behavior of the attending physician in the real life where the choice between the rhythm and the rate control strategy is not always firmly established and pursued accordingly.

4.2. Anticoagulation

Contemporary surveys of practice patterns and a recent review, including 54 studies (from 1998 to 2008) report underuse of OAC in high-risk AF [19–22]. In more than two thirds of the studies, only 60% of patients with previous stroke or TIA are treated with OAC. Most studies based on $CHADS_2$ reported OAC treatment of high-risk subjects ($CHADS_2$ ≥2) below 70%.

Our study shows an overall 55.5% prescription rate of OAC in patients with nonvalvular AF with a striking difference between CARD and MED patients. A substantial underuse of OAC was observed in eligible high-risk patients (those with $CHADS_2$ ≥2) in whom the prescription rate was only 56% (65.9% CARD and 46.5% MED).

The anticoagulation rate in eligible patients was lower than that reported in the Euro Heart Survey which was conducted primarily among specialized centers of cardiology in Europe [19], and in the German Competence NETwork on Atrial Fibrillation — AFNET [7] including various levels of medical care in Germany. However, our study reported a significantly higher prevalence of AF patients treated with OAC, when compared with two other Italian studies. In one study performed in 2003, using the administrative data of patients discharged with diagnosis of AF, the overall OAC prescription was 29% [23] while in a survey performed in primary care, incident patients with AF, diagnosed throughout the period 2001–2004, OAC prescription was only 26% [9].

4.2.1. OAC and risk scores

The prescription rate of OAC did not correlate with the stroke risk of the patients according to $CHADS_2$ or CHA_2DS_2-VASc score. The lack of correlation between OAC prescription and stroke risk in AF patients is in accordance with other studies. In a recent retrospective cohort study from a large US database including 171,393 patients, a similar percentage of patients with low, moderate or high stroke risk received warfarin (40.1%, 43.5% and 42.1%, respectively) [24].

Therefore, it seems that the $CHADS_2$ score is not yet fully incorporated in the clinical practice. A good correlation was found between OAC prescription and hypertension, previous stroke, HF and EF, but not with female sex, a history of diabetes or peripheral vascular disease. On the

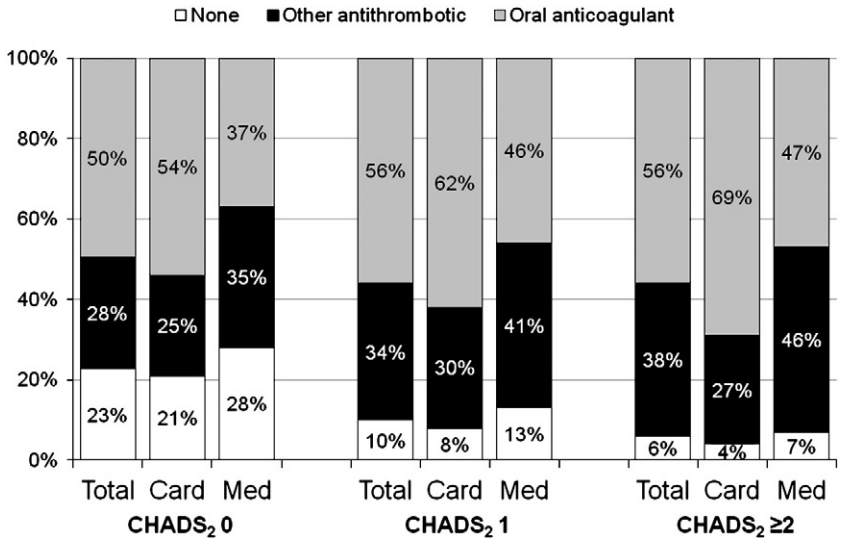

Fig. 4. Antithrombotic treatment prescribed in cardiology and internal medicine according to the risk $CHADS_2$ score.

contrary an inverse correlation was found between advanced age and OAC prescription.

In this sense, educational campaigns should be implemented to convince doctors that age should not be considered a contraindication for OAC prescription.

Also the high prescription rate of OAC in low stroke risk patients requires consideration. Half of the patients with $CHADS_2$ score 0 received anticoagulation. However the $CHADS_2$ 0 group comprises less than 10% of the patients and it is possible that a number of patients at low stroke risk were given anticoagulation in the perspective of cardioversion.

4.2.2. OAC and type of AF

The OAC use was also correlated with the type of AF, being lower in paroxysmal AF in comparison with persistent or permanent AF. This, in accordance with other studies, demonstrates that physicians consider AF patients with paroxysmal AF at lower thromboembolic risk [19,25]. Established evidences from the literature instead clearly show that the thromboembolic risk is not conditioned by the type of AF [26].

4.2.3. OAC and age

Among the contraindications to OAC, age accounted for one half of the reasons with a significant higher prevalence in MED *vs* CARD patients. Evidences from the literature indicate that older age *per se* should not be considered as a contraindication to anticoagulation. However, it is conceivable that age was associated with comorbidities and contraindications to OAC. In a significant number of elderly patients not anticoagulated, contraindications to OAC were not reported and the noncompliance was not deemed a significant obstacle. Therefore, in our study age was an independent predictor of nonprescription of OAC. Both OAC and an antiplatelet agents were given to 7.8% of patients. Empirical common practice is to associate aspirin with OAC in patients with AF who have stable coronary or carotid artery disease and/or peripheral artery disease. However, adding aspirin to OAC does not reduce the risk of vascular events including myocardial infarction, while increases bleeding events. The lower use of combination therapy in ATA-AF reflects a good adherence to guidelines, mainly driven by the awareness of the bleeding risk in elderly AF patients treated with OAC.

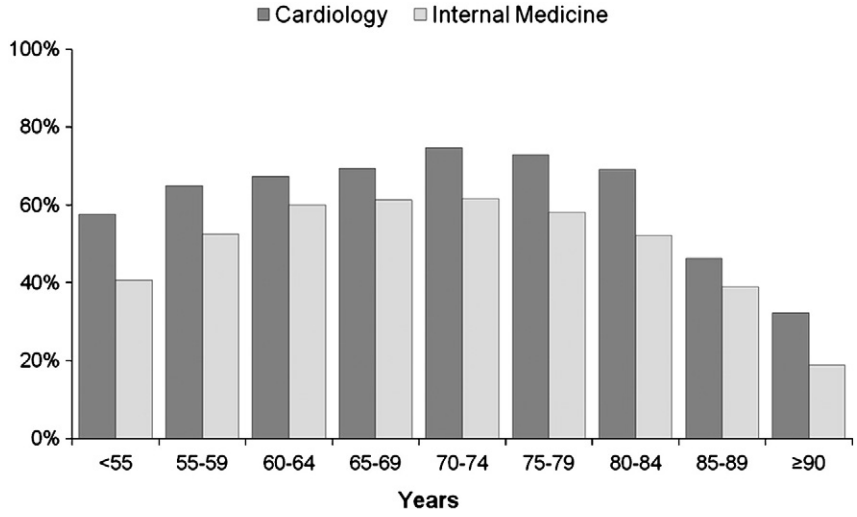

Fig. 5. OAC prescription at discharge from cardiology and internal medicine patients according to the age.

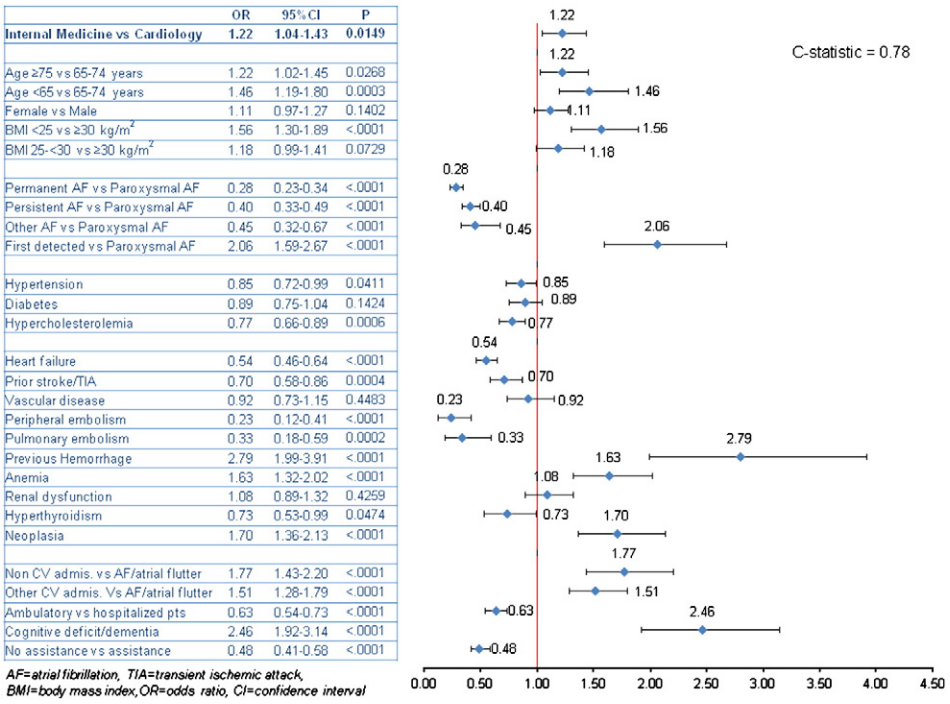

Fig. 6. Predictors of nonprescription of OAC in patients with nonvalvular AF. Logistic regression.

4.2.4. OAC and clinical setting

Patients followed by either MED or CARD specialist are suboptimally treated with OAC. In this context, it is worth noticing that patients followed by MED specialists are surely more severe than those managed by CARD. Despite these relevant differences, the multivariable analysis, adjusted for all available confounding factors including the main diagnosis of admission or outpatients visit, showed that to be managed by MED specialists is independently associated with a lower probability to be treated with OAC. This observation is true for patients with either valvular or nonvalvular AF. Specific educational programs should be implemented to improve adherence to current guidelines for an appropriate OAC treatment for both MED and CARD specialists, in particular in the former ones.

Table 3
Independent predictors of nonprescription of OAC in valvular disease.

Variable	OR	95% CI	p
MED *vs* CARD	1.31	1.05–1.65	0.0181
Age ≥75 *vs* 65–74 years	1.79	1.39–2.31	<.0001
Female sex	0.79	0.65–0.96	0.0189
Heart failure	0.69	0.56–0.86	0.0007
Previous hemorrhage	3.32	2.26–4.88	<.0001
Anemia	1.77	1.38–2.29	<.0001
Cognitive deficit/dementia	2.88	2.04–4.04	<.0001
Non CV admission *vs* AF/atrial flutter	1.67	1.20–2.31	0.0022
Other CV admission *vs* AF/atrial flutter	1.47	1.16–1.86	0.0016
First detected AF *vs* paroxysmal AF	2.30	1.45–3.67	0.0004
Persistent AF *vs* paroxysmal AF	0.41	0.30–0.58	<.0001
Permanent AF *vs* paroxysmal AF	0.32	0.24–0.42	<.0001
Other AF *vs* paroxysmal AF	0.46	0.24–0.87	0.0173
Mitral stenosis *vs* mechanical prosthetic valve	6.82	3.40–13.70	<.0001
Aortic stenosis *vs* mechanical prosthetic valve	13.34	7.10–25.09	<.0001
Mitral insufficiency *vs* mechanical prosthetic valve	10.27	5.65–18.68	<.0001
Biological prosthetic valve *vs* mechanical prosthetic valve	7.13	3.24–15.72	<.0001
Other valvulopathy *vs* mechanical prosthetic valve	17.58	8.79–35.16	<.0001

MED = internal medicine; CARD = cardiology; AF = atrial fibrillation.

4.3. Limitations

This study has several limitations.

Although participating centers were representative of the community hospitals in Italy, the enrolment of patients was not homogeneous. It is possible that centers with more expert and motivated physicians have enrolled more patients determining a bias in the results. Investigators were however encouraged to enroll all consecutive patients with AF encountered in the 4 weeks recruitment period.

Diagnosis was not based on ECG documentation in all patients; in a minority of cases diagnosis was based on a discharge summary.

A further limitation was the number of missing information which, even if not substantial, could have partially influenced some results, such as the choice of arrhythmia strategy.

5. Conclusions

ATA-AF describes AF patients representative of clinical practice managed by cardiologists and internists. In MED AF patients appear different from CARD, they are older and with more comorbidities. Accordingly, OAC use and arrhythmia strategy are very different. Both CARD and MED specialists currently fail to prescribe OAC in accordance with stroke risk. The underutilization of OAC in MED, even if partly due to more advanced age, comorbidities and specific contraindications, remains statistically significant even after adjustment for the possible confounders and indicates that there is some room for further improvement. It is likely that OAC use will improve in the near future, and with specific programs of guideline implementation and with the advent of new oral anticoagulant drugs.

Follow-up data of ATA-AF patients will determine the impact of guideline adherence on long-term complications and survival.

Author contributions

Giuseppe Di Pasquale, Giovanni Mathieu and Aldo Pietro Maggioni participated in the conception, design and conduct of the study,

manuscript drafting, critical revision of the manuscript for important intellectual content, and approval of the final manuscript for submission.

Gianna Fabbri, Giorgio Vescovo, Salvatore Pirelli, Francesco Chiarella, Marino Scherillo, Michele Massimo Gulizia, Gualberto Gussoni, Fabrizio Colombo, Domenico Panuccio, Carlo Nozzoli, Massimo Zoni Berisso participated in the conception and design of the study, critical revision of the manuscript for important intellectual content, and approval of the final manuscript for submission.

Donata Lucci participated in the conception and design of the study, statistical analysis and data interpretation.

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The ATA-AF Steering Committee had the full responsibility for design and conduct of the study, collection, management, analysis and interpretation of the data, preparation, review and approval of the manuscript. All authors had full access to the database. All authors reviewed the paper and unanimously agreed to submit it to the International Journal of Cardiology. The authors of this manuscript have certified that they comply with the Principles of Ethical Publishing in the International Journal of Cardiology.

Appendix A

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Appendix B. Supplementary data

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