ESC Guidelines 2010 on the management of Atrial Fibrillation

European Heart Journal 2010

European Heart Rhythm Association (EHRA);
Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS)

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Guidelines for the management of atrial fibrillation

The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC)

Developed with the special contribution of the European Heart Rhythm Association (EHRA)†

Endorsed by the European Association for Cardio-Thoracic Surgery (EACTS)

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Classes of recommendations

- Evidence and/or general agreement that a given treatment or procedure *is beneficial, useful and effective.*
- Conflicting evidence and/or divergence of opinion about the usefulness/efficacy of the given treatment or procedure:
  - Weight of opinion/evidence is in favour of usefulness/efficacy.
  - Usefulness/efficacy is less well established by evidences/opinion.
- Evidence and/or general agreement that the given treatment or procedure *is not useful/effective and in some cases may be harmful.*

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Levels of evidence

- Data derived from *multiple* randomized clinical trials or *meta-analyzes*.
- Data derived from *a single* randomized clinical trial or large-non randomized studies.
- Consensus of opinion of the experts and/or small studies, restropective studies, registries.

A

B

C

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Clinical Events (outcomes) affected by AF

Outcome parameter	Relative change in AF patients
1. Death	Death rate doubled.
2. Stroke (includes haemorrhagic stroke and cerebral bleeds)	Stroke risk increased; AF is associated with more severe stroke
3. Hospitalisations	Hospitalisations are frequent in AF patients and may contribute to reduced quality of life.
4. Quality of life and exercice capacity	Wide variation from no effect to major reduction. AF can cause market distress trhough palpitations and other AF-related symptoms
5. Left ventricular function	Wide variation from no change to tachycardio-myopathy with acute heart failure.

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Conditions predisposing to, or encouraging progression of AF

- Hypertension
- Symptomatic heart failure (NYHA II - IV) including tachycardiomyopathy
- Valvular heart disease
- Cardiomyopathies including primary electrical cardiac disease
- Atrial septal defect and other congenital heart defects
- Coronary artery disease
- Thyroid dysfunction and possibly subclinical thyroid dysfunction
- Obesity
- Diabetes mellitus
- Chronic obstructive pulmonary disease (COPD) and sleep apnoea
- Chronic renal disease

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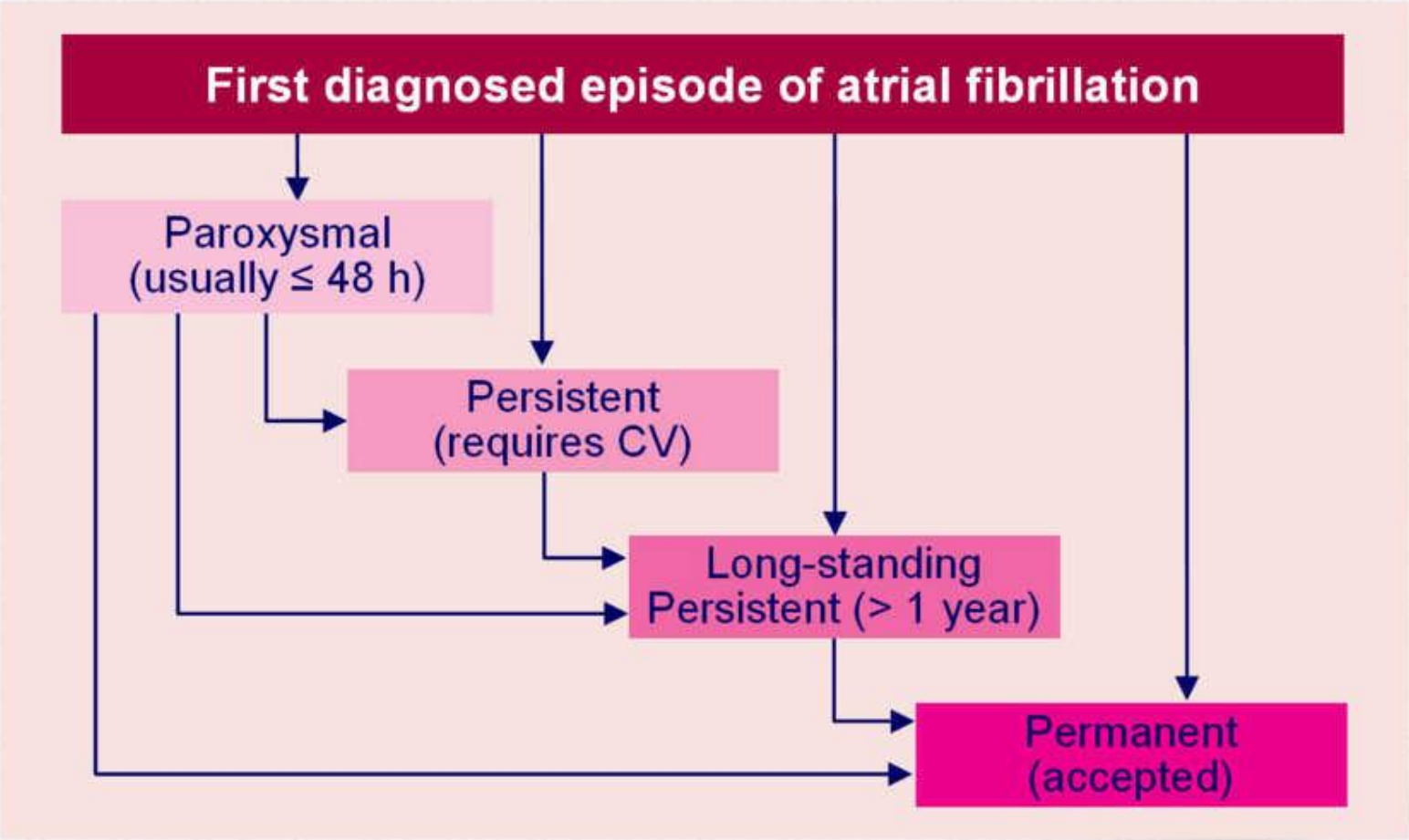
Types of Atrial Fibrillation



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Clinical evaluation

- Acute ventricular rate control.
- Immediate assessment of the need for anticoagulation.
- First decision to add rhythm control therapy to the management based on symptoms (may be reassessed later).
- Treatment of underlying heart disease.

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Structural abnormalities associated with AF

Extracellular matrix alterations
Interstitial and replacement fibrosis
Inflammatory changes
Amyloid deposition
Myocyte alterations
Apoptosis
Necrosis
Hypertrophy
Dedifferentiation
Gap-junction redistribution
Intracellular substrate accumulation (haemocromatosis, glycogen)
Microvascular changes
Endocardial remodelling (endomyocardial fibrosis)

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EHRA score of AF-related symptoms

Classification of AF-related symptoms **(EHRA score)**	
EHRA class	**Explanation**
EHRA I	'No symptoms'
EHRA II	'Mild symptoms'; normal daily activity not affected
EHRA III	'Severe symptoms', normal daily activity affected
EHRA IV	'Disabling symptoms'; normal daily activity discontinued

AF = atrial fibrillation; EHRA = European Heart Rhythm Association

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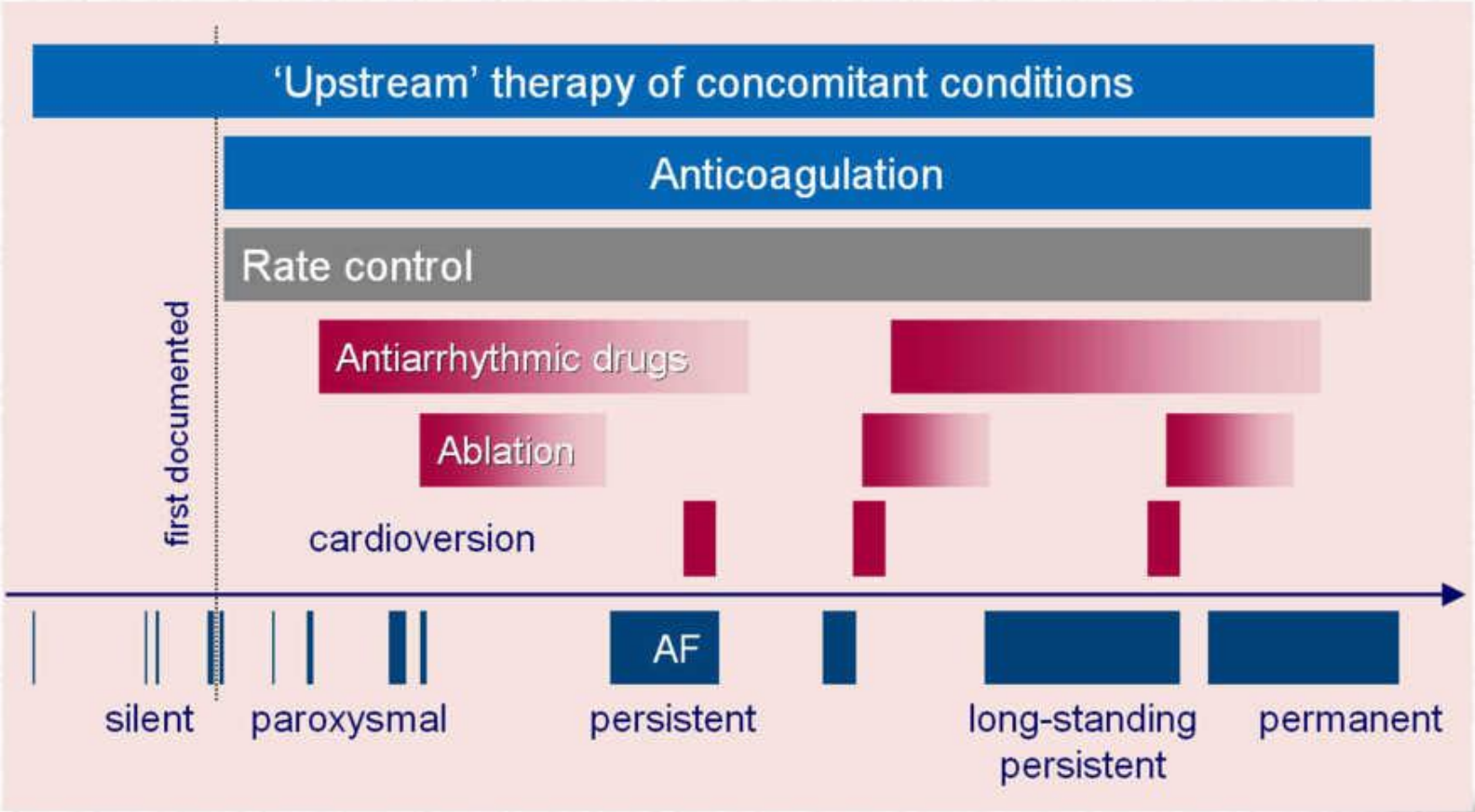
Natural time course of AF



AF = atrial fibrillation

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Diagnosis and initial management of AF

Recommendations	Class[a]	Level[b]
The diagnosis of AF requires documentation by ECG.	I	B
In patients with suspected AF, an attempt to record an ECG should be made when symptoms suggestive of AF occur.	I	B
A simple symptom score (EHRA score) is recommended to quantify AF-related symptoms.	I	B
All patients with AF should undergo a through physical examination, and a cardiac and arrhythmia-related history should be taken.	I	C
In patients with severe symptoms, documented or suspected heart disease or risk factors, an echocardiagram is recommended.	I	B
In patients treated with antiarrhythmic drugs, a 12-lead ECG should be recorded at regular intervals during follow-up.	I	C

[a]Class of recommendation.
[b]Level of evidence.
AF = atrial fibrillation; ECG = electrocardiogram; EHRA = European Heart Rhythm Association.

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Diagnosis and initial management of AF

Recommendations	Class[a]	Level[b]
In patients with suspected symptomatic AF, additional ECG monitoring should be considered in order to document the arrhythmia.	IIa	B
Additional ECG monitoring should be considered for detection of 'silent' AF in patients who may have sustained an AF-related complication.	IIa	B
In patients with AF treated with rate control, Holter ECG monitoring should be considered for assessment of rate control or bradycardia.	IIa	C
In young active patients with AF treated with rate control, exercice testing should be considered in order to assess ventricular rate control.	IIa	C
In patients with documented or suspected AF, an echocardiogram should be considered.	IIa	C

[a]Class of recommendation.
[b]Level of evidence.
AF = atrial fibrillation; ECG = electrocardiogram.

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Diagnosis and initial management of AF

Recommendations	Class[a]	Level[b]
Patients with symptomatic AF or AF-related complications should be considered for referral to a cardiologist.	IIa	C
A structured follow-up plan prepared by a specialist is useful for follow-up by a general or primary care physician.	IIa	C
In patients treated with rhythm control, repeated ECG monitoring may be considered to assess the efficacy of treatment.	IIb	B
Most patients with AF may benefit from specialist follow-up at regular intervals.	IIb	C

[a]Class of recommendation.
[b]Level of evidence.
AF = atrial fibrillation; ECG = electrocardiogram.

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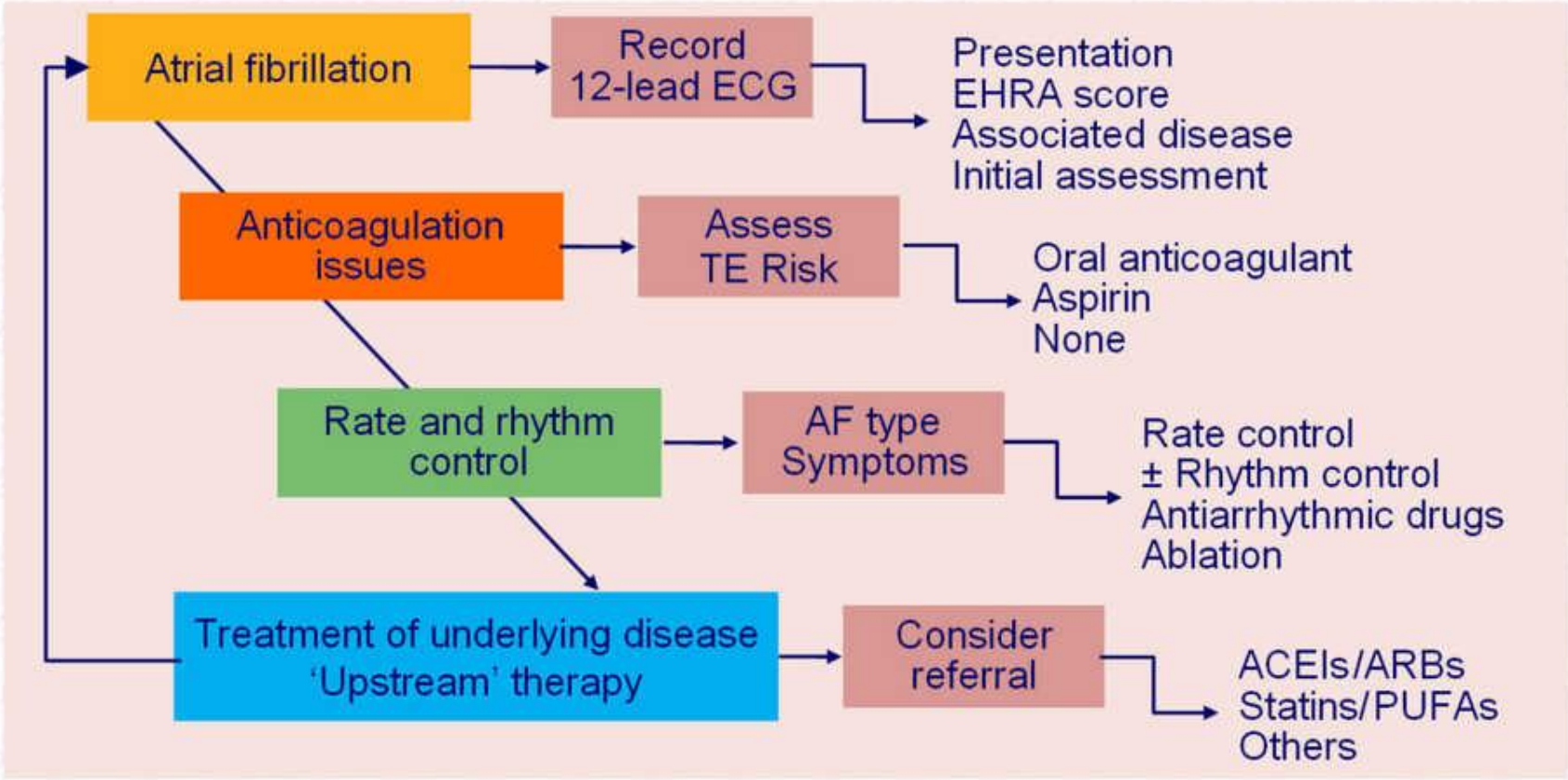
The management cascade for patients with AF



ACEI = angiotensin-converting enzyme inhibitor; AF = atrial fibrillation; ARB = angiotensin receptor blocker; PUFA = polyunsaturated fatty acid; TE = thrombo-embolism.

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$CHADS_2$ score and stroke rate

$CHADS_2$ score	Patients (n = 1733)	Adjuste stroke rate (%/y)* (95% confidence interval)
0	120	1.9 (1.2 - 3.0)
1	463	2.8 (2.0 - 3.8)
2	523	4.0 (3.1 - 5.1)
3	337	5.9 (4.6 - 7.3)
4	220	8.5 (6.3 - 11.1)
5	65	12.5 (8.2 - 17.5)
6	5	18.2 (10.5 - 27.4)

*The adjusted stroke rate was derived from the multivariable analysis assuming no aspirin usage; these stroke rates are based on data from a cohort of hospitalised AF patients, published in 2001, with low numbers in those with a **$CHADS_2$ score** of 5 and 6 to allow an accurate judgement of the risk in these patients. Given that stroke rates are declining overall, actual stroke rates in contemporary non-hospitalised cohorts may also vary from these estimates. Adapted from Gage BF et al.

AF = atrial fibrillation; $CHADS_2$ = cardiac failure, hypertension, age, diabetes, stroke (doubled).

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Risk factors for stroke and thrombo-embolism in non-valvular AF

Major risk factors
Previous stroke
TIA or systemic embolism
Age ≥ 75 years

Clinically relevant non-major risk factors
CHF or moderate to severe LV systolic dysfunction [e.g. LV EF ≤ 40%]
Hypertension
Diabetes mellitus
Age 65-74 years
Female sex
Vascular disease

AF= atrial fibrillation; EF = ejection fraction (as documented by echocardiography, radionuclide ventriculography, cardiac catheterization, cardiac magnetic resonance imaging, etc.); LV = left ventricular; TIA = transient ischaemic attack.

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Risk factor-based point-based scoring system - CHA_2DS_2-VASc

Risk factor	Score
Congestive heart failure/LV dysfunction	1
Hypertension	1
Age ≥ 75 ans	2
Diabetes mellitus	1
Stroke/TIA/thrombo-embolism	2
Vascular disease*	1
Age 65-74	1
Sex category [i.e. femal sex]	1
Maximum score	**9**

*Prior myocardial infarction, peripheral artery disease, aortic plaque. Actual rates of stroke in contemporary cohorts may vary from these estimates.

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Adjusted stroke rate according to CHA_2DS_2-VASc score

CHA_2DS_2-VASc score	Patients (n = 7329)	Adjusted stroke rate (%/y)
0	1	0%
1	422	1.3%
2	1230	2.2%
3	1730	3.2%
4	1718	4.0%
5	1159	6.7%
6	679	9.8%
7	294	9.6%
8	82	6.7%
9	14	15.2%

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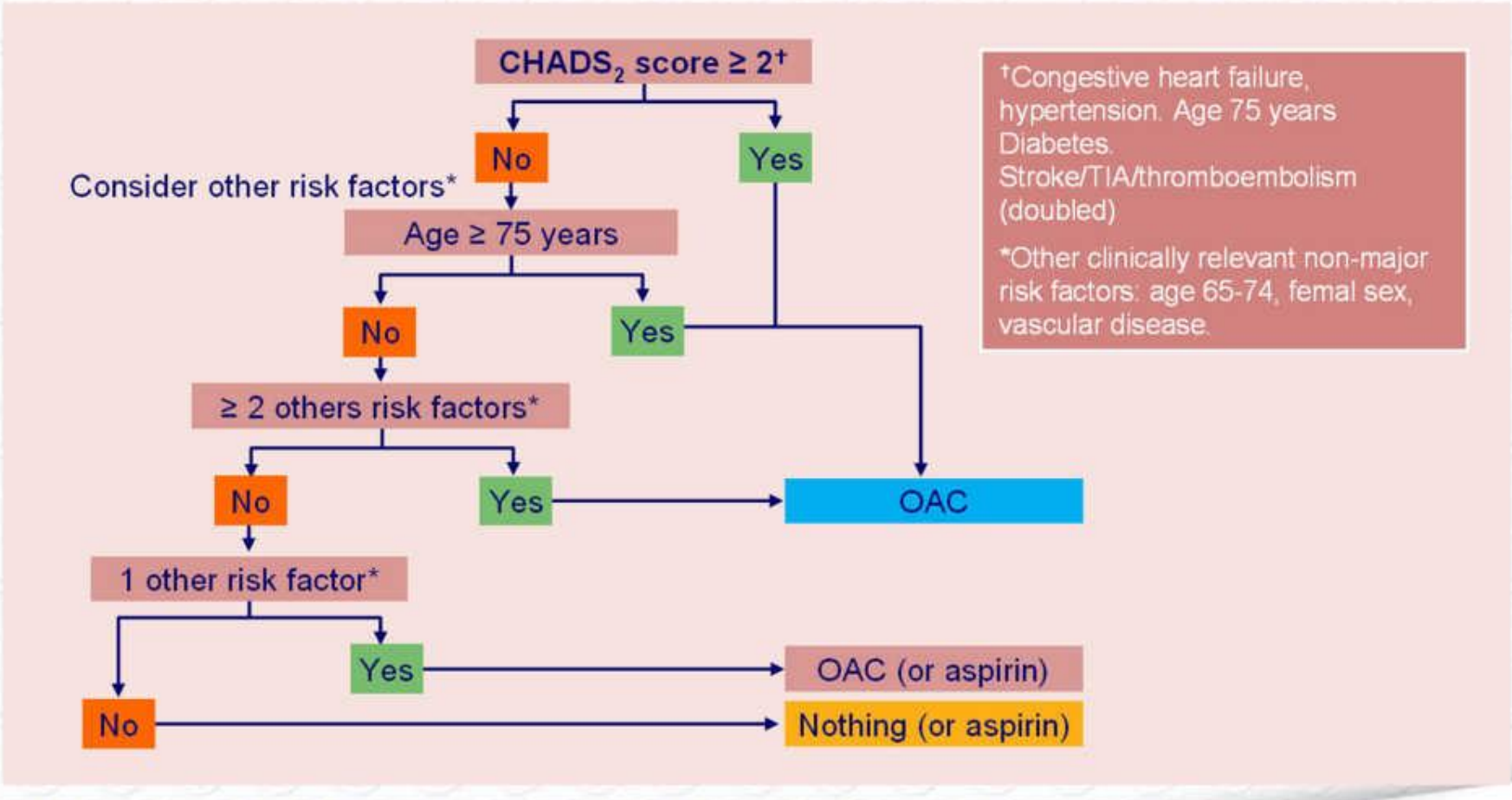
Use of oral anticoagulation for stroke prevention in AF



AF = atrial fibrillation; OAC = oral anticoagulant; TIA = transient ischaemic attack.

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Approach to thromboprophylaxis in AF

Risk category	CHA_2DS_2-VASc score	Recommended antithrombotic therapy
One 'major' risk factor or ≥ 2 'clinically relevant non-major' risk factors	≥ 2	OAC
One 'clinically relevant non-major' risk factor	1	Either OAC or aspirin 75-325 mg daily. Preferred: OAC rather than aspirin.
No risk factors	0	Either aspirin 75-325 mg daily or no antithrombotic therapy. Preferred: no antithrombotic therapy rather than aspirin.

AF = atrial fibrillation; CHA_2DS_2-VASc = cardiac failure, hypertension, age ≥ 75 (doubled), diabetes, stroke (doubled)-vascular disease, age 65–74 and sex category (female); INR = international normalized ratio; OAC = oral anticoagulation, such as a vitamin K antagonist (VKA) adjusted to an intensity range of INR 2.0–3.0 (target 2.5).

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The HAS-BLED bleeding risk score

Letter	Clinical characteristic*	Points awarded
H	Hypertension	1
A	Abnormal renal and liver function (1 point each)	1 or 2
S	Stroke	1
B	Bleeding	1
L	Labile INRs	1
E	Elderly (e.g. age > 65 years)	1
D	Drugs or alcohol (1 point each)	1 or 2
		Maximum 9 points

*Hypertension is defined as systolic blood pressure > 160 mmHg.
INR = international normalized ratio.

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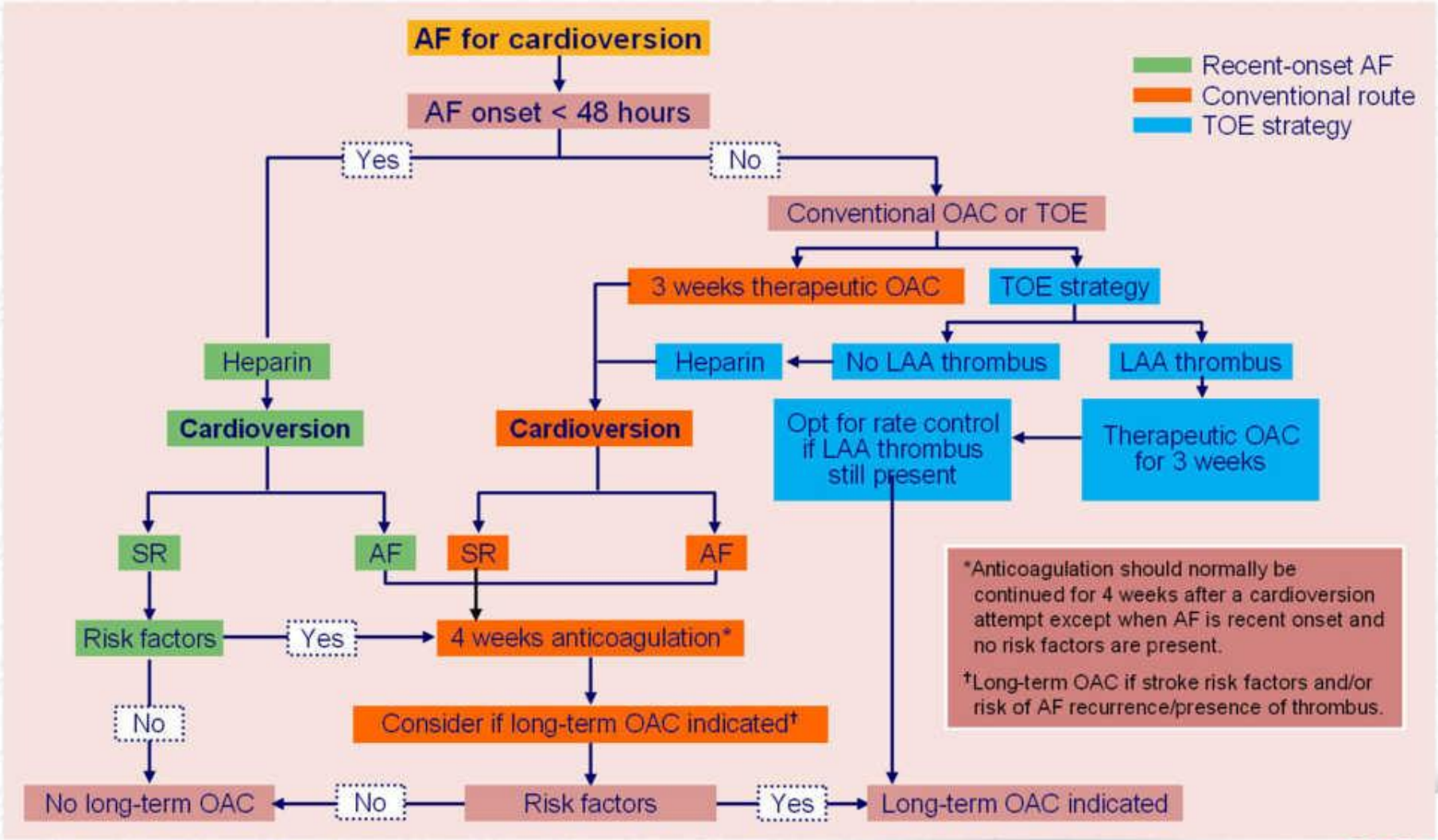
Cardioversion, TOE and anticoagulation



AF = atrial fibrillation; DCC = direct current cardioversion; LA = left atrium; LAA = left atrial appendage; OAC = oral anticoagulant; SR= sinus rhythm; TOE= transoesophageal echocardiography.

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Prevention of thromboembolism in AF

Recommendations	Class[a]	Level[b]
Antithrombotic therapy to prevent thromboembolism is recommended for all patients with AF, except in those at low risk (lone AF, aged < 65 years or with contraindications).	I	A
It is recommended that the selection of the antithrombotic therapy should be based upon the absolute risks of stroke/thromboembolism and bleeding and the relative risk and benefit for a given patient.	I	A
The $CHADS_2$ (Cardiac failure, Hypertension, Age, Diabetes, Stroke [Doubled]) score is recommended as a simple initial (easily remembered) means of assessing stroke risk in non-valvular AF.	I	A
For the patients with a $CHADS_2$ score of ≥ 2, chronic OAC therapy with a VKA is recommended in a dose-adjusted regimen to achieve an INR range of 2.0-3.0 (target 2.5), unless contraindicated.	I	A
For a more detailed or comprehensive stroke risk assessment in AF (e.g. with $CHADS_2$ score 0-1), a risk factor-based approach is recommended, considering 'major' and 'clinical relevant non-major' stroke risk factors.	I	A
Patients with 1 'major' or ≥ 2 'clinically relevant non-major' risk factors are high risk and OAC therapy [for example, with a VKA, dose adjusted to achieve the target intensity INR of 2.0-3.0] is recommended, unless contraindicated	I	A
Patient with one 'clinically relevant non-major' risk factor are at intermediate risk and antithrombotic therapy is recommended, either as:	I	A B
i. OAC therapy (e;g; VKA), or	I	A
ii. aspirin 75-325 mg daily	I	B
Patients with no risk factors are at low risk (essentially patients aged < 65 years with lone AF, with none of the risk factors) and the use of either aspirin 75-325 mg daily or no antithrombotic therapy is recommended.	I	B
For patients with AF who have mechanical heart valves, it is recommended that the target intensity of anticoagulation with a VKA should be based on the type and position of the prosthesis, maintaining an INR of at least 2.5 in the mitral position and at least 2.0 for an aortic valve.	I	B
Antithrombotic therapy is recommended for patients with atrial flutter as for those with AF.	I	C

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation; CHADS2 = cardiac failure, hypertension, age, diabetes, stroke (doubled); INR = international normalized ratio; LMWH = low molecular weight heparin; OAC = oral anticoagulant; TIA = transient ischaemic attack; VKA = vitamin K antagonist.

Prevention of thromboembolism in AF

Recommendations	Class[a]	Level[b]
The selection of antithrombotic therapy should be considered using the same criteria irrespective of the pattern of AF (i.e. paroxysmal, persistent, or permanent).	IIa	A
Most patients with one 'clinically relevant non-major' risk factor should be considered for OAC therapy (e.g. with a VKA) rather than aspirin, based upon an assessment of the risk of bleeding complications, the ability to safely sustain adjusted chronic anticoagulation, and patient preferences.	IIa	A
In patients with no risk factors who are at low risk (essentially patients aged < 65 years with lone AF, with none of the risk factors), no antithrombotic therapy should be considered, rather than aspirin.	IIa	B
Combination therapy with aspirin 75-100 mg plus clopidogrel 75 mg daily, should be considered for stroke prevention in patients for whom there is patient refusal to take OAC therapy or a clear contraindication to OAC therapy (e.g. inability to cope or continue with anticoagulation monitoring), where there is a low risk of bleeding.	IIa	B
Assessment of the risk of bleeding should be considered when prescribing antithrombotic therapy (whether with VKA or aspirin), and the bleeding risk with aspirin should be considered as being similar to VKA, especially in the elderly.	IIa	A
The HAS-BLED score (Hypertension, Abnormal renal/liver function, Stroke, Bleeding history or predisposition, Labile INR, Elderly (>65), Drugs/alcohol concomitantly) should be considered as a calculation to assess bleeding risk whereby a score of ≥ 3 indicates 'high risk' and some caution and regular review is needed, following the initiation of antithrombotic therapy, whether with OAC or aspirin.	IIa	B
In patients with AF who do not have mechanical prosthetic heart valves or those who are not at high risk for thromboembolism who are undergoing surgical or diagnostic procedures that carry a risk of bleeding, the interruption of OAC (with subtherapeutic anticoagulation for up to 48 h) should be considered, without substituting heparin as 'bridging' anticoagulation therapy.	IIa	C
In patients with a mechanical prosthetic heart valve or AF at high risk for thromboembolism who are undergoing surgical or diagnostic procedures, 'bridging' anticoagulation with therapeutic doses of either low molecular weight heparin (LMWH) or unfractionated heaparin during the temporary interruption of OAC therapy should be considered.	IIa	C

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation; CHADS2 = cardiac failure, hypertension, age, diabetes, stroke (doubled); INR = international normalized ratio; LMWH = low molecular weight heparin; OAC = oral anticoagulant; TIA = transient ischaemic attack; VKA = vitamin K antagonist.

Prevention of thromboembolism in AF

Recommendations	Class[a]	Level[b]
Following surgical procedures, resumption of OAC therapy should be considered at the 'usual' maintenance dose (without a loading dose) on the evening of (or the next morning after) surgery, assuming there is adequate haemostasis.	IIa	B
Re-evaluation at regular intervals of the benefits, risks and need for antithrombotic therapy should be considered.	IIa	C
In patients with AF presenting whith acute stroke or TIA, management of uncontrolled hypertension should be considered before antithrombotic treatment is started, and cerebral imaging (computed tomography or magnetic resonance imaging) performed to exclude haemorrhage.	IIa	C
In the absence of haemorrhage, OAC should be considered approximately 2 weeks after stroke, but in the presence of haemorrhage, anticoagulation should not be given.	IIa	C
In the presence of a large cerebral infarction, delaying the initiation of anticoagulation should be considered, given the risk of haemorrhagic transformation.	IIa	C
In patients with AF and an acute TIA, OAC therapy should be considered as soon as possible in the absence of cerebral infarction or haemorrhage.	IIa	C
In some patients with one 'clinically relevant non-major' risk factor, for example, female patients aged <65 years with no other risk factors, aspirin may be considered rather than OAC therapy.	IIb	C
When surgical procedures require interruption of OAC therapy for longer than 48 h in high-risk patients, unfractionated heparin or subcutaneous LMWH may be considered	IIb	C
In patients with AF who sustain ischaemic stroke or systemic embolism during treatment with usual intensity anticoagulation with VKA (INR 2.0-3.0), raising the intensity of the anticoagulation to a maximum target INR of 3.0-3.5 may be considered, rather than adding an antiplatelet agent.	IIb	C

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation; CHADS2 = cardiac failure, hypertension, age, diabetes, stroke (doubled); INR = international normalized ratio; LMWH = low molecular weight heparin; OAC = oral anticoagulant; TIA = transient ischaemic attack; VKA = vitamin K antagonist.

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Drugs and doses for pharmacological conversion of (recent-onset) AF

Drug	Dose	Follow-up dose	Risks
Amiodarone	5 mg/kg i.v. over 1 h	50 mg/h	Phlebitis, hypotention. Will slow the ventricular rate. Delayed AF conversion to sinus rhythm.
Flecainide	2 mg/kg i.v. over 10 min, or 200-300 mg p.o.	N/A	Not suitable for patients with market structural heart disease; may prolong QRS duration, and hence the QT interval; and may inadvertently increase the ventricular rate due to conversion to atrial flutter and 1:1 conduction to the ventricles.
Ibutilide	1 mg i.v. over 10 min	1 mg i.v. over 10 min after waiting for 10 min	Can cause prolongation of the QT interval and torsades de pointes; watch for abnormal T-U waves or QT prolongation. Will slow the ventricular rate.
Propafenone	2 mg/kg i.v. over 10 min, or 450-600 mg p.o.		Not suitable for patients with market structural heart disease; may prolong QRS duration; will slightly slow the ventricular rate, but may inadvertently increase the ventricular rate due to conversion to atrial flutter and 1;1 conduction to the ventricules.
Vernakalant	3 mg/kg i.v. over 10 min	Second infusion of 2 mg/kg i.v. over 10 min after 15 min rest	So far only evaluated in clinical trials; recently approved.

ACS = acute coronary syndrome; AF = atrial fibrillation; DCC = direct current cardioversion; i.v. = intravenous; N/A = not applicable; NYHA, New York Heart Association; p.o. = per os; QRS = QRS duration; QT = QT interval; T-U = abnormal repolarization (T-U) waves.

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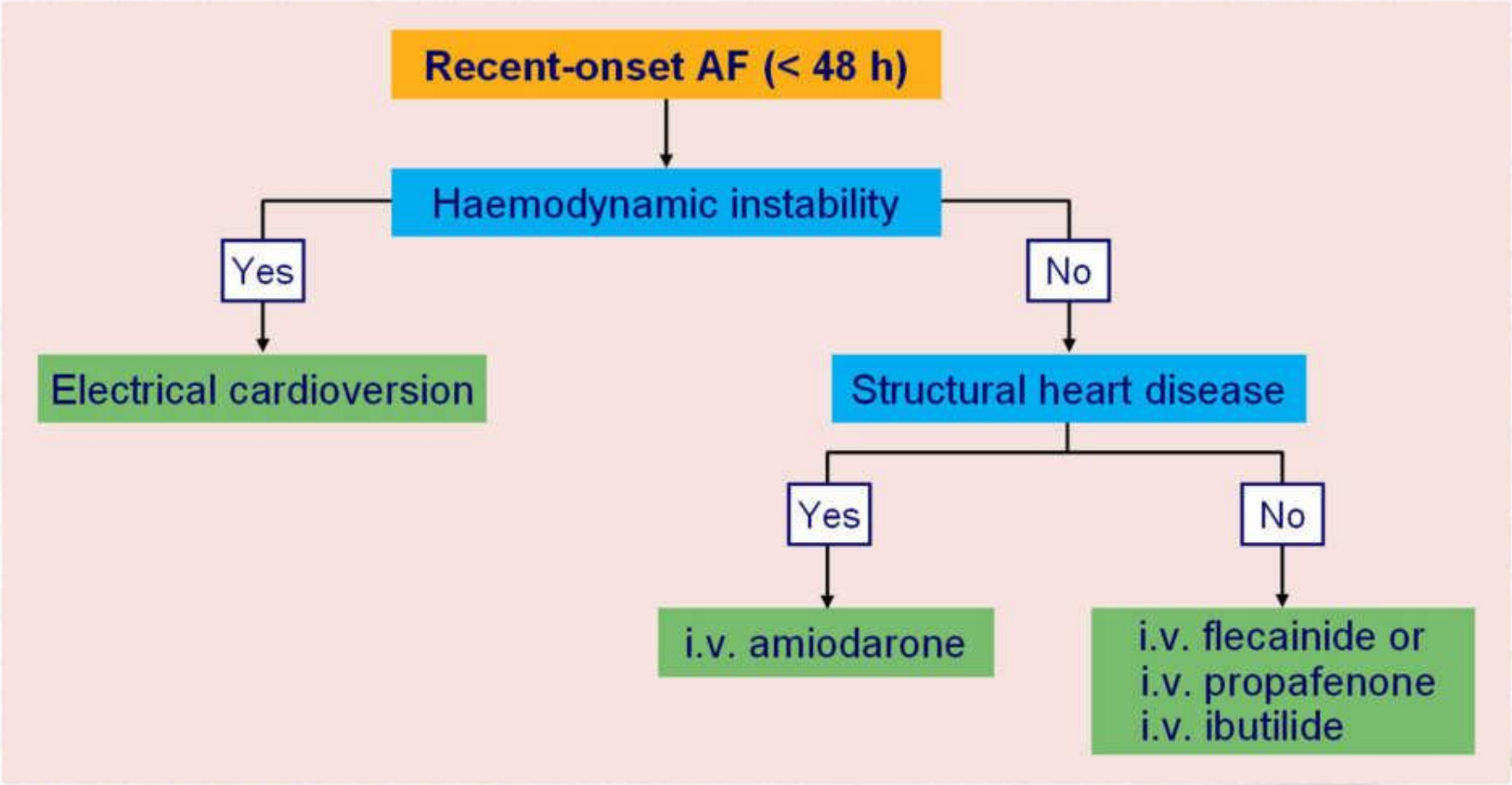
DCC and pharmacological conversion recent-onset AF



AF = atrial fibrillation; i.v. = intravenous.

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Pharmacological cardioversion of AF

Recommendations	Class[a]	Level[b]
When pharmacological cardioversion is preferred and there is no structural heart disease, i.v. fleainide or propafenone is recommended for cardioversion of recent-onset AF.	I	A
In patients with recent-onset AF and structural heart disease, i.v. amiodarone is recommended.	I	A
In selected patients with recent-onset AF and no significant structural heart disease, a single high oral dose of flecainide or propafenone (the 'pill-in-the-pocket' approach) should be considered, provided this treatment has proven safe during previous testing in a medically secure environment.	IIa	B
In patients with recent-onset AF, structural heart disease, but without hypotension or manifest congestive heart failure, ibutilide may be considered. Serum electrolytes and the QTc interval must be within the normal range, and the patients must be closely monitored during and for 4 h after the infusion because of risk of proarrhythmia.	IIb	A
Digoxin (LoE A), verapamil, sotalol, metoprolol (LoE B), ajmaline and other β-blocking agents (LoE C) are ineffective in converting recent-onset AF to sinus rhythm and are not recommended.	III	A B C

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; LoE = level of evidence; i.v. = intravenous.

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DC cardioversion for AF

Recommendations	Class[a]	Level[b]
Immediate DCC is recommended when a rapid ventricular rate does not respond promptly to pharmacological measures in patients with AF and ongoing myocardial ischaemia, symptomatic hypotention, angina, or heart failure.	I	C
Immediate DCC is recommended for patients with AF involving pre-excitation when rapid tachycardia or haemodynamic instability is present.	I	B
Elective DCC should be considered in order to initiate a long-term rhythm control management strategy for patients with AF.	IIa	B
Pre-treatment with amiodarone, flecainide, propafenone, ibutilide, or sotalol should be considered to enhance success of DCC and prevent recurrent AF.	IIa	B
Repeated DCC may be considered in highly symptomatic patients refractory to other therapy.	IIb	C
Pre-treatment with β-blockers, diltiazem or verapamil may be considered for rate control, although the efficacy of these agents in enhancing success of DCC or preventing early recurrence of AF is uncertain.	IIb	C
DCC is contraindicated in patients with digitalis toxicity.	III	C

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; DCC = direct current cardioversion.

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General Management of the AF Patient

Clinical management of patients with AF involves the following five objectives:

1. Prevention of thromboembolism
2. Optimal management of concomitant cardiovascular disease
3. Symptom relief
4. Rate control
5. Correction of the rhythm disturbance

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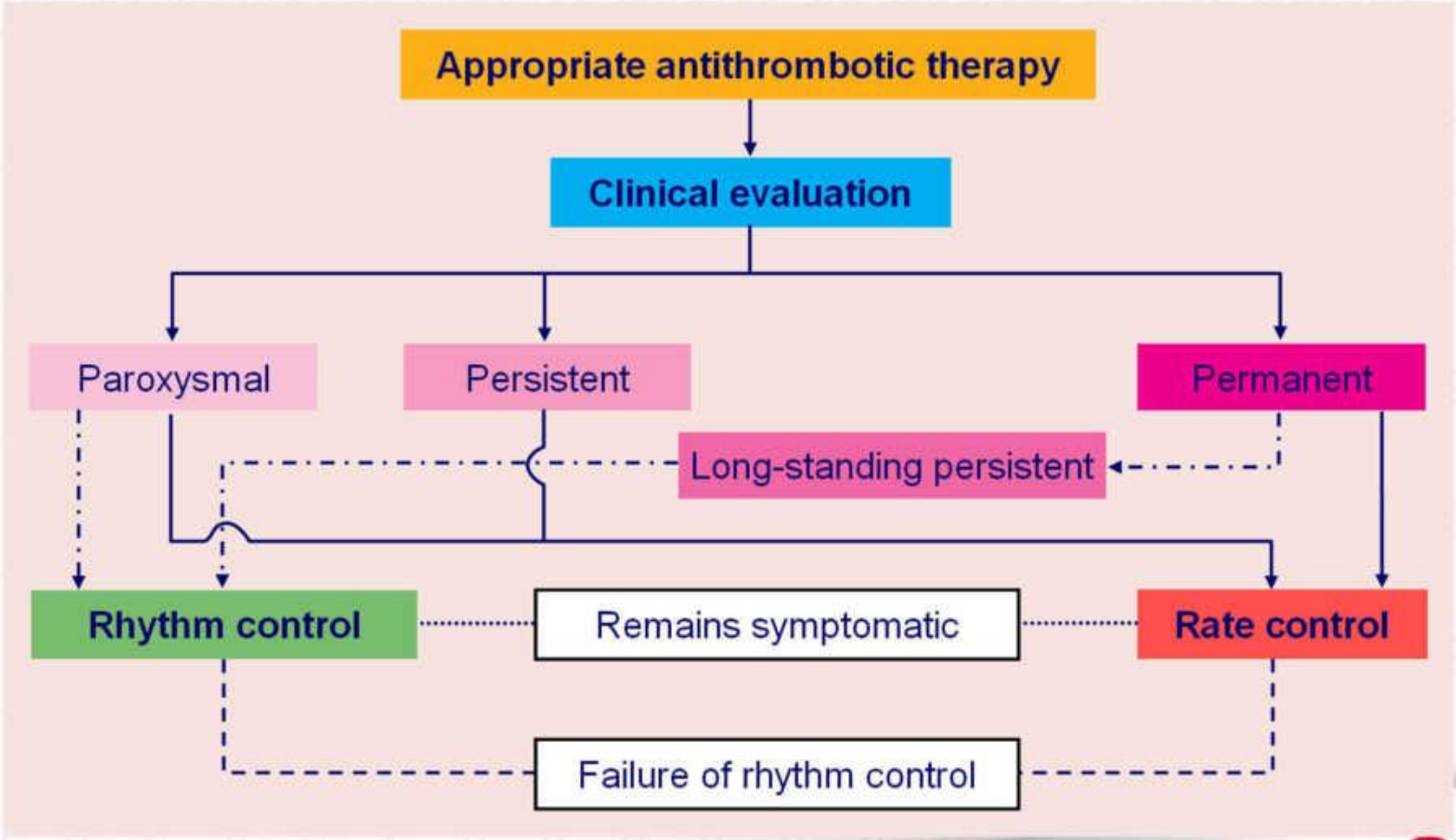
Choice of rate and rhythm control strategies



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Rate and rhythm control of AF

Recommendations	Class[a]	Level[b]
Rate control should be the initial approach in elderly patients with AF and minor symptoms (EHRA score 1).	I	A
Rhythm control is recommended in patients with symptomatic (EHRA score ≥ 2) AF despite adequate rate control.	I	B
Rate control should be continued throught a rhythm control approach to ensure adequate control of the ventricular rate during recurrences of AF.	I	A
Rhythm control as an initial approach should be considered in young symptomatic patients in whom catheter ablation treatment has not been ruled out.	IIa	C
Rhythm control should be considered in patients with AF secondary to a trigger or substrate that has been corrected (e.g. ischaemia, hyper-thyroidism).	IIa	C
Rhythm control in patients with AF and AF-related heart failure should be considered for improvement of symptoms.	IIa	B

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; EHRA = European Heart Rhythm Association.

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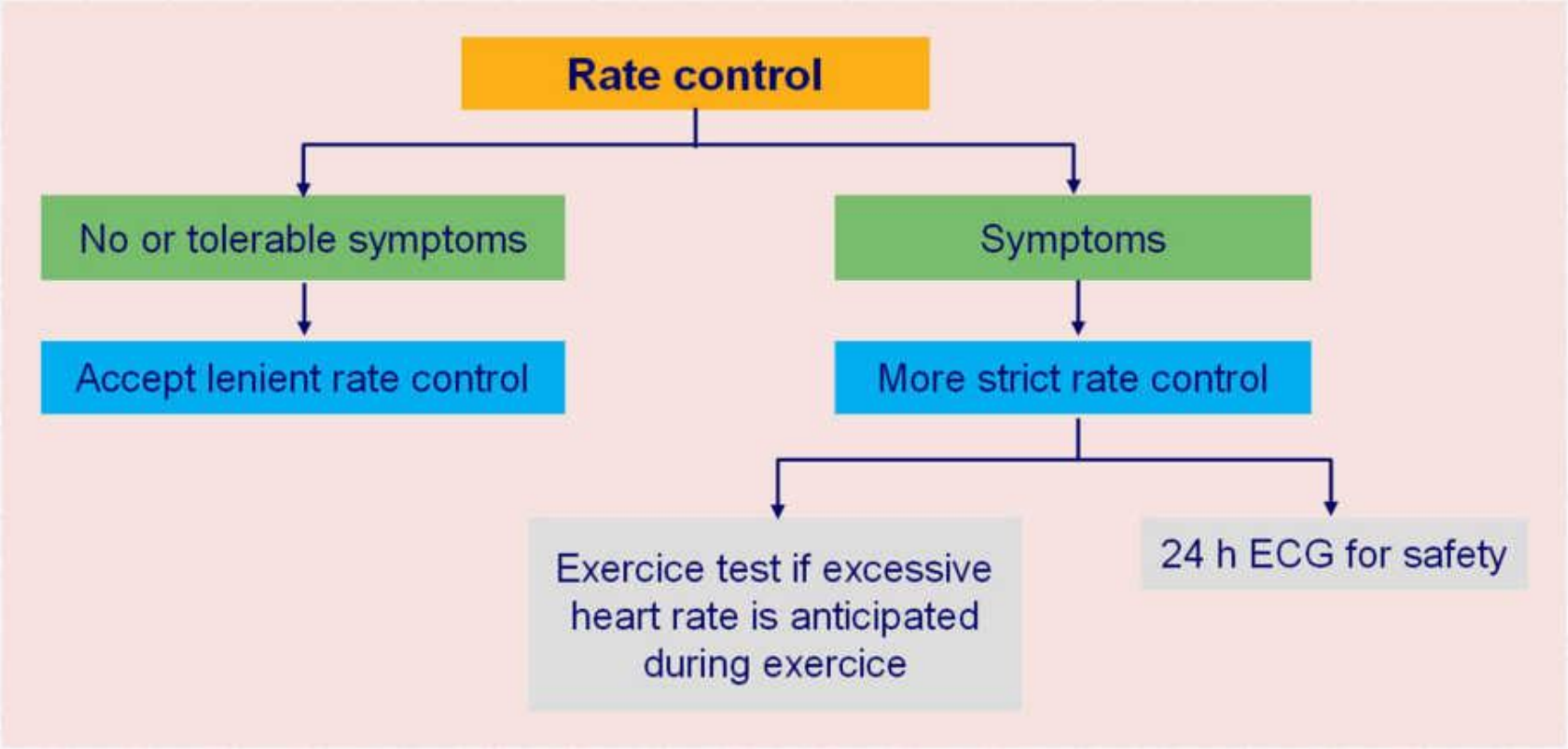
Optimal level of heart rate control



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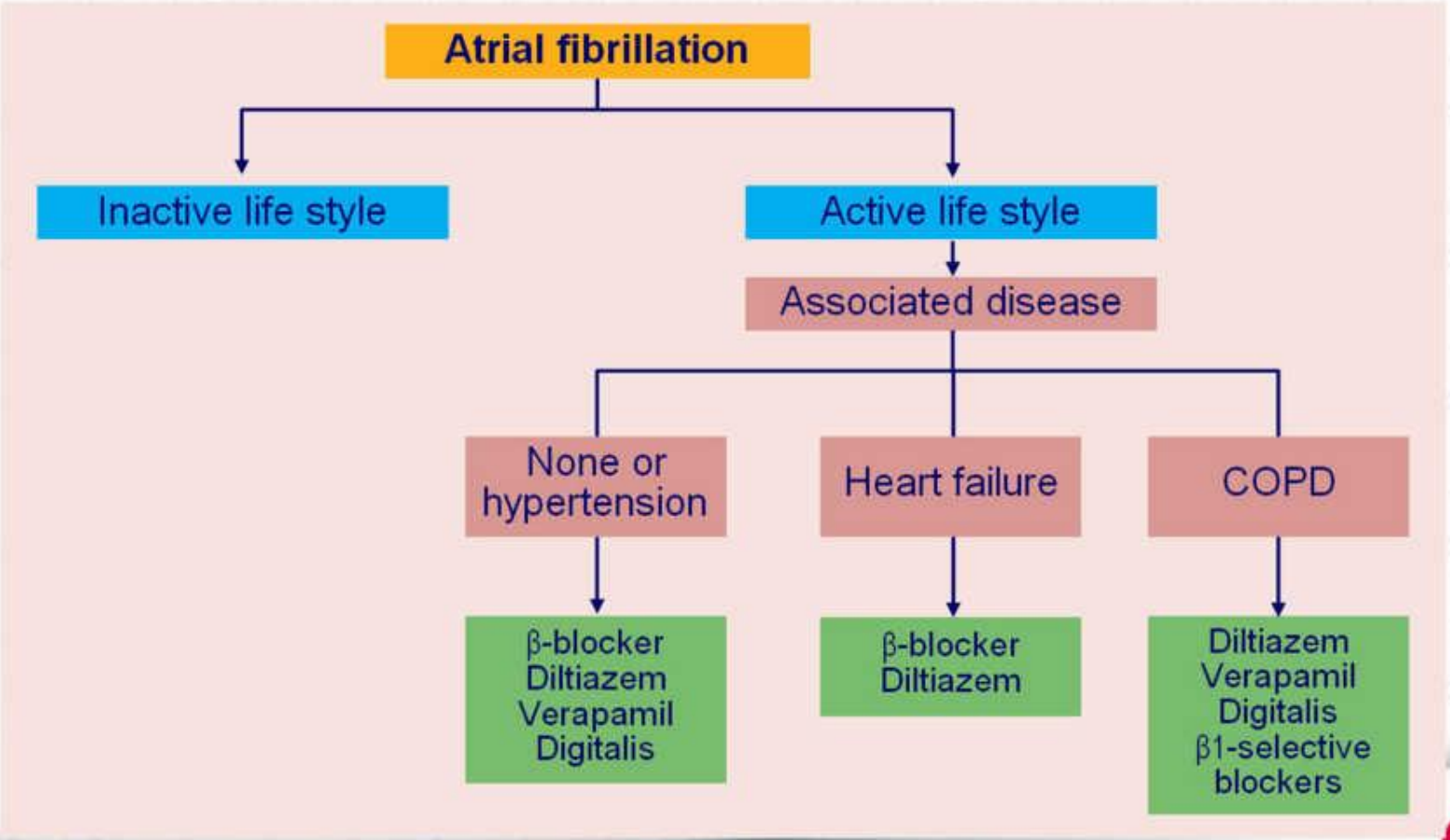
Rate control of atrial fibrillation

The choice of drugs depends on life style and underlying disease



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Drugs for rate control

	Intravenous administration	Maximum oral maintenance dose
β-Blockers		
Metoprolol CR/XL	2.5 - 5 mg	200 mg o.d. (ER)
Bisoprolol	N/A	2.5 - 10 mg o.d.
Atenolol	N/A	25 - 100 mg o.d.
Esmolol	10 mg	N/A
Propranolol	1 mg	10 - 40 mg t.i.d.
Carvedilol	N/A	3.125 - 25. mg b.i.d.
Non-dihydropyridine calcium channel antagonists		
Verapamil	5 mg	240 mg o.d. (ER)
Diltiazem	N/A	360 mg o.d. (ER)
Digitalis glycosides		
Digoxin	0.5 - 1 mg	0.125 mg - 0.5 mg o.d.
Digitoxin	0.4 - 0.6 mg	0.05 mg - 0.1 mg o.d.
Others		
Amiodarone	5 mg/kg in 1 h, and 50 mg/h maintenance	100 mg - 200 mg o.d.
Dronedarone‡	N/A	400 mg b.i.d.

ER = extended release formulations; N/A = not applicable. ‡Only in patients with non-permanent atrial fibrillation.

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Acute rate control in AF

Recommendations	Class[a]	Level[b]
In the acute setting in the absence of pre-excitation, i.v. administration of β-blockers or non-dihydropyridine calcium channel antagonists is recommended to slow the ventricular response to AF, exercising caution in patients with hypotension or heart failure.	I	A
In the acute setting, i.v. administration of digitalis or amiodarone is recommended to control the heart rate in patients with AF and concomitant heart failure, or in the setting of hypotension.	I	B
In pre-excitation, preferred drugs are class 1 antiarrhythmic drugs or amiodarone	I	C
When pre-excited AF is present, β-blockers, non-dihydropyridine calcium channel antagonists, digoxin and adenosine are contraindicated.	III	C

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; i.v. = intravenous.

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Long-term rate control in AF

Recommendations	Class[a]	Level[b]
Rate control using pharmacological agent (β-blockers, non-dihydropyridine calcium channel antagonists, digitalis, or a combination thereof) is recommended in patients with paroxysmal, persistent or permanent AF. The choice of medication should be individualised and the dose modulated to avoid bradycardia.	I	B
In patients who experience symptoms related to AF during activity, the adequacy of rate control should be assessed during exercice, and therapy should be adjusted to achieve a physiological chronotropic response and to avoid bradycardia.	I	C
In pre-excitation AF, or in patients with a history of AF, preferred drugs for rate control are propafenone or amiodarone.	I	C

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; bmp = beats per minute; LV = left ventricular; NYHA = New York Heart Association.

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Long-term rate control in AF

Recommendations	Class[a]	Level[b]
It is reasonable to initiate treatment with a lenient rate control protocol aimed at a resting heart rate < 110 bpm.	IIa	B
It is reasonable to adopt a stricter rate control strategy when symptoms persist or tachycardiomyopathy occurs, despite lenient rate control: resting heart rate < 80 bpm and heart rate during moderate exercice < 110 bpm. After achieving the strict heart rate target a 24 h Holter monitor is recommended to assess safety.	IIa	B
It is reasonable to achieve rate control by administration of dronedarone in non-permanent AF except for patients with NYHA class III - IV or unstable heart failure.	IIa	B
Digoxin is indicated in patients with heart failure and LV dysfunction, and in sedentary (inactive) patients.	IIa	C
Rate control may be achieved by administration of oral amiodarone when other measures are unsuccessful or contraindicated.	IIb	C
Digitalis should not be used as the sole agent to control the rate of ventricular response in patients with paroxysmal AF.	III	B

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; bmp = beats per minute; LV = left ventricular; NYHA = New York Heart Association.

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AV node ablation in AF patients

Recommendations	Class[a]	Level[b]
Ablation of the AV node to control heart rate should be considered when the rate cannot be controlled with pharmacological agents and when AF cannot be prevented by antiarrhythmic therapy or is associated with intolerable side-effects, and direct catheter-based or surgical ablation of AF is not indicated, has failed or is rejected.	IIa	B
Ablation of the AV node should be considered for patients with permanent AF and an indication for CRT (NYHA functional class III or ambulatory class IV symptoms despite optimal medical therapy, LVEF ≤ 35%, QRS width ≥ 130 ms).	IIa	B
Ablation of the AV node should be considered for CRT non-responders in whom AF prevents effective biventricular stimulation and amiodarone is ineffective or contraindicated.	IIa	C

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; AV = atrioventricular; CRT = cardiac resynchronization therapy; LV = left ventricular; LVEF = left ventricular ejection fraction; NYHA = New York Heart Association.

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AV node ablation in AF patients

Recommendations	Class[a]	Level[b]
In patients with any type of AF and severely depressed LV function (LVEF ≤ 35%) and severe heart failure symptoms (NYHA III or IV), biventricular stimulation should be considered after AV node ablation.	IIa	C
Ablation of the AV node to control heart rate may be considered when tachycardiamediated cardiomyopathy is suspected and the rate cannot be controlled with pharmacological agents, and direct ablation of AF is not indicated, has failed or is rejected.	IIb	C
Ablation of the AV node with consecutive implantation of a CRT device may be considered in patients with permanent AF, LVEF ≤ 35% and NYHA functional class I or II symptoms on optimal medical therapy to control heart rate when pharmacological therapy is insufficient or associated with side-effects.	IIb	C
Catheter ablation of the AV node should not be attempted without a prior trial of medication, or catheter ablation for AF, to control the AF and/or ventricular rate in patients with AF.	III	C

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation; AV = atrioventricular; CRT = cardiac resynchronization therapy; LV = left ventricular; LVEF = left ventricular ejection fraction; NYHA = New York Heart Association.

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Choice of pacemakers after AV node ablation

Recommendations	Class[a]	Level[b]
In patients with any type of AF, moderately depressed LV function (LVEF ≤ 45%) and mild heart failure symptoms (NYHA II) implantation of a CRT pacemaker may be considered after AV node ablation.	IIb	C
In patients with paroxysmal AF and normal LV function, implantation of a dual-chamber (DDD) pacemaker with mode-switch function may be considered after AV node ablation.	IIb	C
In patients with persistent or permanent AF and normal LV function, implantation of a single-chamber (WIR) pacemaker may be considered after AV node ablation.	IIb	C

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; AV = atrioventricular; CRT = cardiac resynchronization therapy; LV = left ventricular; LVEF = left ventricular ejection fraction; NYHA = New York Heart Association.

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Principles of antiarrhythmic drug therapy to maintain sinus rhythm

1. Treatment is motivated by attempts to reduce AF-related symptoms.
2. Efficacy of antiarrhythmic drugs to maintain sinus rhythm is modest.
3. Clinically successful antiarrhythmic drug therapy may reduce rather than eliminate recurrence of AF.
4. If one antiarrhythmic drug 'fails' a clinically acceptable response may be achieved with another agent.
5. Drug-induced proarrhythmia or extra-cardiac side-effects are frequent.
6. Safety rather than efficacy considerations should primarily guide the choice of antiarrhythmic agent.

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Suggested doses and main caveats for commonly used antiarrhythmic drugs

Drug	Dose	Main contraindications and precautions	ECG features prompting lower dose or discontinuation	AV nodal slowing
Disopyramide	100-250 mg t.i.d.	Contraindicated in systolic heart failure. Caution when using concomitant medication with QT-prolonging drugs.	QT interval > 500 ms	None
Flecainide	100-200 mg b.i.d.	Contraindicated if creatinine clearance < 50 mg/mL, in coronary artery disease, reduced LV ejection fraction.	QRS duration increase > 25% above baseline	None
Flecanide XL	200 mg o.d.	Caution in the presence of conduction system disease.		
Propafenone	150-300 mg t.i.d.	Contraindicated in coronary artery disease, reduced LV ejection fraction.	QRS duration increase > 25% above baseline	Slight
Propafenone SR	225-425 mg b.i.d.	Caution in the presence of conduction system disease and renal impairment.		

AF = atrial fibrillation; AV = atrioventricular; bpm = beats per minute; CYP = cytochrome P; ECG = electrocardiogram; LV = left ventricular; NYHA = New York Heart Association.

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Suggested doses and main caveats for commonly used antiarrhythmic drugs (Contd)

Drug	Dose	Main contraindications and precautions	ECG features prompting lower dose or discontinuation	AV nodal slowing
d,l-Sotalol	80-160 mg b.i.d..	Contraindicated in the presence of significant LV hypertrophy, systolic heart failure, pre-existing QT prolongation, hypokalaemia. Creatinine clearance < 50 mg/mL. Moderate renal dysfunction requires careful adaptation of dose.	QT interval > 500 ms	Similar to high-dose β-blockers
Amiodarone	600 mg o.d. for 4 weeks, 400 mg o.d. for 4 weeks then 200 mg o.d.	Caution when using concomitant medication with QT-prolonging drugs, heart failure. Dose of vitamin K antagonists and of digitoxin/digoxin should be reduced.	QT interval >500 ms	10–12 bpm in AF

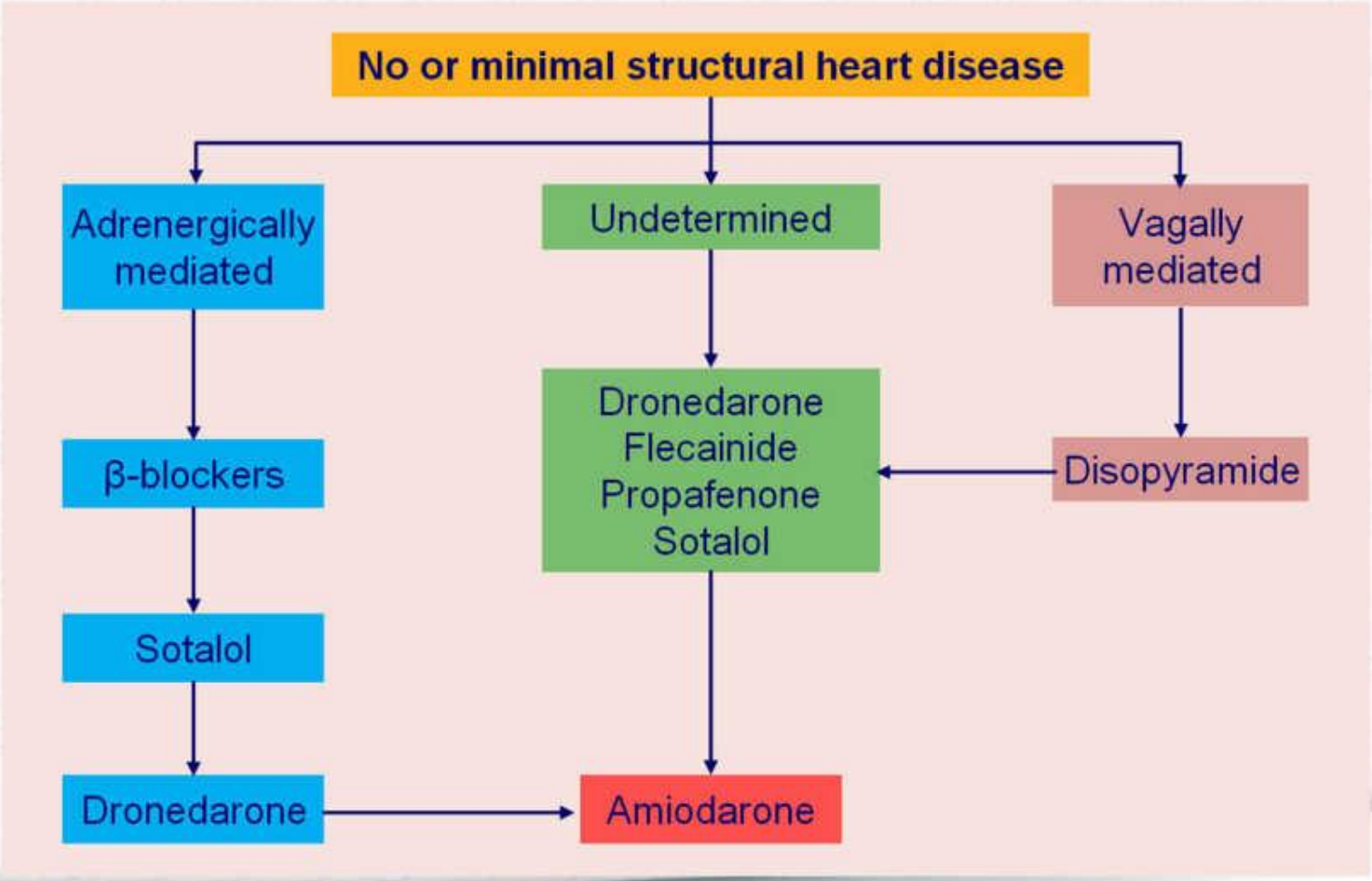
AF = atrial fibrillation; AV = atrioventricular; bpm = beats per minute; CYP = cytochrome P; ECG = electrocardiogram; LV = left ventricular; NYHA = New York Heart Association.

Suggested doses and main caveats for commonly used antiarrhythmic drugs (Contd)

Drug	Dose	Main contraindications and precautions	ECG features prompting lowerdose or discontinuation	AV nodal slowing
Dronedarone	400 mg b.i.d.	Contraindicated in NYHA class III–IV or unstable heart failure, during concomitant medication with QT-prolonging drugs, powerful CYP 3A4 inhibitors, if creatinine clearance < 30 mg/mL. Dose of digitoxin/digoxin should be reduced. Elevations in serum creatinine of 0.1–0.2 mg/dL are common and do not reflect reduced renal function.	QT interval > 500 ms	10–12 bpm in AF

AF = atrial fibrillation; AV = atrioventricular; bpm = beats per minute; CYP = cytochrome P; ECG = electrocardiogram; LV = left ventricular; NYHA = New York Heart Association.

Choice of antiarrhythmic for the patient with no or minimal structural heart disease



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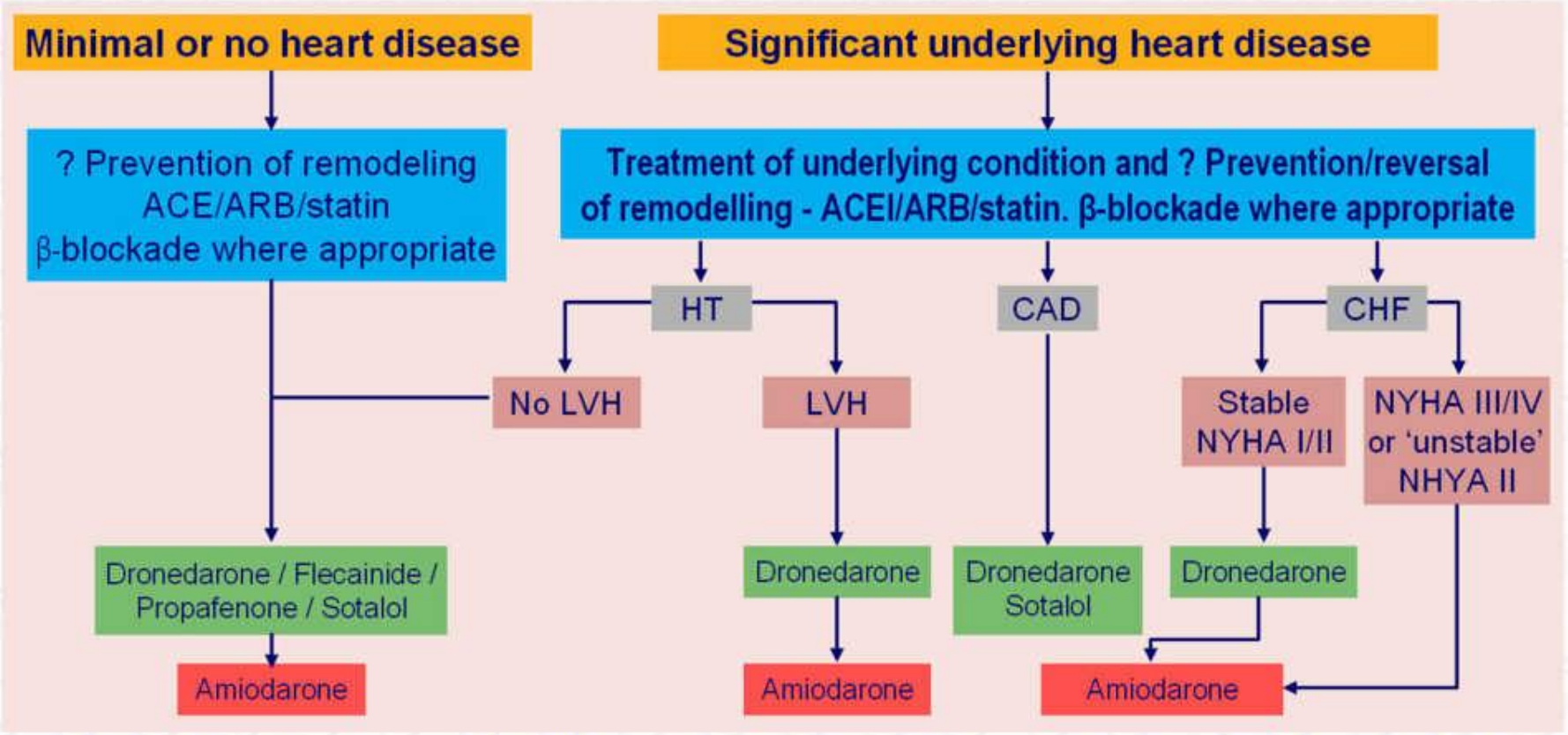
Choice of antiarrhythmic drug according to underlying pathology



ACEI = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CAD = coronary artery disease; CHF = congestive heart failure; HT = hypertension; LVH = left ventricular hypertrophy; NYHA = New York Heart Association; unstable = cardiac decompensation within the prior 4 weeks. Antiarrhythmic agents are listed in alphabetical order within each treatment box. ? = evidence for 'upstream' therapy for prevention of atrial remodelling still remains controversial.

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Choice of an antiarrhythmic drug for AF control

Recommendations	Class[a]	Level[b]
The following antiarrhythmic drugs are recommended for rhythm control in patients with AF, depending on underlying heart disease:		
• amiodarone	I	A
• dronedarone	I	A
• flecainide	I	A
• propafenone	I	A
• d,l-sotalol	I	A
Amiodarone is more effective in maintaining sinus rhythm than sotalol, propafenone, flecainide (by analogy) or dronedarone (LoE A), but because of its toxicity profile should generally be used when other agents have failed or are contraindicated (LoE C).	I	A C
In patients with severe heart failure, NYHA class III and IV or recently unstable (decompensation within the prior month) NYHA class II, amiodarone should be the drug of choice.	I	B

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; AV = atrioventricular; LoE = level of evidence; NYHA = New York Heart Association.

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Choice of an antiarrhythmic drug for AF control

Recommendations	Class[a]	Level[b]
In patients without significant structural heart disease, initial antiarrhythmic therapy should be chosen from dronedarone, flecainide, propafenone, and sotalol.	I	A
β-blockers are recommended for prevention of adrenergic AF.	I	C
If one antiarrhythmic drug fails to reduce the recurrence of AF to a clinically acceptable level, the use of another antiarrhythmic drug should be considered.	IIa	C
Dronedarone should be considered in order to reduce cardiovascular hospitalisations in patients with non-permanent AF and cardiovascular risk factors.	IIa	B
β-blockers should be considered for rhythm (plus rate) control in patients with a first episode of AF.	IIa	C
Disopyramide may be considered in patients with vagally mediated AF.	IIb	B

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; AV = atrioventricular; LoE = level of evidence; NYHA = New York Heart Association.

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Choice of an antiarrhythmic drug for AF control

Recommendations	Class[a]	Level[b]
Dronedarone is not recommended for treatment of AF in patients with NYHA class III and IV, or with recently unstable (decomposition within the prior month) NYHA class II heart failure.	III	B
Antiarrhythmic drug therapy is not recommended for maintenance of sinus rhythm in patients with advanced sinus node disease or AV node dysfunction unless they have a functioning permanent pacemaker.	III	C

[a]Class of recommendation.

[b]Level of evidence.

AF = atrial fibrillation; AV = atrioventricular; LoE = level of evidence; NYHA = New York Heart Association.

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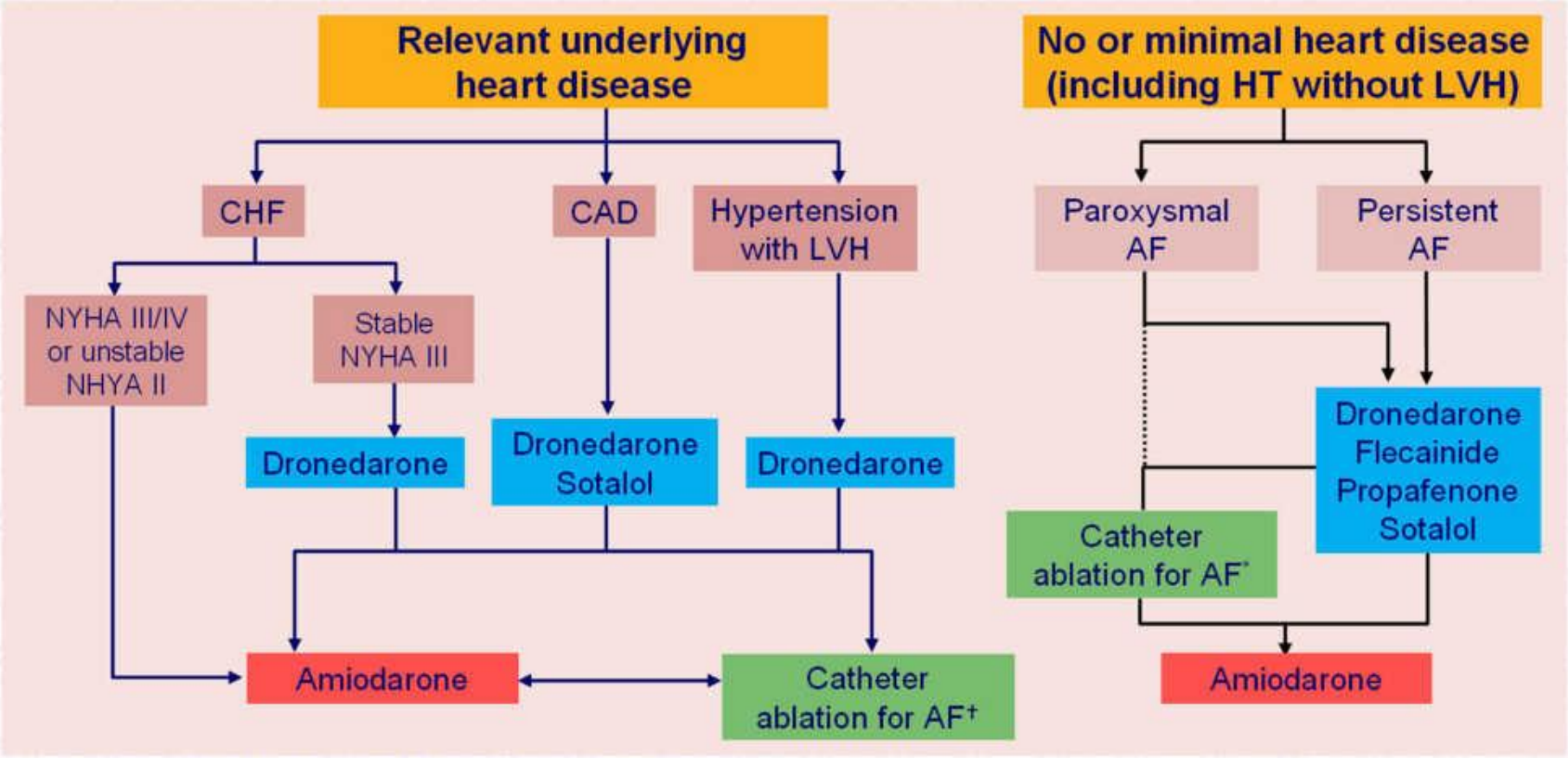
Choice between ablation and antiarrhythmic drug therapy for patients with and without structural heart disease



†More extensive LA ablation may be needed; *usually PVI is appropriate.
AF = atrial fibrillation; CAD = coronary artery disease; CHF = congestive heart failure; HT = hypertension; LVH = left ventricular hypertrophy; NYHA = New York Heart Association; PVI = pulmonary vein isolation. Antiarrhythmic agents are listed in alphabetical order within each treatment box.

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Left atrial catheter ablation

Recommendations	Class[a]	Level[b]
Ablation of common atrial flutter is recommended as part of an AF ablation procedure if documented prior to the ablation procedure or occuring during the AF ablation.	I	B
Catheter ablation for paroxysmal AF should be considered in symptomatic patients who have previously failed a trial of antiarrhythmic medication.	IIa	A
Ablation of persistent symptomatic AF that is refractory to antiarrhythmic therapy should be considered a treatment option.	IIa	B
In patients post-ablation, LMWH or i.v. UFH should be considered as 'bridging therapy' prior to resumption of systemic OAC, which should be continued for a minimum of 3 months. Thereafter, the individual stroke risk factors of the patient should be considered when determining if OAC therapy should be continued.	IIa	C
Continuation of OAC therapy post-ablation is recommended in patients with 1 'major' ('definitive') or ≥ 2 'clinically relevant non-major' risk factor (i.e., CHA_2DS_2-VASc score ≥ 2).	IIa	B

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation; i.v. = intravenous; LMWH = low molecular weight heparin; OAC = oral anticoagulant; UFH = unfractionated heparin.

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Left atrial catheter ablation

Recommendations	Class[a]	Level[b]
Catheter ablation of AF may be considered in patients with symptomatic long-standing persistent AF refractory to antiarrhythmic drugs.	IIb	C
Catheter ablation of AF in patients with heart failure may be considered when antiarrhythmic medication, including amiodarone, fails to control symptoms.	IIb	B
Catheter ablation of AF may be considered prior to antiarrhythmic drug therapy in symptomatic patients despite adequate rate control with paroxyxmal symptomatic AF and no significant underlying heart disease.	IIb	B

[a]Class of recommendation.
[b]Level of evidence.
AF = atrial fibrillation; i.v. = intravenous; LMWH = low molecular weight heparin; OAC = oral anticoagulant; UFH = unfractionated heparin.

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Surgical ablation of AF

Recommendations	Class[a]	Level[b]
Surgical ablation of AF should be considered in patients with symptomatic AF undergoing cardiac surgery.	IIa	A
Surgical ablation of AF may be performed in patients with asymptomatic AF undergoing cardiac surgery if feasible with minimal risk.	IIb	C
Minimally invasive surgical ablation of AF without concomitant cardiac surgery is feasible and may be performed in patients with symptomatic AF after failure of catheter ablation.	IIb	C

[a]Class of recommendation.

[b]Level of evidence.

AF = atrial fibrillation.

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Primary prevention of AF with "upstream" therapy

Recommendations	Class[a]	Level[b]
ACEIs and ARBs should be considered for prevention of new-onset AF in patients with heart failure and reduced ejection fraction.	IIa	A
ACEIs and ARBs should be considered for prevention of new-onset AF in patients with hypertension, particularly with left ventricular hypertrophy.	IIa	B
Statins should be considered for prevention of new-onset AF after coronary artery bypass grafting, isolated or in combination with valvular interventions.	IIa	B
Statins may be considered for prevention of new-onset AF in patients with underlying heart disease, particularly heart failure.	IIb	B
Upstream therapies with ACEIs, ARBs, and statins are not recommended for primary prevention of AF in patients without cardiovascular disease.	III	C

[a]Class of recommendation.

[b]Level of evidence.

ACEI = angiotensin-converting enzyme inhibitor; AF = atrial fibrillation; ARB = angiotensin receptor blocker.

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Secondary prevention of AF with "upstream" therapy

Recommendations	Class[a]	Level[b]
Pretreatment with ACEIs and ARBs may be considered in patients with recurrent AF undergoing electrical cardioversion and receiving anti-arrhythmic drug therapy.	IIb	B
ARBs or ACEIs may be useful for prevention of recurrent paroxysmal AF or in patients with peristent AF undergoing electrical cardioversion in the absence of significant structural heart disease if these agents are indicated for other reasons (e.g. hypertension)	IIb	B

[a]Class of recommendation.

[b]Level of evidence.

ACEI = angiotensin-converting enzyme inhibitor; AF = atrial fibrillation; ARB = angiotensin receptor blocker.

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Rate control during AF with heart failure

Recommendations	Class[a]	Level[b]
β-blockers are recommended as first-line therapy to control the ventricular rate in patients with heart failure and low LVEF.	I	A
Where monotherapy is inadequate for heart rate control, digoxin should be added.	I	B
In haemodynamically unstable patients with acute heart failure and low LVEF, amiodarone is recommended as the initial treatment.	I	B
If an AP is excluded, digoxin is recommended as an alternative to amiodarone to contrôl the heart rate in patients with AF and acute systolic heart failure.	I	C

[a]Class of recommendation.

[b]Level of evidence.

AF = atrial fibrillation; AP = accessory pathway; LVEF = left ventricular ejection fraction.

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Rate control during AF with heart failure

Recommendations	Class[a]	Level[b]
AV node ablation should be considered to control the heart rate when other measures are unsuccessful or contraindicated in patients with permanent AF and an indication for CRT (NYHA class III - IV, LVEF ≤ 35%, and QRS width ≥ 130 ms).	IIa	B
In patients with HF and preserved LVEF, a non-dihydropyridine calcium channel antagonist may be considered.	IIb	C
A β-blocker may be considered as an alternative to a non dihydropyridine calcium channel antagonist in heart failure with preserved ejection fraction.	IIb	C
A non-dihydropyridine calcium channel antagonist is not recommended to control the heart rate in patients with systolic heart failure.	III	C

[a]Class of recommendation.

[b]Level of evidence.

AF = atrial fibrillation; AV = atrioventricular; CRT = cardiac resynchronization therapy; LVEF = left ventricular ejection fraction; NYHA = New York Heart Association.

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Rhythm control of AF in heart failure

Recommendations	Class[a]	Level[b]
DCC is recommended when a rapid ventricular rate does not respond to pharmacological measures in patients with AF and ongoing myocardial ischaemia, symptomatic hypotension, or symptoms of pulmonary congestion.	I	C
In patients with AF and severe (NYHA class III or IV) or recent (≤ 4 weeks) unstable heart failure, the use of antiarrhythmic therapy to maintain sinus rhythm should be restricted to amiodarone.	I	C
Administration of amiodarone is a reasonable option for pharmacological cardioversion of AF, or to facilitate electrical cardioversion of AF	IIb	B
In patients with AF and stable heart failure (NYHA class I, II) dronedarone should be considered to reduce cardiovascular hospitalisations.	IIa	C
For patients with heart failure and symptomatic persistent AF despite adequate rate control, electrical cardioversion and rhythm control may be considered.	IIb	B
Catheter ablation (pulmonary vein isolation) may be considered in heart failure patients with refractory symptomatic AF.	IIb	B

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; DCC = direct current cardioversion; NYHA = New York Heart Association.

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Atrial Fibrillation in athletes

Recommendations	Class[a]	Level[b]
When a class I 'pill-in-the-pocket' approach is used, sport cessation should be considered for as long as the arrhythmia persists, and until one to two half-lives of the antiarrhythmic drug used have elapsed.	IIa	B
Isthmus ablation should be considered in competitive or leisure-time athletes with documented atrial flutter, especially when therapy with class I anti-arrhythmic drugs is intended.	IIa	C
Where appropriate, AF ablation should be considered to prevent recurrent AF in athletes.	IIa	C
When a specific cause for AF is indentified in an athlete (such as hyper-thyroidism), participation in competitive or leisure time sports should be temporarily suspended until correction of the cause.	III	C
Physical sports activity should not be allowed when symptoms due to haemodynamic impairment (such as dizziness) are present.	III	C

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation.

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Atrial Fibrillation in valvular heart disease

Recommendations	Class[a]	Level[b]
Anticoagulation (INR 2.0-3.0) is indicated in patients with mitral stenosis and AF (paroxysmal, persistent, or permanent).	I	C
Anticoagulation (INR 2.0-3.0) is recommended in patients with AF and clinically significant mitral regurgitation.	I	C
Percutaneous mitral balloon valvotomy should be considered for asymptomatic patients with moderate or severe mitral stenosis and suitable valve anatomy who have new onset AF in the absence of LA thrombus.	IIa	C
Early mitral valve surgery should be considered in severer mitral regurgitation, preserved LV function, and new onset AF, even in the absence of symptoms, particularly when valve repair is feasible.	IIa	C

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; INR = international normalized ratio; LA = left atrial; LV = left ventricular.

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Atrial Fibrillation in acute coronary syndromes

Recommendations	Class[a]	Level[b]
DCC is recommended for patients with severe haemodynamic compromise or intractable ischaemia, or when adequate rate control cannot be achieved with pharmacological agents in patients with ACS and AF.	I	C
Intravenous administration of amiodarone is recommended to slow a rapid ventricular response to AF in patients with ACS.	I	C
Intravenous β-blockers are recommended to slow a rapid ventricular response to AF in patients with ACS.	I	C
Intravenous administration of non-dihydropyridine calcium antagonists (verapamil, diltiazem) should be considered to slow a rapid ventricular response to AF in patients with ACS and no clinical signs of heart failure.	IIa	C
Intravenous administration of digoxin may be considered to slow a rapid ventricular response in patients with ACS and AF associated with heart failure.	IIb	C
Administration of flecainide or propafenone is not recommended in patients with AF in the setting of ACS.	III	B

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation, ACS = acute coronary syndrome; DCC = direct current cardioversion.

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Atrial Fibrillation in :

Diabetics

Recommendations	Class[a]	Level[b]
AF patients with diabetes are recommended to undergo full assessment and management of all cardiovascular risk factors, including blood pressure, lipids, etc…	I	C

Elderly

Recommendations	Class[a]	Level[b]
Every patient aged 65 years and older who attends their general practitioner should be screened by checking the pulse, followed by an ECG in case of irregularity.	I	B

[a]Class of recommendation.
[b]Level of evidence.
AF = atrial fibrillation, ECG = electrocardiogram.

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Atrial Fibrillation in pregnancy

Recommendations	Class[a]	Level[b]
DCC can be performed safely at all stages of pregnancy, and is recommended in patients who are haemodynamically unstable due to AF, and whenever the risk of ongoing AF is considered high, for the mother or for the fœtus.	I	C
Protection against thromboembolism is recommended throughout pregnancy in AF patients with a high thromboembolic risk; the choice of agent (heparin or warfarin) should be made according to the stage of pregnancy.	I	C
Administration of an oral VKA is recommended from the second trimester, until 1 month befor expected delivery.	I	B
Subcutaneous administration of LMWH in weight adjusted therapeutic doses may be given during the first trimester and during the last month of pregnancy. Alternatively, UFH may be given, to prolong the activated partial thromboplastin time to 1.5 times the control.	I	B

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; DCC = direct current cardioversion; LMWH = low molecular weight heparin; UFH = unfractionated heparin; VKA = vitamin K antagonist.

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Atrial Fibrillation in pregnancy

Recommendations	Class[a]	Level[b]
If rate control is necessaire, a β-blocker or a non-dihydropyridine calcium channel antagonist should be considered. During the first trimester of pregnancy, the use of β-blockers must be weighed against the potential risk of negative fœtal effects.	IIa	C
In haemodynamically stable patients with structurally normal hearts, flecainide or ibutilide given intravenously to terminate recent-onset AF may be considered, if arrhythmia conversion is mandatory and DCC considered inappropriate.	IIb	C
If rate control is indicated, and β-blockers or non-dihydropyridine calcium channel antagonists are contraindicated, digoxin may be considered.	IIb	C

[a]Class of recommendation.

[b]Level of evidence.

AF = atrial fibrillation; DCC = direct current cardioversion.

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Post-operative Atrial Fibrillation

Recommendations	Class[a]	Level[b]
Oral β-blockers are recommended to prevent postoperative AF for patients undergoing cardiac surgery in the absence of contraindications.	I	A
If used β-blockers (or other oral antiarrhythmic drug for AF management) are recommended to be continued until the day of surgery.	I	B
Restoration of sinus rhythm by DCC is recommended in patients who develop postoperative AF and are haemodynamically unstable.	I	C
Ventricular rate control is recommended in patients with AF without haemodynamic instability.	I	B

[a]Class of recommendation.

[b]Level of evidence.

AF = atrial fibrillation; DCC = direct current cardioversion.

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Post-operative Atrial Fibrillation

Recommendations	Class[a]	Level[b]
Preoperative administration of amiodarone should be considered as prophylactic therapy for patients at high risk for postoperative AF.	IIa	A
Unless contraindicated, antithrombotic/anticoagulation medication for post-operative AF should be considered when the duration of AF is ≥ 48 h.	IIa	A
If sinus rhythm is restored successfully, duration of anticoagulation should be for a minimum of 4 weeks but more prolonged in the presence of stroke risk factors.	IIa	B
Antiarrhythmic medications should be considered for recurrent or refractory postoperative AF in an attempt to maintain sinus rhythm.	IIa	C
Sotalol may be considered for prevention of AF after cardiac surgery, but is associated with risk of proarrhythmia.	IIb	A
Biatrial pacing may be considered for prevention of AF after cardiac surgery.	IIb	A
Corticosteroids may be considered in order to reduce the incidence of AF after cardiac surgery, but are associated with risk.	IIb	B

[a]Class of recommendation. [b]Level of evidence.

AF = atrial fibrillation; DCC = direct current cardioversion.

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Atrial Fibrillation in hyperthyroidism

Recommendations	Class[a]	Level[b]
In patients with active thyroid disease, antithrombotic therapy is recommended based on the presence of other stroke risk factors.	I	C
Administration of a β-blocker is recommended to control the rate of ventricular response in patients with AF complicating thyrotoxicosis, unless contraindicated.	I	C
In circumstances when a β-blocker cannot be used, administration of a non-dihydropyridine calcium channel antagonist (diltiazem or verapamil) is reconnended to control the ventricular rate in patients with AF and thyrotoxicosis.	I	C
If a rhythm control strategy is desirable, it is necessary to normalize thyroid function prior to cardioversion, as otherwise the risk of relaps remains high.	I	C
Once a euthyroid state is restored, recommendations for antithrombotic prophylaxis are the same as for patients without hyperthyroidism.	I	C

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation.

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AF in Wolff-Parkinson-White syndrome

Recommendations	Class[a]	Level[b]
Catheter ablation of an overt AP in patients with AF is recommended to prevent sudden cardiac death (SCD).	I	A
Immediate referral to an experienced ablation centre for catheter ablation is recommended for patients who survived SCD and have evidence of overt AP conduction.	I	C
Catheter ablation is recommended for patients with high risk professions (e.g. pilots, public transport drivers) and overt but asymptomatic AP conduction on the surface ECG.	I	B
Catheter ablation is recommended in patients at high risk of developing AF in the presence of an overt but asymptomatic AP on the surface ECG.	I	B
Asymptomatic patients with evidence of an overt AP may should be considered for catheter ablation of the AP only after a full explanation and careful counselling.	I	B

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; AP = accessory pathway; ECG = electrocardiogram; SCD = sudden cardiac death..

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AF in hypertrophic cardiomyopathy

Recommendations	Class[a]	Level[b]
Restoration of sinus rhythm by DCC or pharmacological cardioversion is recommended in patients with HCM presenting with recent-onset AF.	I	B
OAC therapy (INR 2.0-3.0) is recommended in patients with HCM who develop AF unless contraindicated.	I	B
Amiodarone (or alternatively, disopyramide plus β-blocker) should be considered in order to achieve rhythm control and to maintain sinus rhythm in patients with HCM.	IIa	C
Direct catheter ablation of AF should be considered in patients with symptomatic AF refractory to pharmacological control.	IIa	C
Ablation procedures (with concomitant septal myectomy if indicated) may be considered in patients with HCM and refractory AF.	IIa	C

[a]Class of recommendation. [b]Level of evidence. AF = atrial fibrillation; DCC = direct current cardioversion; HCM = hypertrophic cardiomyopathy; INR = international normalized ratio.

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Atrial Fribillation in pulmonary disease

Recommendations	Class[a]	Level[b]
Correction of hypoxaemia and acidosis is recommended initial management for patients who develop AF during an acute pulmonary illness or exacerbation of chronic pulmonary disease.	I	C
DCC should be attempted in patients with pulmonary disease who become haemodynamically unstable as a consequence of AF.	I	C
A non-dihydropyridine calcium channel antagonist (diltiazem or verapamil) should be considered to control the ventricular rate in patients with obstructive pulmonary disease who develop AF.	IIa	C
β-1 selective blockers (e.g. bisoprolol) in small doses should be considered as an alternative for ventricular rate control.	IIa	C
Theophylline and β-adrenergic agonist agents are not recommended in patients with bronchospastic lung disease who develop AF.	III	C
Non-selective β-blockers, sotalol, propafenone, and adenosine are not recommended in patients with obstructive lung disease who develop AF.	III	C

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; DCC = direct current cardioversion.

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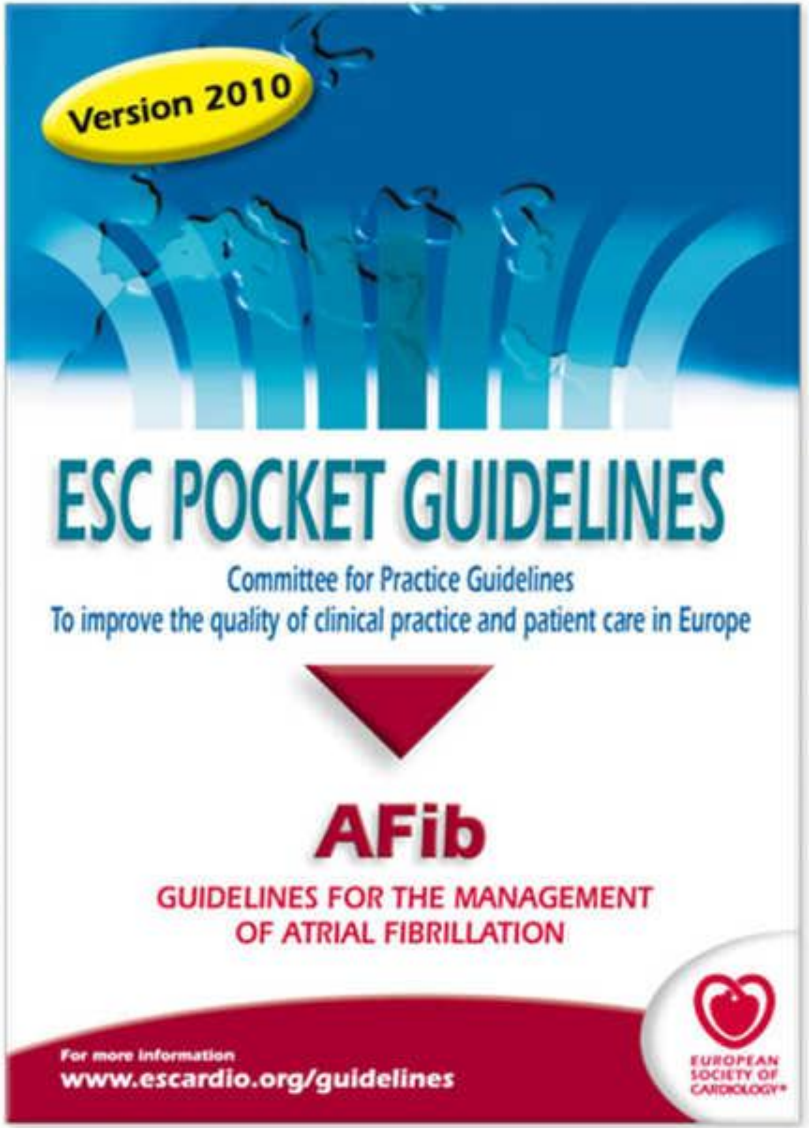

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