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2024 European Society of Cardiology Guidelines for the management of atrial fibrillation, developed in collaboration with the European Association for Cardio-Thoracic Surgery: what's new?

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ABSTRACT

The article presents key approaches to the diagnosis and treatment of atrial fibrillation in light of the new 2024 ESC Guidelines for the management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery. The main changes made to the new recommendations are reflected. The innovative patient-oriented principle of atrial fibrillation treatment — AF-CARE is considered in detail. An analysis of the updated scale for assessing the risk of stroke and systemic embolism CHA_2DS_2-VA is given. The article provides definitions of clinical, subclinical, trigger-induced, newly diagnosed, paroxysmal, persistent and permanent forms of atrial fibrillation, algorithms for the treatment of different forms of atrial fibrillation based on the choice of drug therapy taking into account the left ventricular ejection fraction. Much attention is paid to screening and early detection of atrial fibrillation. The categories of patients for whom screening is advisable are determined. The importance of early diagnostics of atrial cardiomyopathy using atrial myocardial strain analysis is emphasized. The role of timely, guideline-based treatment of comorbid pathology such as chronic heart failure, diabetes mellitus, obesity, obstructive sleep apnea, arterial hypertension and others is emphasized in order to prevent atrial fibrillation and, if it occurs, to reduce relapses.

Keywords: atrial fibrillation; sinus rhythm control; ventricular rate control; stroke prevention.

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Рекомендации Европейского общества кардиологов 2024 по лечению фибрилляции предсердий, разработанные в содружестве с Европейской ассоциацией кардиоторакальных хирургов: что нового?

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АННОТАЦИЯ

В статье представлены ключевые подходы к диагностике и лечению фибрилляции предсердий в свете новых Рекомендаций Европейского общества кардиологов 2024 г. по лечению фибрилляции предсердий, разработанных в содружестве с Европейской ассоциацией кардиоторакальных хирургов. Отражены основные изменения, внесенные в новые рекомендации. Подробно рассмотрен инновационный пациенториентированный принцип лечения фибрилляции предсердий — AF-CARE. Дан анализ обновлённой шкалы оценки риска инсульта и системных эмболий CHA_2DS_2-VA. Приведены определения клинической, субклинической, триггер-индуцированной, впервые выявленной, пароксизмальной, персистирующей и постоянной форм фибрилляции предсердий, алгоритмы лечения разных форм фибрилляции предсердий, основанные на выборе медикаментозной терапии с учётом фракции выброса левого желудочка. Большое внимание уделено скринингу и раннему выявлению фибрилляции предсердий. Определены категории пациентов, у которых целесообразно проводить скрининг. Подчёркнута важность ранней диагностики предсердной кардиомиопатии с помощью анализа деформации миокарда предсердий. Сделан акцент на роли своевременного, базирующегося на актуальных рекомендациях лечения коморбидной патологии, такой как хроническая сердечная недостаточность, сахарный диабет, ожирение, обструктивное апноэ сна, артериальная гипертензия и других, с целью профилактики фибрилляции предсердий, а при ее появлении — уменьшения рецидивов.

Ключевые слова: фибрилляция предсердий; контроль синусового ритма; контроль частоты желудочковых сокращений; профилактика инсульта.

Как цитировать

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INTRODUCTION

Atrial fibrillation (AF) is one of the most commonly encountered arrhythmias. According to the 2024 European Society of Cardiology Guidelines for the management of atrial fibrillation, the current prevalence of AF is estimated at 1%–2% of the general population [1]. Similar figures are reported in the 2020 national guidelines for the diagnosis and treatment of atrial fibrillation and atrial flutter [2]. Some publications even suggest higher prevalence of AF [3–5]. It is expected that the prevalence of AF will double in the coming decades, driven by population aging, the growing burden of comorbidities complicated by AF, increased patient awareness, enhanced screening in high-risk groups, and advancements in technologies for detecting asymptomatic AF.

DEFINITION, DIAGNOSIS, CLASSIFICATION

AF is a supraventricular arrhythmia characterized by uncoordinated atrial activation and loss of effective atrial contraction [1]. On surface electrocardiogram (ECG), AF is identified by the absence of distinct *P* waves and the presence of irregular *QRS* complexes.

The diagnosis of AF in symptomatic patients is typically straightforward: the presence of characteristic symptoms combined with AF-specific findings on a standard 12-lead ECG allows for an accurate diagnosis. In asymptomatic patients, diagnosis is more challenging. In asymptomatic episodes detected using long-term monitoring devices, particularly those that do not record standard ECG signals (e.g., oscillometric, photoplethysmographic, mechanocardiographic), AF should be confirmed on a conventional ECG [1]. The confirmation may be made using a standard 12-lead ECG or devices capable of recording one or more ECG leads [1]. The minimum duration of an AF episode required for diagnosis remains undefined. The recording time for a standard 12-lead ECG is 10 s, whereas the 2020 guidelines contain a consensus statement that a AF episode lasting at least 30 s is necessary for diagnosis when using devices with one or more ECG leads [1]. The 2024 ESC guidelines do not specify a minimum duration for AF diagnosis.

In the 2024 ESC guidelines, the classification of AF remains unchanged. The following categories are still recognized:

- newly diagnosed AF (AF that has not been previously diagnosed, regardless of symptoms,-temporal pattern, or duration);
- paroxysmal AF (AF that terminates spontaneously or with medical intervention within 7 days of onset, with most spontaneous conversions to sinus rhythm occurring within the first 48 h) [6];
- persistent AF (AF episodes that do not terminate spontaneously within 7 days, long-standing persistent AF is defined as continuous AF lasting at least 12 months; however, rhythm control remains a treatment option, distinguishing this form from permanent AF) [7, 8];
- permanent AF (AF in which no further attempts to restore sinus rhythm are planned, based on shared decision-making between a patient and a physician).

The definition of clinical AF has been slightly modified: it now refers to symptomatic or asymptomatic AF that is clearly documented by a physician using ECG (either a standard 12-lead ECG or a high-quality ECG recorded by other devices). The minimum duration required to diagnose clinical AF remains unclear and depends on the clinical context. Episodes lasting ⩾30 s may indicate the clinical significance of arrhythmia, necessitating further monitoring of the patient and their arrhythmia, as well as risk stratification for thromboembolism and prevention of thromboembolic events.

With the increasing implementation of screening for early detection of asymptomatic AF, the term device-detected subclinical AF has been introduced. This refers to subclinical asymptomatic AF detected using devices such as implanted cardiac electronic devices, consumer wearable monitors, and others. Most atrial high-rate episodes recorded by devices (⩾170 bpm, lasting >5 min) may represent AF [1]. All episodes of atrial high-rate activity must be visually reviewed by a physician, as some may be electrical artifacts, creating a false impression of AF. Confirmation by a competent specialist capable of interpreting intracardiac electrograms or ECG recordings from consumer devices is essential [9, 10]. Device-detected subclinical AF is a predictor of future clinical AF [11]. Currently, there is no clear consensus on whether subclinical AF should be treated. However, patients with subclinical AF require monitoring and management of risk factors that may contribute to its progression to clinical AF. Screening using 24-hour ECG monitoring is recommended for patients aged ⩾75 years or those aged ⩾65 years with additional risk factors based on the CHA_2DS_2-VA score, to ensure earlier detection of AF (Class IIa, Level B).

A new category, trigger-induced AF, has been introduced, which is defined as a new AF episode occurring in close proximity to a triggering and potentially reversible factor [12–15].

AF is fundamentally driven by *atrial cardiomyopathy*, which is defined as a combination of structural, electrical, or functional changes in the atria that lead to clinical sequelae, such as AF progression/recurrence, limited efficacy of AF therapy, and/or the development of heart failure [16, 17]. Atrial cardiomyopathy involves inflammatory and prothrombotic atrial remodeling, neurohormonal activation, and myocardial fibrosis [18]. In our view, besides volumetric characteristics, the assessment of atrial remodeling should include the analysis of atrial myocardial strain [19, 20].

AF-CARE PRINCIPLES

The AF-CARE principles have replaced the ABC approach in the management of AF patients. In the acronym

AF-CARE, C stands for Comorbidity and risk factor management, A for Avoid stroke and thromboembolism, R for Reduce symptoms by rate and rhythm control, E for Evaluation and dynamic reassessment [1]. The approach is focused on AF prevention, early arrhythmia detection, and a multidisciplinary, personalized patient management strategy. The control of risk factors such as poor diet, excessive alcohol consumption, obesity, smoking, drug use, low physical activity, and a sedentary lifestyle is deemed crucial. A key role of timely, guideline-based management of comorbidities, including chronic heart failure (CHF), diabetes mellitus, obesity, obstructive sleep apnea, and hypertension, is emphasized to prevent AF and, in diagnosed cases, reduce recurrence.

STROKE AND SYSTEMIC THROMBOEMBOLISM PREVENTION

The risk assessment scale for stroke and systemic embolism has been revised. It has been proposed that female sex should no longer be considered an independent risk factor for thrombotic complications, as it serves as a stroke risk modifier dependent on age rather than an independent predictor [21–24]. In the previous 2020 ESC guidelines, as well as in the Russian national guidelines, female sex was formally included as a risk factor in the CHA_2DS_2-VASc score. Consequently, the indication for oral anticoagulants differed between men and women with AF, as women received an additional risk point based on sex under otherwise equal conditions. The newly introduced CHA_2DS_2-VA score no longer includes female sex as a thromboembolic risk factor. Regardless of sex, oral anticoagulants are recommended for patients with CHA_2DS_2-VA ⩾ 2 (Class I, Level C). For those with CHA_2DS_2 = 1, the use of oral anticoagulants should be considered (Class IIa Level C), taking into account additional thromboembolic risk modifiers. These include cancer, chronic kidney disease, ethnicity (Black, Latino, Asian), biomarkers (elevated troponin and natriuretic peptide levels), left atrial enlargement, hyperlipidemia, smoking, and obesity [1].

The acronym CHA_2DS_2-VA is defined as follows [1].

C for Chronic heart failure, 1 risk point. CHF is defined by the presence of symptoms and signs of CHF, regardless of left ventricular ejection fraction (LVEF), including heart failure with reduced ejection fraction (HFrEF), heart failure with mildly reduced ejection fraction (HFmrEF), heart failure with preserved ejection fraction (HFpEF), or asymptomatic LVEF ⩽40% [25–27].

H for Hypertension, 1 risk point. Hypertension is defined as resting blood pressure (BP) >140/90 mmHg in at least 2 measurements or current antihypertensive therapy to achieve target BP levels. The BP range associated with the lowest cardiovascular risk is 120–129/70–79 mmHg. If achieving target values is not feasible, maintaining BP at the lowest reasonable level is recommended [28, 29].

A_2 for Age ⩾75 years, 2 risk points. Age is an independent risk factor for ischemic stroke [30]. Although stroke risk increases along a continuum with age, for practical purposes, patients aged ⩾75 years receive a score of 2.

D for Diabetes mellitus, 1 risk point. Diabetes mellitus is defined as type 1 or type 2 diabetes diagnosed according to current criteria or requiring glucose-lowering therapy [31].

S_2 for Prior Stroke, transient ischemic attack (TIA), or arterial thromboembolism, 2 risk points. A history of thromboembolic events is associated with a significantly increased risk of recurrence, warranting the assignment of 2 points.

V for Vascular disease, 1 risk point. The patient has confirmed coronary artery disease (CAD), including a history of myocardial infarction, angina, coronary revascularization (surgical or percutaneous), significant coronary artery disease on coronary angiography or other imaging studies [32], peripheral arterial disease (PAD) with intermittent claudication, prior peripheral arterial revascularization, percutaneous or surgical interventions on the abdominal aorta, or multiple aortic plaques identified on imaging (mobile, ulcerated, or ⩾4 mm thick) [33, 34].

A for Age 65–74 years, 1 risk point.

During follow-up, periodic individualized reassessment of thromboembolic risk is recommended for patients with AF to ensure the timely initiation and adjustment of anticoagulant therapy.

The 2024 ESC guidelines identify two groups of patients who, due to their high risk of thromboembolic events, should receive oral anticoagulants chronically regardless of their CHA_2DS_2-VA score. In these patients, risk assessment is not required for anticoagulant prescription [35–41]. These groups include those with hypertrophic cardiomyopathy and those with amyloid cardiomyopathy

Direct oral anticoagulants (DOACs) are preferred over vitamin K antagonists (VKAs).

To prevent underdosing and ensure adequate drug concentrations for thromboembolic prevention, the guidelines emphasize that unjustified dose reductions of DOACs should be avoided unless the patient meets specific criteria for dose adjustment as per the drug's prescribing information.

The use of oral anticoagulants may be considered for patients with asymptomatic, device-detected subclinical AF and an increased risk of thromboembolic events to prevent ischemic stroke and systemic thromboembolism, except in those with a high bleeding risk (Class IIb, Level B) [1]. However, the guidelines emphasize that the AF burden required to initiate oral anticoagulant therapy remains unknown.

In patients with AF, the addition of antiplatelet agents to oral anticoagulant therapy for stroke prevention is not recommended. Similarly, switching from one DOAC to another or from a DOAC to a VKA for the prevention of recurrent thromboembolic events is not advised.

Long-term oral anticoagulant therapy should be considered for patients with trigger-induced AF and

an elevated thromboembolic risk to prevent ischemic stroke and thromboembolic complications (Class IIa, Level C).

At the start of antithrombotic therapy, its safety is essential. This requires the identification and correction of modifiable and partially modifiable risk factors for bleeding, including strict blood pressure control, reduction of excessive alcohol consumption, avoidance of antiplatelet agents and nonsteroidal or corticosteroid anti-inflammatory drugs, maintenance of an adequate time in the therapeutic range of the international normalized ratio when using VKAs, and assessment of drug interactions. Systematic reviews and validation studies evaluating the predictive value of various bleeding risk assessment scales have shown inconsistent results and only modest prognostic accuracy [42–51]. Consequently, the 2024 ESC guidelines do not refer to a single bleeding risk assessment scale due to the uncertainty in accurate risk assessment with any scale and the potential adverse consequences of withholding oral anticoagulants in patients at high risk of both thromboembolism and bleeding. Several bleeding risk assessment scales are presented, including ABC-bleeding, ATRIA, DOAC, GARFIELD-AF, HAS-BLED, HEMORR2HAGES, ORBIT. The guidelines emphasize that bleeding risk assessment scales should not be used as a single criterion for withholding or discontinuing anticoagulation therapy, as the risk of thrombotic complications in patients with AF generally outweighs the risk of bleeding [52, 53]. Physicians should carefully consider stroke and bleeding risks, as these factors are dynamic and interrelated, requiring reassessment at each patient visit with the elimination of modifiable risk factors whenever possible. Patients with nonmodifiable bleeding risk factors should be regularly monitored by a multidisciplinary team, including specialists in the management of relevant comorbid conditions.

REDUCTION OF SYMPTOMS THROUGH HEART RATE AND RHYTHM CONTROL

Newly Diagnosed Atrial Fibrillation

The guidelines provide a structured algorithm for managing patients with newly diagnosed AF [1]. The initial step is to determine whether the patient is hemodynamically stable or unstable. In cases of hemodynamic instability, urgent electrical cardioversion is indicated. In hemodynamically stable patients, management should follow the AF-CARE principles, including control of comorbid conditions and AF risk factors, prevention of stroke and systemic thromboembolic events, and initial heart rate (HR) control. The choice of initial HR control therapy, before establishing a long-term management strategy, depends on the LVEF. In patients with LVEF >40%, available pharmacologic options include β-blockers, digoxin, and non–dihydropyridine calcium channel blockers (diltiazem or verapamil) (Class I). If monotherapy fails to achieve target resting HR, combination therapy with a β-blocker and digoxin or a non-dihydropyridine calcium channel blocker (diltiazem or verapamil) and digoxin may be considered (Class IIa). In patients with reduced LVEF (⩽40%), non–dihydropyridine calcium channel blockers (diltiazem and verapamil) are contraindicated. The preferred agents for initial HR control in these patients are β-blockers and/or digoxin (Class I for monotherapy, Class IIa for combination therapy). For patients with symptomatic newly diagnosed AF and stable hemodynamics, elective cardioversion is recommended (Class I). A wait-and-see approach is recommended, as spontaneous restoration of sinus rhythm may occur within 48 h of AF onset (Class IIa). When planning early cardioversion, therapeutic-dose anticoagulation—using DOACs, VKAs, low-molecular-weight heparin, or unfractionated heparin—should be initiated as soon as possible to prevent cardioversion-related thromboembolism. Early cardioversion is not recommended without prior anticoagulation therapy for at least three weeks or transesophageal echocardiography to exclude left atrial thrombi before cardioversion if AF duration exceeds 24 h. Most patients should continue oral anticoagulation for at least 4 weeks after cardioversion. A novel approach to anticoagulation after cardioversion allows omitting anticoagulants in patients without thromboembolic risk factors if sinus rhythm is restored within 24 h of AF onset [1]. However, in the presence of any thromboembolic risk factors, long-term oral anticoagulation should be prescribed regardless of the cardioversion outcome.

Management of Patients with Paroxysmal Atrial Fibrillation

In patients diagnosed with paroxysmal AF [1], strict adherence to all AF-CARE principles is essential.

During an AF episode, initial HR control in patients with a LVEF >40% is achieved using β-blockers, digoxin, or non-dihydropyridine calcium channel blockers (diltiazem or verapamil) (Class I). If monotherapy fails to achieve target resting HR, combination therapy with a β-blocker and digoxin or a non-dihydropyridine calcium channel blocker (diltiazem or verapamil) and digoxin may be considered (Class IIa). In patients with reduced LVEF (⩽40%), β-blockers and/or digoxin are the preferred options for initial HR control (Class I for monotherapy, Class IIa for combination therapy). The initial target HR is <110 bpm (lenient control) (Class IIa). If symptoms persist despite lenient HR control, a strict approach (<80 bpm) should be considered (Class IIa). Patients should actively participate in selecting the management strategy, and rhythm control decisions should be made jointly by the physician and the patient (Class I). The choice of antiarrhythmic drug depends on LVEF and comorbid conditions. For patients with HFrEF (LVEF ⩽40%), amiodarone is the only recommended antiarrhythmic drug for rhythm

control (Class I). In patients with HFmrEF (LVEF 41%–49%), the 2024 ESC guidelines allow for a broader selection of drugs: amiodarone or dronedarone[1] (Class I), with sotalol as an alternative in cases of inefficacy, intolerance, or contraindications for these drugs (Class IIb). A similar approach is recommended for patients with CAD or valvular heart disease. In the absence of structural heart disease (lone AF) or minimal cardiac pathology, dronedarone, flecainide, or propafenone are recommended (Class I). If these are ineffective, poorly tolerated, or contraindicated, sotalol may be considered, albeit with a lower level of recommendation (Class IIb). If antiarrhythmic drug therapy is ineffective, the physician and patient may jointly decide on a catheter-based procedure to maintain sinus rhythm (Class I). If catheter ablation fails, several management options are available: repeating the catheter procedure (Class IIa), performing surgical or hybrid ablation (Class IIb), or continuing antiarrhythmic drug therapy.

Management of Patients with Persistent Atrial Fibrillation

When managing patients with persistent AF, strict adherence to the AF-CARE principles is essential. However, the management approach [1] differs slightly from that used for patients with paroxysmal AF.

For initial HR control in patients with LVEF >40%, β-blockers, digoxin, or non-dihydropyridine calcium channel blockers (diltiazemor verapamil) are recommended (Class I). If monotherapy fails to achieve target resting HR, combination therapy with a β-blocker and digoxin or a non-dihydropyridine calcium channel blocker (diltiazem or verapamil) and digoxin may be considered (Class IIa). HR should be monitored to avoid bradycardia. In patients with reduced LVEF (⩽40%), β-blockers and/or digoxin are the preferred options for initial HR control (Class I for monotherapy, Class IIa for combination therapy). The initial target resting HR is <110 bpm (lenient control, Class IIa). If symptoms persist despite the lenient control, a strict approach (<80 bpm) should be considered (Class IIa). The choice of AF management strategy should be made jointly by the physician and the patient (Class I). If there are clear clinical and historical benefits of maintaining sinus rhythm, rhythm control should be recommended (Class IIa). Either pharmacologic or catheter-based approaches may be considered as a first-line strategy (Class IIb for catheter ablation). The choice of antiarrhythmic drug depends on LVEF and the presence of comorbid conditions, similar to the approach in paroxysmal AF. In patients with HFrEF (LVEF ⩽40%), amiodarone is the only recommended drug for rhythm control (Class I). In patients with HFmrEF (LVEF 41% to 49%), CAD, or valvular heart disease, amiodarone or dronedarone is recommended (Class I). If these drugs are ineffective, not tolerated, or contraindicated, sotalol may be considered, but with a lower recommendation level (Class IIb). In patients with no structural heart disease (lone AF) or minimal cardiac pathology, dronedarone, flecainide, or propafenone is recommended (Class I). If these are ineffective, poorly tolerated, or contraindicated, sotalol may be considered, albeit with a lower level of recommendation (Class IIb). If AF recurs despite antiarrhythmic drug therapy, catheter ablation is recommended (Class I). Endoscopic or hybrid ablation may also be considered (Class IIa). If catheter ablation was used as a first-line strategy, several options exist for further management: repeat catheter ablation, perform endoscopic/hybrid/surgical ablation, continue antiarrhythmic drug therapy or accept a permanent AF strategy with rate control instead of pursuing sinus rhythm maintenance.

Management of Patients with Permanent Atrial Fibrillation [1]

The AF-CARE principles are fundamental in managing all forms of AF. Addressing risk factors, adequately treating comorbid conditions, and preventing thromboembolic events are cornerstones of patient management in permanent AF. In this setting, HR control is of paramount importance. The selection of medications for long-term rate control, whether monotherapy or combination therapy, follows the same principles as for newly diagnosed, paroxysmal, and persistent AF. If permanent AF with tachycardia is associated with severe symptoms and at least one hospitalization due to HF, atrioventricular node ablation with cardiac resynchronization therapy may be considered as a first-line strategy (Class IIa). Atrioventricular node ablation with pacemaker implantation should also be considered if target HR control cannot be achieved with medications (Class IIa). The choice of pacing modality (right ventricular or biventricular pacing) depends on patient characteristics, the presence of HF, and LVEF. To optimize outcomes, the pacemaker should be implanted several weeks before atrioventricular node ablation. The initial pacing rate after ablation should be 70 to 90 bpm [1]. This strategy does not impair left ventricular function and may even improve LVEF in selected patients [1].

We have reviewed the key updates in the diagnosis and management of atrial fibrillation. The 2024 ESC guidelines include numerous detailed tables and algorithms that outline management strategies for patients with various comorbid conditions.

CONCLUSION

The primary innovation of the 2024 ESC guidelines on atrial fibrillation management, developed in collaboration with the European Association for Cardio-Thoracic Surgery, is the adoption of the AF-CARE principles for patient management. A major update is that sex is no longer considered a risk factor for ischemic stroke or

[1] *Dronedarone is currently not registered in the Russian Federation.*

systemic thromboembolism. The CHA_2DS_2-VA score is now recommended for risk stratification. The HAS-BLED score is no longer mandatory for bleeding risk assessment. Several bleeding risk scores are proposed, emphasizing that a high estimated risk should not preclude anticoagulant therapy but warrants careful evaluation and risk factor modification. Strategies and algorithms for sinus rhythm restoration and management of various AF subtypes are updated. Indications for catheter ablation, with an increased recommendation class for AF ablation are expanded. Greater emphasis on AF screening, early detection, arrhythmia prevention, comorbidity management, and risk factor modification is made.

ADDITIONAL INFORMATION

Author contribution. T.N. Novikova, writing the main part of the text, literature review, making final edits; F.I. Bitakova, S.A. Sayganov, literature review; D.A. Kunshin, L.S. Dyatchina, I.A. Dolinina, V.I. Novikov, writing the text, literature review. All authors confirm that their authorship complies with the international ICMJE criteria (all authors have made a significant contribution to the development of the concept and preparation of the article, as well as read and approved the final version before its publication).

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