VIA MEDICA

ORIGINAL ARTICLE

Cardiology Journal
2015, Vol. 22, No. 3, 296–305
DOI: 10.5603/CJ.a2014.0083

ISSN 1897–5593

Management of patients with valvular and non-valvular atrial fibrillation in Poland: Results from Reference Cardiology University Center

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Abstract

Background: *Information on epidemiology of atrial fibrillation (AF) in Middle European Countries such as Poland is limited.*

Methods: *We studied 1,556 patients with AF. We focused on different types of AF in terms of clinical features and management.*

Results: *CHA_2DS_2-VASc score was 3.5 ± 1.7 and HAS-BLED score — 2.4 ± 1.1. In-hospital mortality was 2%. The CHA_2DS_2-VASc score was the highest in permanent AF ($p < 0.001$) and the HAS-BLED score was the highest in paroxysmal and permanent AF ($p < 0.001$). The CHA_2DS_2-VASc score ≥ 2 was found in the majority of non-valvular AF patients. Permanent AF was associated with the highest thromboembolic risk ($p < 0.001$). Valvular AF was more commonly observed in patients with permanent AF ($p = 0.004$). Seventy-one percent of patients who had CHA_2DS_2-VASc > 2 received antithrombotic therapy. Acetylsalicylic acid alone was most common in paroxysmal AF ($p < 0.001$). Patients with valvular AF had more often permanent AF ($p < 0.004$). Valvular AF patients were more often prescribed antithrombotic therapy ($p = 0.001$). The in-hospital mortality did not differ between patients with valvular and non-valvular AF ($p = 0.3$). In multivariate logistic regression, odds of in-hospital death were higher for patients > 75 years old (OR = 6.26, $p = 0.001$, 95% CI 2.06–19.02) and with ejection fraction < 35% (OR = 5.25, $p < 0.001$, 95% CI 2.24–12.32).*

Conclusions: *Our population with AF have similar risk of stroke and bleeding as in European registries. The need for anticoagulation in AF patients is well established in daily medical care in Poland similarly to Western Europe. Patients with valvular AF are more frequently prescribed antithrombotic therapy than patients with non-valvular AF. In-hospital mortality is relatively low in both valvular and non-valvular AF patients and is connected with old age and diminished ejection fraction.* (Cardiol J 2015; 22, 3: 296–305)

Key words: valvular atrial fibrillation, non-valvular atrial fibrillation

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Received: 24.07.2014 Accepted: 21.09.2014

Introduction

Atrial fibrillation (AF) is the most common cardiac arrhythmia, occurring in 1–2% of the general population and is a well known risk factor of cardiovascular morbidity and mortality [1]. In 2010 and 2012, the guidelines of the European Society of Cardiology on the management of AF were released as a consequence of well controlled randomized trials such as RELY, ROCKET and ARISTOTLE [1–5]. On the other hand, there is an increasing number of national registries describing prevalence of AF, co-morbidities, stroke risk factors and antithrombotic therapy in real life conditions [6, 7]. Data from 7 representative Western European countries illustrating changes in the management of AF have been recently published [8]. Information on epidemiology of AF in Middle European Countries such as Poland is limited. Moreover, data on valvular AF patients are very scant.

This is the first real life report on characteristics and management of the patients with AF including valvular AF patients from Reference Cardiology University Center in Bialystok, Poland.

Methods

Study population

We retrospectively studied 1,556 patients with the diagnosis of AF hospitalized in the Department of Cardiology and Department of Invasive Cardiology in years 2012–2014. No exclusion criteria were defined to avoid biased selection of patients and achieve a cohort close to real life. At the study entry medical history was recorded, all patients underwent physical examination, resting electrocardiography (ECG), and routine transthoracic echocardiography. The study protocol conformed to the ethical guidelines of the 1975 Declaration of Helsinki, and was approved by the local Ethics Committee.

In the analysis, we focused on different types of AF in terms of clinical features and management.

Definitions of valvular AF, chronic kidney disease, chronic heart failure, anemia and ischemic heart disease

We define valvular AF according to recent 2014 AHA/ACC/HRS guideline for the management of patients with AF [9] as AF in rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve or valve repair.

Chronic kidney disease (CKD) was defined as estimated glomerular filtration rate (eGFR) < 60 mL/ /min/1.73 m^2.

The group with heart failure (HF) consistent of patients with ejection fraction (EF) < 50%.

Anemia was defined as hemoglobin concentration less than 13 mg/dL in males and 12 mg/dL in females.

Ischemic heart disease (IHD) was defined as significant stenosis on coronary angiography or history of myocardial infarction (MI).

Statistical analysis

Data are expressed as means and standard deviations. Relative frequencies are used to present categorical variables. The Student's t-test or the Wilcoxon rank-sum test was used for statistical analysis where applicable. The Kruskal-Wallis test or χ^2 test were used to describe differences between different types of AF. Logistic regression and multinomial logistic regression was used to evaluate the association between variables and in-hospital mortality. A p value of less than 0.05 was considered statistically significant. The statistic software, StataIC (data analysis of statistical software) version 13, was used.

Results

Baseline characteristics

A total of 1,556 patients with AF (700 women, 45%; mean age 71 ± 11 years) were included in the analysis. Paroxysmal AF was present in 42% (n = 659), persistent in 17% (n = 260), permanent in 41% (n = 637) of the patients. Valvular AF was observed in 5% (n = 71). Hypertension was present in 74% (n = 1,145), diabetes in 27% (n = 415), CKD in 31% (n = 474), IHD in 45% (n = 706) and chronic HF in 56% (n = 877) of the patients. The mean left ventricular EF assessed by echocardiography was 46 ± 14%, mean left atrium diameter was 45 ± 8 mm.

CHA_2DS_2-VASc (congestive heart failure, hypertension, age ≥ 75, diabetes mellitus, prior stroke or transient ischemic attack, vascular disease, age 65 to 74, female) score in the population with non-valvular AF was 3.5 ± 1.7 and HAS-BLED (hypertension, abnormal renal/liver function, stroke, bleeding history or predisposition, labile international normalized ratio [INR], elderly, drugs/ /alcohol concomitantly) score was 2.4 ± 1.1.

In the study population, the in-hospital mortality was 2% (n = 35), there were no differences between males and females (p = 0.07).

Clinical characteristics of the population and gender differences are shown in Table 1.

Table 1. Clinical characteristics of the population and gender differences.

	All patients (n = 1,556)	Female (n = 700)	Male (n = 856)	P
Age [years]	71 ± 11	74 ± 9	69 ± 12	< 0.001
Age ≥ 75 years [%]	43	35	52	< 0.001
Body mass index [kg/m^2]	29 ± 5	29 ± 5	29 ± 5	0.4
Heart rate [bpm]	81 ± 26	82 ± 25	81 ± 24	0.3
Bradycardia (< 60 bpm)	14	14	14	0.7
Tachycardia (> 100 bpm)	16	16	17	0.5
SBP [mm Hg]	130 ± 23	131 ± 24	130 ± 21	0.4
CHA_2DS_2-VASc score:	3.5	4.3 ± 1.5	2.9 ± 1.6	0.001
0 [%]	3	0	5	< 0.001
1 [%]	10	3	16	< 0.001
≥ 2 [%]	87	97	79	< 0.001
HAS-BLED score:	2.4	2.5 ± 1	2.3 ± 1.1	0.001
0 [%]	10	5	14	< 0.001
≥ 3 [%]	25	18	33	< 0.001
eGFR [mL/min/1.73 m^2]:	74 ± 26	72 ± 28	75 ± 24	0.02
≥ 90 [%]	29	32	26	0.003
60–89 [%]	40	40	39	
45–59 [%]	17	16	18	
30–44 [%]	10	9	11	
15–29 [%]	3	2	5	
< 15 [%]	1	1	1	
Left atrial diameter [mm]	45 ± 8	44 ± 8	46 ± 8	0.0004
Ejection fraction [%]	46 ± 14	49 ± 13	42 ± 14	< 0.001
Valvular AF [%]	5	4	6	0.08
Type of AF:				0.0004
Paroxysmal [%]	42	38	48	
Persistent [%]	17	18	15	
Permanent [%]	41	44	37	
Co-morbidity:				
No co-morbidity [%]	3	2	3	0.3
1 co-morbidity [%]	12	11	12	0.5
≥ 2 co-morbidity [%]	85	86	84	0.3
Hypertension [%]	74	70	78	< 0.001
Diabetes mellitus [%]	27	24	30	0.007
Ischemic heart disease [%]	45	48	42	0.03
Chronic heart failure [%]	56	55	58	0.2
Ejection fraction < 35%	25	32	16	< 0.001
Dilated cardiomyopathy [%]	7	11	2	< 0.001
Chronic kidney disease [%]	31	28	35	0.002
COPD [%]	7	8	4	< 0.001
Anemia [%]	29	28	29	0.9
Hypothyroidism [%]	3	2	5	0.002
Hyperthyroidism [%]	2	2	3	0.01
Peripheral artery disease [%]	3	4	1	< 0.001
Previous MI [%]	18	20	15	0.006
Previous TIA/stroke [%]	10	10	10	0.7
Previous PCI [%]	9	11	6	0.001
Previous CABG [%]	6	7	4	0.006
Pacemaker [%]	15	13	18	0.004
ICD/CRT [%]	5	7	2	< 0.001
Electrical cardioversion [%]	6	7	5	0.9
Pharmacological cardioversion:				
Amiodarone [%]	4	4	3	0.5
Propafenone [%]	1	1	1	0.7
In-hospital mortality [%]	2	2	3.2	0.07

AF — atrial fibrillation; CABG — coronary artery bypass graft; COPD — chronic obstructive pulmonary disease; CRT — implanted cardiac re-synchronization device; eGFR — estimated glomerular filtration rate; ICD — implantable cardioverter defibrillator; MI — myocardial infarction; PCI — percutaneous coronary interventions; SBP — systolic blood pressure; TIA — transient ischemic attack

Prevalence of co-morbidities in different types of AF

Out of 1,556 patients, 3% were diagnosed to have only AF with no co-morbidity, 12% had one co-morbidity and 85% two or more co-morbidities. Among patients without co-morbidities or with one co-morbidity, paroxysmal type of AF was prevalent ($p = 0.003$, $p = 0.006$, respectively).

The CHA_2DS_2-VASc score in non-valvular AF population was the highest in permanent type of AF ($p < 0.001$) and the HAS-BLED score was the highest in paroxysmal and permanent AF ($p < 0.001$).

We observed several significant differences between patients with paroxysmal and permanent AF. Those with paroxysmal type had higher eGFR, smaller left atrium ($p < 0.001$), higher EF ($p < 0.001$), less patients with HF with EF < 35% ($p < 0.001$), less patients with valvular AF ($p = 0.004$).

Clinical characteristics of patients with different types of AF are shown in Table 2.

The cause of admission

The more common cause of admission were scheduled procedures (62%, coronary angiography, ablation and pacemaker implantation), less frequently acute coronary syndromes (14%). Among patients with MI paroxysmal type of AF was most common ($p < 0.001$). Permanent AF was more often observed in patients admitted due to exacerbation of chronic HF ($p < 0.001$) (Table 3).

Stroke risk factors

The CHA_2DS_2-VASc score ≥ 2 was found in the majority of non-valvular AF patients. Permanent type of AF was associated with the highest thromboembolic risk ($p < 0.001$) and was most commonly observed in patients with valvular AF ($p = 0.004$) (Table 4).

Antithrombotic therapy at discharge

Out of 1,537 (99%) patients who had CHA_2DS_2-VASc score ≥ 2.71% received antithrombotic therapy. Among patients who did not require anticoagulation ($n = 19$, CHA_2DS_2-VASc score = 0) 7 received oral anticoagulation.

Antiplatelet drug was given in 39% of the patients. Out of this group 21% of patients had both acetylsalicylic acid (ASA) and oral anticoagulation and 18% ($n = 277$) ASA as the only antithrombotic treatment. Thirty-four percent out of the population treated with ASA were diagnosed previously with IHD. ASA alone was the most common treatment in paroxysmal type of AF ($p < 0.001$) (Table 5).

Comparison of patients with valvular and non-valvular AF

Patients with valvular AF were older ($p < 0.001$), had higher systolic blood pressure and INR on admission ($p < 0.001$, $p = 0.03$, respectively). They had more often permanent type of AF ($p < 0.004$), anemia ($p = 0.005$) and lower EF ($p < 0.001$). The history of hypertension, IHD and previous MI was observed less frequently in valvular AF patients ($p = 0.002$, $p = 0.006$, $p = 0.03$, respectively) but they underwent coronary artery bypass graft (CABG) more often ($p < 0.001$).

The mean eGFR evaluated by MDRD formula was 74 ± 26 mL/min./1.73 m^2 in patients with non-valvular AF and 73 ± 28 mL/min./1.73 m^2 in patients with valvular AF ($p = 0.002$). CKD was observed with similar frequency ($p = 0.35$).

Valvular AF patients were significantly more often prescribed antithrombotic therapy ($p = 0.001$).

Comparison between the two groups is shown in Table 6.

In-hospital mortality

The in-hospital mortality did not significantly differ between patients with valvular and non-valvular AF ($p = 0.3$). Thirty-nine percent of the patients died of HF, 30% died of MI, 13% died of aortic stenosis, 3% died of pulmonary embolism, 3% died of stroke, 3% died of sepsis and 9% died of other reasons.

In the logistic regression model, odds of in-hospital death were 4.6 times higher for patients > 75 years old ($p < 0.001$, 95% CI 2.08–10.21) and 6.4 times higher if left ventricular EF was < 35% ($p < 0.001$, 95% CI 2.84–14.41). Of all co-morbidities diabetes (OR = 2.36, $p = 0.012$, 95% CI 1.20–4.64), CKD (OR = 2.73, $p = 0.006$, 95% CI 1.33–5.59) and anemia (OR = 3.11, $p = 0.002$, 95% CI 1.52–6.36) were significantly associated with in-hospital mortality.

In multivariate logistic regression, odds of in-hospital death were higher for patients > 75 years old (OR = 6.26, $p = 0.001$, 95% CI 2.06–19.02) and with EF < 35% (OR = 5.25, $p < 0.001$, 95% CI 2.24–12.32) (Table 7).

Discussion

Recently, several population-based studies and registries have provided information on the incidence, prevalence, and outcome of AF population [6, 7, 10–12]. However, there are no data regarding the characteristics of AF patients in Poland. We report the first results from the Cardiology Reference Center.

Table 2. Clinical characteristics of patients with different types of atrial fibrillation.

	Paroxysmal AF (n = 659)	Persistent AF (n = 260)	Permanent AF (n = 637)	P
Age [years]	71 ± 11	67 ± 11	73 ± 10	0.001
Age ≥ 75 years [%]	41	30	50	0.001
Female [%]	49	60	59	0.0004
Body mass index [kg/m^2]	29 ± 5	29 ± 5	29 ± 5	0.7
Heart rate [bpm]	80 ± 25	88 ± 26	80 ± 23	0.001
Bradycardia (< 60 bpm]	16	10	14	0.09
Tachycardia (> 100 bpm)	17	22	14	0.01
SBP [mm Hg]	132 ± 23	128 ± 21	130 ± 23	0.05
CHA_2DS_2-VASc score:	3.5 ± 1.7	2.9 ± 1.8	3.6 ± 1.6	0.001
0 [%]	3	7	1	< 0.001
1 [%]	11	16	8	0.02
≥ 2 [%]	86	77	91	< 0.001
HAS-BLED:	2.5 ± 1.1	2.0 ± 1.1	2.4 ± 1.1	0.001
0 [%]	2	8	3	< 0.001
≥ 3 [%]	50	30	43	< 0.001
eGFR [mL/min/1.73 m^2]:	76 ± 26	76 ± 26	70 ± 26	0.001
≥ 90 [%]	31	30	27	0.0003
60–89 [%]	43	43	34	
45–59 [%]	13	14	23	
30–44 [%]	9	8	11	
15–29 [%]	3	3	4	
< 15 [%]	1	1	1	
International normalized ratio	1.4 ± 1	1.8 ± 1	1.7 ± 1	
International normalized ratio > 3.5	3	7	6	0.009
Left atrial diameter [mm]	42 ± 6	45 ± 7	50 ± 9	0.001
Ejection fraction [%]	49 ± 13	46 ± 14	42 ± 14	0.001
Valvular AF [%]	3	4	7	0.004
Co-morbidity:				
No co-morbidity [%]	3	6	2	0.003
1 co-morbidity [%]	12	17	9	0.006
≥ 2 co-morbidity [%]	84	78	89	0.00003
Hypertension [%]	78	65	73	0.0003
Diabetes mellitus [%]	27	22	28	0.2
Ischemic heart disease [%]	49	34	46	0.0003
Chronic heart failure [%]	57	60	54	0.3
Ejection fraction < 35%	17	24	33	< 0.001
Dilated cardiomyopathy [%]	4	6	11	< 0.001
Chronic kidney disease [%]	26	27	39	< 0.001
COPD [%]	7	6	8	0.6
Anemia [%]	31	21	30	0.006
Hypothyroidism [%]	4	2	4	0.4
Hyperthyroidism [%]	2	3	2	0.9
Peripheral artery disease [%]	4	2	3	0.3
Previous MI [%]	22	14	16	0.005
Previous TIA/stroke [%]	10	7	12	0.09
Previous PCI [%]	9	7	10	0.4
Previous CABG [%]	4	7	7	0.1
Pacemaker [%]	16	6	19	< 0.001
ICD/CRT [%]	3	5	7	0.0007
Electrical cardioversion [%]	2	30	1	< 0.001
Pharmacological cardioversion:				
Amiodarone [%]	5	8	0	< 0.001
Propapafenone [%]	1	2	0	0.002
In-hospital mortality [%]	2	3	2	0.8

Abbreviations as in Table 1.

Table 3. The cause of admission.

	All patients (n = 1,556)	Paroxysmal AF (n = 659)	Persistent AF (n = 260)	Permanent AF (n = 637)	P
Atrial fibrillation [%]	5	3	18	2	< 0.0001
Acute coronary syndrome:	14	17	10	12	< 0.0001
Unstable angina [%]	3	3	1	3	
NSTEMI [%]	6	8	5	5	
STEMI [%]	5	6	4	4	
Exacerbation of CHF [%]	8	4	7	12	
Acute heart failure [%]	3	2	3	3	
Pulmonary embolism [%]	1	2	2	1	
Schedule procedure:	58	59	55	60	< 0.0001
Pacemaker implantation [%]	7	5	1	10	
Ablation [%]	1	3	1	0	
Coronary angiography [%]	51	51	53	50	
Other [%]	10	12	6	10	< 0.0001

CHF — chronic heart failure; NSTEMI — non ST elevation myocardial infarction; STEMI — ST elevation myocardial infarction

Table 4. Stroke risk factors.

	Paroxysmal AF (n = 659)	Persistent AF (n = 260)	Permanent AF (n = 637)	P
Age ≥ 75 years [%]	41	30	50	< 0.001
Hypertension [%]	78	65	73	0.0003
Diabetes mellitus [%]	27	22	28	0.2
Coronary artery disease [%]	49	34	46	0.0003
Chronic heart failure [%]	57	60	54	0.3
Ejection fraction < 35%	17	24	33	< 0.001
Peripheral artery disease [%]	4	2	3	0.3
Previous MI [%]	22	14	16	0.005
Previous TIA/stroke [%]	10	7	12	0.09
CHA_2DS_2-VASc score ≥ 2	86	77	91	< 0.001
Valvular AF [%]	3	4	7	0.004

Abbreviations as in Table 1.

AF is associated with a variety of cardiovascular conditions and frequently coexists with HF, both leading to increased mortality [7, 13]. In consequence, AF population remains a heterogenous group due to variety of clinical presentations and treatment options. In most of the reports and registries, AF is associated with at least one concomitant condition, most commonly with hypertension [6, 7]. In our population, 97% of AF patients had at least one associated medical condition. Approximately half of the AF patients suffered from coronary artery disease or HF. Every third person was obese, had diabetes or anemia. These findings are consistent with the data from Euro Heart Survey study where 90% of the patients had concomitant co-morbidities, with hypertension as the most prevalent co-morbidity [13].

Classification of AF into different types is useful in clinical practice and is associated with different therapy approach. There are only few studies showing differences in characteristics and management of patients with different types of AF [7]. In our study, the most common AF type was paroxysmal AF, similarly as in RAFTING registry from Greece

Table 5. Antithrombotic therapy at discharge.

	All patients (n = 1,538)	Paroxysmal AF (n = 652)	Persistent AF (n = 257)	Permanent AF (n = 629)	P
Antithrombotic therapy [%]	71	61	80	79	< 0.001
Vitamin K antagonists [%]	59	49	59	70	< 0.001
Warfarin [%]	27	26	33	25	0.4
Acenocumarol [%]	32	23	26	45	< 0.001
NOAC [%]	12	12	21	9	< 0.001
Dabigatran [%]	5	4	12	3	< 0.001
Rivaroxaban [%]	7	8	9	6	0.1
Antiplatelet therapy [%]	39	48	33	34	< 0.001
ASA + VKA [%]	19	18	20	21	< 0.001
ASA + NOAC [%]	2	2	3	2	< 0.001
ASA without OAC [%]	18	28	10	11	< 0.001
No antithrombotic therapy [%]	29	39	21	21	< 0.001

AF — atrial fibrillation; ASA — acetylsalicylic acid; NOAC — new oral anticoagulants; OAC — oral anticoagulation; VKA — vitamin K antagonists

[14], but in contrast to AFNET and PREFER registry were most common type was permanent type [7, 8]. Nieuwlaat et al. [13] showed that patients with permanent AF were older, had more often HF, valvular heart disease, diabetes and previous stroke/ /transient ischemic attack. There were no differences in prevalence of coronary artery disease, CKD or history of MI and CABG/percutaneous coronary intervention [13]. Consistent data were published in the Registry of German Competence NETwork on Atrial Fibrillation (AFNET) [7]. In our population, prevalence of co-morbidities, such as hypertension, diabetes, IHD, chronic HF and anemia is similar in patients with paroxysmal and permanent AF. These findings are contrary to studies mentioned above, in which paroxysmal AF population had less often concomitant conditions.

Sex differences in the epidemiology and clinical management of AF are evident and have been described in several studies [6, 15, 16]. In this analysis, we found that females were older, had more often IHD, severely impaired EF, previous MI and CABG. These results differ from the Euro Observational Research Programme on Atrial Fibrillation (EORP-AF) where females had more non-ischemic HF and HF with preserved EF [6]. Similarly in Euro Heart Survey on Atrial Fibrillation females had more co-morbidities including HF with preserved EF [17]. Secondly, in our study, female patients had more often a permanent type of AF. The prevalence of valvular AF was similar in both genders. These results also differ from the EORP-AF and Euro Heart Survey studies where valvular AF was found more frequently in females, but there were no differences in type of AF between males and females [6, 16].

To date information on valvular AF is very scant. The prevalence of valvular AF in Europe according to PREFER registry varies from 1.9% to 5.4% [8]. In our population, valvular AF was present in 5% of the patients, similarly as in Spain and France. Patients with valvular AF were older, had more often a permanent type of AF, anemia and lower EF. The history of hypertension, coronary artery disease and previous MI was observed less frequently in valvular AF patients but they underwent CABG more often. CKD was recorded with similar frequency. Valvular AF patients were significantly more often prescribed antithrombotic therapy. To our knowledge there have been no studies focusing on characteristics and management of patients with valvular AF so far.

Antithrombotic treatment is the hottest topic concerning AF nowadays. Our data were consistent with data from Italy, where 70% of patients were given such a therapy. Different results were reported in France, Spain and Germany where antithrombotic treatment was used in 90%, 87.9% and 87.4%, respectively. There were no significant differences between the use of new oral anticoagulants (NOAC) between Poland (12%), Germany (11.6%) and Spain (11.2%). In France, NOAC were used half as frequently. Surprisingly, in such a Western European country as Italy the rate of use of NOAC was extremely low (0.3%), much lower than in Poland [8].

Table 6. Comparison of patients with valvular and non-valvular atrial fibrillation.

	Non-valvular AF	Valvular AF	P
Age [years]	71 ± 11	68 ± 9	< 0.001
Age ≥ 75 years [%]	44	24	0.001
Female [%]	45	55	0.08
Body mass index [kg/m^2]	29 ± 5	28 ± 4	0.9
Heart rate [bpm]	81 ± 25	83 ± 25	< 0.001
Bradycardia (< 60 bpm)	14	12	0.5
Tachycardia (> 100 bpm)	17	16	0.9
SBP [mm Hg]	131 ± 22	128 ± 27	< 0.001
eGFR [mL/min/1.73 m^2]:	74 ± 26	73 ± 28	0.002
≥ 90 [%]	30	32	0.4
60–89 [%]	40	32	
45–59 [%]	17	17	
30–44 [%]	9	16	
15–29 [%]	3	3	
< 15 [%]	1	0	
International normalized ratio	1.53 ± 1.0	2.67 ± 1.77	0.03
Left atrial diameter [mm]	45 ± 8	54 ± 10	0.7
Ejection fraction [%]	46 ± 14	44 ± 16	< 0.001
Type of AF:			0.004
Paroxysmal [%]	43	25	
Persistent [%]	17	15	
Permanent [%]	40	60	
Co-morbidity:			
No co-morbidity [%]	3	3	0.9
1 co-morbidity [%]	12	15	0.3
≥ 2 co-morbidity [%]	85	82	0.3
Hypertension [%]	74	58	0.002
Diabetes mellitus [%]	23	31	0.4
Ischemic heart disease [%]	46	30	0.006
Chronic heart failure [%]	56	60	0.4
Ejection fraction < 35%	24	32	0.1
Dilated cardiomyopathy [%]	7	10	0.4
Chronic kidney disease [%]	31	36	0.35
COPD [%]	7	7	0.97
Anemia [%]	28	43	0.005
Hypothyroidism [%]	3	1	0.3
Hyperthyroidism [%]	2	6	0.6
Peripheral artery disease [%]	3	0	0.1
Previous MI [%]	19	8	0.03
Previous TIA/stroke [%]	10	11	0.7
Previous PCI [%]	9	8	0.8
Previous CABG [%]	5	21	< 0.001
Pacemaker [%]	15	22	0.09
ICD/CRT [%]	5	7	0.4
Electrical cardioversion [%]	6	4	0.5
Pharmacological cardioversion:			
Amiodarone [%]	4	4	0.8
Propapafenone [%]	1	1	0.7
Antithrombotic therapy [%]	70	85	0.01
No antithrombotic therapy [%]	27	11	
Unknown [%]	3	4	
Vitamin K antagonists [%]	58	84	
New oral anticoagulants [%]	12	1	
Only aspirin [%]	19	3	0.001
In-hospital mortality [%]	2	4	0.3

Abbreviations as in Table 1.

Table 7. Multivariate logistic regression.

Odds of in-hospital death	Odds ratio	95% confidence interval	P
Age ≥ 75 years	6.26	2.06–19.02	0.001
Anemia	1.97	0.84–4.59	0.1
Chronic kidney disease	0.86	0.36–2.03	0.7
Ejection fraction < 35%	5.25	2.24–12.32	< 0.001
Diabetes mellitus	1.72	0.73–4.06	0.2

Population-based studies have indicated AF to be an independent predictor of increased late mortality [18]. Data from the Framingham study demonstrated a 1.5- to 1.9-fold risk of mortality in patients with AF in both males and females across a wide range of ages after adjustment for preexisting cardiovascular diseases [19].

Swedish nation-wide long-term case-control study showed the same finding in patients hospitalized with incident AF. The concomitant diseases that contributed most to an increased mortality were neoplasm, chronic renal failure and chronic obstructive airway disease. It is worth noting that none of these diseases are included in CHA_2DS_2-VASc score [12].

The relationship between mortality and type of AF remains unclear. Actually, there is no information on connections of various types of AF with all-cause mortality. For example, Swedish registry data did not allow differentiation between paroxysmal, persistent and permanent type of AF [12]. It is likely that on follow-up some of the patients progressed to permanent type of AF. For example, in the Loire Valley AF Project, only permanent type of AF was associated with increased mortality [17]. Our data on mortality concerns only short-term follow-up what is why the analysis of types is possible, because the percentage of patients who progressed to permanent type was low. In our population, the in-hospital mortality was 2% and did not differ between patients with valvular and non-valvular AF. Of all co-morbidities only diabetes, CKD and anemia had impact on in-hospital mortality. However, the independent predictors of death were age > 75 years and EF < 35%.

Limitations of the study

We have no current data on treatment strategies for the prevention of AF. Outpatient centers did not contribute for this registry and patients cared for by general practitioners were not included. This has to be taken into account when extrapolating from these data to the general population. No patients with AF were admitted because of a stroke, and only 5% were admitted due to AF. These evidences point out a selection bias, probably a referral to a Cardiology and Interventional Department of a high complexity Hospital.

Multiple logistic regression requires 10 to 15 events per variable analyzed. Since there were only 31 deaths, the model obtained is not a solid evidence.

Conclusions

AF originates from various substrates and, as a consequence, the AF population remains heterogeneous group. Most patients included in our registry have at least one comorbidity, most commonly hypertension. Our population with AF have similar risk of ischemic stroke and bleeding as in European registries. The need for anticoagulation in AF patients is well established in daily medical care in Poland, similarly to Western Europe. Patients with valvular AF are more frequently prescribed antithrombotic therapy than patients with non-valvular AF. In our study, paroxysmal AF population is similar to permanent AF population while in other registries permanent AF population correlates with HF more frequently. In-hospital mortality is relatively low in both valvular and non-valvular AF patients and connected with old age and left ventricular HF.

Acknowledgements

Our study was supported by funds from Leading National Research Center in Bialystok, Poland (KNOW).

Conflict of interest: None declared

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