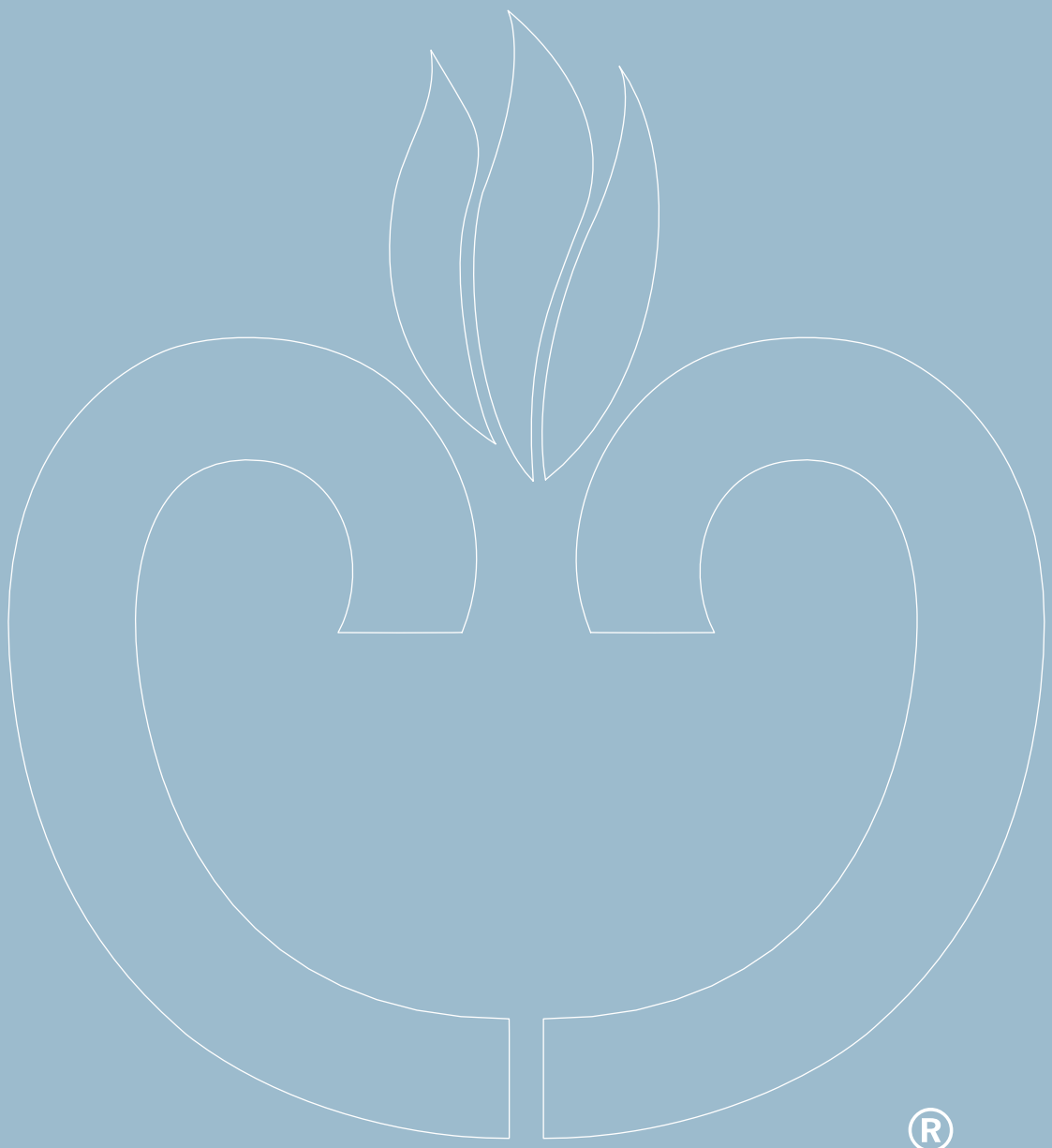
Canadian Cardiovascular Society

2010 Atrial Fibrillation Guidelines



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8. Prevention and Treatment of Atrial Fibrillation following Cardiac Surgery

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Chapter 2: Atrial Fibrillation: Etiology and Initial Investigations

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Recommendations

1. All patients with atrial fibrillation should have a complete history and physical examination, electrocardiogram, echocardiogram, basic laboratory investigations. Details are highlighted in **Table 1**. (Strong Recommendation; Low Quality Evidence)
2. Other ancillary tests should be considered under specific circumstances. Details included in **Table 2**. (Strong Recommendation; Low Quality Evidence)
3. We recommend that the assessment of patient well - being, symptoms, and quality of life (QOL) be part of the evaluation of every patient with AF. (Strong Recommendation, Low Quality of Evidence)
4. We suggest that QOL of the AF patient can be assessed in routine care using the CCS-SAF scale. (Conditional Recommendation, Low Quality of Evidence)
5. Underlying causes or precipitating factors for AF including hypertension should be identified and treated. Details are highlighted in Table 3. (Strong; High Quality of Evidence)

Table 1. Baseline Evaluation of Atrial Fibrillation for All Patients

History and Physical Exam
Establish Pattern (New Onset, Paroxysmal, Persistent or Permanent)
Establish Severity (including impact on quality of life)
Identify Etiology
Identify reversible causes (hyperthyroidism, ventricular pacing, supraventricular tachycardia, exercise, etc)
Identify risk factors whose treatment could reduce recurrent AF or improve overall prognosis (i.e. hypertension, sleep apnea, left ventricular dysfunction, etc)
Take social history to identify potential triggers (i.e. alcohol, intensive aerobic training, etc)
Elicit family history, to identify potentially heritable causes of AF (particularly in lone AF)
Determine thromboembolic risk
Determine bleeding risk to guide appropriate antiplatelet or antithrombotic therapy
Review prior pharmacologic therapy for AF, both for efficacy and adverse effects
Measure blood pressure and heart rate
Determine patient height and weight
Comprehensive precordial cardiac examination and assessment of jugular venous pressure, carotid and peripheral pulses to detect evidence of structural heart disease
12-Lead Electrocardiogram
Document presence of AF
Assess for structural heart disease (myocardial infarction, ventricular hypertrophy, atrial enlargement, congenital heart disease) or electrical heart disease (Ventricular pre-excitation, Brugada syndrome)
Identify risk factors for complications of therapy for AF (conduction disturbance, sinus node dysfunction or repolarization). Document baseline PR, QT or QRS intervals.
Echocardiogram
Document ventricular size, wall thickness and function
Evaluate left atrial size (if possible, left atrial volume)
Exclude significant valvular or congenital heart disease (particularly atrial septal defects)
Estimate ventricular filling pressures and pulmonary arterial pressure
Complete blood count, coagulation profile, renal function, thyroid and liver function
Fasting lipid profile, fasting glucose

Table 2. Additional Investigations Useful in Selected Cases

Investigation	Potential Role
Chest radiography	Exclude concomitant lung disease, heart failure, baseline in patients receiving amiodarone
Ambulatory electrocardiography (Holter monitor, event monitor, loop monitor)	Document AF, exclude alternative diagnosis (atrial tachycardia, atrial flutter, AVNRT/AVRT, ventricular tachycardia), symptom-rhythm correlation, assess ventricular rate control
Treadmill exercise test	Investigation of patients with symptoms of coronary artery disease, assessment of rate control,
Trans-esophageal echocardiography	Rule out left atrial appendage thrombus, facilitate cardioversion in patients not receiving oral anticoagulation, more precise characterization of structural heart disease (mitral valve disease, atrial septal defects, cor triatriatum, etc)
Electrophysiologic Study	Patients with documented regular supraventricular tachycardia (i.e. atrial tachycardia, AVNRT/AVRT, atrial flutter) that is amenable to catheter ablation
Serum calcium and magnesium	In cases of suspected deficiency (i.e. diuretic use, gastrointestinal losses) which could influence therapy (i.e. sotalol)
Sleep Study (ambulatory oximetry or poly-somnography)	In patients with symptoms of obstructive sleep apnea or in select patients with advanced symptomatic heart failure
Ambulatory blood pressure monitoring	In cases of borderline hypertension
Genetic testing	In rare cases of apparent familial AF (particularly with onset at a young age) with additional features of conduction disease, Brugada syndrome or cardiomyopathy.

Table 3. Potential Causes of Atrial Fibrillation

Cardiac Causes
Hypertension
Heart failure *
Coronary artery disease with prior myocardial infarction
Left ventricular dysfunction (systolic and diastolic) *
Including hypertrophic, dilated and restrictive cardiomyopathies
Valvular heart disease
Congenital heart disease * (early repair of atrial septal defect)
Pericardial disease
Post-surgical (particularly cardiac surgery)
Sick sinus syndrome
Atrial fibrillation as a result of ventricular pacing *
Supraventricular tachycardia (including Wolf-Parkinson White syndrome, atrial tachycardia, atrial flutter or other) *
Genetic/Familial
Non-Cardiac Causes
Obstructive sleep apnea *
Obesity *
Excessive alcohol ingestion (acute or chronic) *
Hyperthyroidism *
Vagally-mediated (i.e. habitual aerobic training) *
Pulmonary disease (pneumonia, COPD, pulmonary embolism, pulmonary hypertension)
Lone (idiopathic) Atrial Fibrillation

* Denotes cause for which treatment may prevent the development or recurrence of atrial fibrillation

Chapter 3: Atrial Fibrillation: Rate and Rhythm Management

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Recommendations

1. We recommend that the goals of ventricular rate control should be to improve symptoms and quality of life which are attributable to excessive ventricular rates. (Strong Recommendation, Low Quality Evidence)
2. We recommend that the goals of rhythm control therapy should be to improve patient symptoms and clinical outcomes, and that these do not necessarily imply the elimination of all AF. (Strong Recommendation, Moderate Quality Evidence)
3. We recommend that ventricular rate be assessed at rest in all patients with persistent and permanent AF or AFL. (Strong Recommendation, Moderate Quality Evidence)
4. We recommend that heart rate during exercise be assessed in patients with persistent or permanent AF or AFL and associated exertional symptoms. (Strong Recommendation, Moderate Quality Evidence)
5. We recommend that treatment for rate control of persistent or permanent AF or AFL should aim for a resting heart rate of less than 100 beats per minute. (Strong Recommendation, High Quality Evidence)
6. We recommend beta-blockers or non-dihydropyridine calcium channel blockers as initial therapy for rate control of AF or AFL in most patients without a past history of

myocardial infarction or left ventricular dysfunction (Strong Recommendation, Moderate Quality Evidence)

7. We suggest that digoxin not be used as initial therapy for active patients and be reserved for rate control in patients who are sedentary or who have left ventricular systolic dysfunction. (Conditional Recommendation, Moderate Quality Evidence)
8. We suggest that digoxin be added to therapy with beta-blockers or calcium channel blockers in patients whose heart rate remains uncontrolled. (Conditional Recommendation, Moderate Quality Evidence)
9. We suggest that dronedarone may be added for additional rate control in patients with uncontrolled ventricular rates despite therapy with beta-blockers, calcium channel blockers and/or digoxin. (Conditional Recommendation, Moderate Quality Evidence).
10. We suggest that amiodarone for rate control should be reserved for exceptional cases in which other means are not feasible or are insufficient. (Conditional Recommendation, Low Quality Evidence)
11. We recommend beta-blockers as initial therapy for rate control of AF or AFL in patients with myocardial infarction or left ventricular systolic dysfunction (Strong Recommendation, High Quality Evidence).
12. We recommend AV junction ablation and implantation of a permanent pacemaker in symptomatic patients with uncontrolled ventricular rates during AF despite maximally tolerated combination pharmacologic therapy (Strong Recommendation, Moderate Quality Evidence).
13. We recommend the optimal treatment of precipitating or reversible predisposing conditions of AF prior to attempts to restore or maintain sinus rhythm. (Strong Recommendation, Low Quality Evidence)
14. We recommend a rhythm control strategy for patients with AF or AFL who remain symptomatic with rate control therapy or in whom rate control therapy is unlikely to control symptoms. (Strong Recommendation, Moderate Quality Evidence)
15. We recommend use of maintenance oral anti-arrhythmic therapy as first-line treatment for patients with recurrent AF in whom long-term rhythm control is desired. (Strong Recommendation, Moderate Quality Evidence)
16. We recommend that oral anti-arrhythmic drug therapy should be avoided in patients with AF or AFL and advanced sinus or AV nodal disease unless the patient has a

pacemaker/implantable defibrillator. (Strong Recommendation, Low Quality Evidence)

17. We recommend that an AV blocking agent should be used in patients with AF or AFL being treated with a class I anti-arrhythmic drug (e.g. propafenone or flecainide) in the absence of advanced AV node disease. (Strong Recommendation, Low Quality Evidence)
18. We recommend intermittent anti-arrhythmic drug therapy ("pill in pocket") in symptomatic patients with infrequent, longer-lasting episodes of AF or AFL as an alternative to daily anti-arrhythmic therapy. (Strong Recommendation, Moderate Quality Evidence)
19. We recommend electrical or pharmacologic cardioversion for restoration of sinus rhythm in patients with AF or AFL selected for rhythm control therapy who are unlikely to convert spontaneously. (Strong Recommendation, Low Quality Evidence)
20. We recommend pre-treatment with anti-arrhythmic drugs prior to electrical cardioversion in patients who have had AF recurrence post-cardioversion without anti-arrhythmic drug pre-treatment. (Strong Recommendation, Moderate Quality Evidence)
21. We recommend catheter ablation of AF in patients who remain symptomatic following adequate trials of anti-arrhythmic drug therapy and in whom a rhythm control strategy remains desired. (Strong Recommendation, Moderate Quality Evidence)
22. We suggest that, in patients requiring pacing for the treatment of symptomatic bradycardia secondary to sinus node dysfunction, atrial or dual chamber pacing be generally used for the prevention of AF (Conditional Recommendation, High Quality Evidence).
23. We suggest that, in patients with intact AV conduction, pacemakers be programmed to minimize ventricular pacing for prevention of AF (Conditional Recommendation, Moderate Quality Evidence).

Chapter 4: Catheter Ablation of Atrial Fibrillation and Flutter

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Recommendations

1. We recommend catheter ablation of AF in patients who remain symptomatic following adequate trials of anti-arrhythmic drug therapy and in whom a rhythm control strategy remains desired. (Strong Recommendation, Moderate Quality Evidence)
2. We suggest catheter ablation to maintain sinus rhythm in select patients with symptomatic atrial fibrillation and mild-moderate structural heart disease who are refractory or intolerant to at least one anti-arrhythmic medication. (Conditional Recommendation, Moderate Quality Evidence).
3. We suggest catheter ablation to maintain sinus rhythm as first-line therapy for relief of symptoms in highly selected patients with symptomatic, paroxysmal atrial fibrillation. (Conditional Recommendation, Low Quality Evidence)
4. We recommend curative catheter ablation for symptomatic patients with typical atrial flutter as first line therapy or as a reasonable alternative to pharmacologic rhythm or rate control therapy. (Strong Recommendation, Moderate Quality Evidence)

5. In patients with evidence of ventricular pre-excitation during AF, we recommend catheter ablation of the accessory pathway, especially if AF is associated with rapid ventricular rates, syncope, or a pathway with a short refractory period. (Strong Recommendation, Low Quality Evidence)
6. In young patients with lone, paroxysmal AF, we suggest an electrophysiological study to exclude a reentrant tachycardia as a cause of AF; if present, we suggest curative ablation of the tachycardia. (Conditional Recommendation, Very Low Quality Evidence).

Chapter 5: Prevention of Stroke and Systemic Embolization in Atrial Fibrillation and Flutter

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Recommendations

1. We recommend that all patients with AF or AFL (paroxysmal, persistent or permanent), should be stratified using a predictive index for the risk for stroke (e.g. $CHADS_2$) and for the risk of bleeding (e.g. HAS-BLED), and that most patients should receive antithrombotic therapy. (Strong Recommendation, High Quality Evidence)

2. We recommend that patients at very low risk of stroke ($CHADS_2 = 0$) should receive aspirin (75-325 mg/day). (Strong Recommendation, High Quality Evidence). We suggest that some young persons with no standard risk factors for

stroke may not require any antithrombotic therapy. (Conditional Recommendation, Moderate Quality Evidence)

3. We recommend that patients at low risk of stroke ($CHADS_2$ = 1) should receive OAC therapy (either warfarin (INR 2 – 3) or dabigatran). (Strong Recommendation, High Quality Evidence). We suggest, based on individual risk/benefit considerations, that aspirin is a reasonable alternative for some. (Conditional Recommendation, Moderate Quality Evidence).

4. We recommend that patients at moderate risk of stroke ($CHADS_2 \geq 2$) should receive OAC therapy (either warfarin (INR 2 – 3) or dabigatran). (Strong Recommendation, High Quality Evidence)

5. We suggest, that when OAC therapy is indicated, most patients should receive dabigatran in preference to warfarin. In general, the dose of dabigatran 150 mg po bid is preferable to a dose of 110 mg po bid (exceptions discussed in text). (Conditional Recommendation, High Quality Evidence)

6. We recommend that hemodynamically stable patients with AF or AFL of ≥ 48 hours or uncertain duration for whom electrical or pharmacological cardioversion is planned should receive therapeutic OAC therapy (warfarin [INR 2-3] or dabigatran) for 3 weeks before and at least 4 weeks post cardioversion.

   Following attempted cardioversion:

   a) If AF or AFL persists or recurs or if symptoms suggest that the presenting AF or AFL has been recurrent, the patient should have antithrombotic therapy continued indefinitely using either OAC or aspirin as appropriate.

   b) If sinus rhythm is achieved and sustained for 4 weeks, the need for ongoing antithrombotic therapy should be based upon the risk of stroke and, in selected cases, expert consultation may be required.

   (Strong Recommendation, Moderate Quality Evidence)

7. We recommend that hemodynamically stable patients with AF or AFL of known duration < 48 hours may undergo cardioversion without prior or subsequent anticoagulation. However, if the patient is at particularly high risk of stroke (e.g. mechanical valve, rheumatic heart disease, recent stroke or TIA), cardioversion should be delayed and the patient should receive OAC for 3 weeks before and at least 4 weeks post cardioversion.

   Following attempted cardioversion:

   a) If AF or AFL persists, or recurs, or if symptoms suggest that the presenting AF or AFL has been recurrent, antithrombotic therapy (OAC or aspirin as appropriate) should be commenced and continued indefinitely.

   b) If NSR is achieved and sustained for 4 weeks, the need for ongoing antithrombotic therapy should be based on the risk of stroke according to $CHADS_2$ score and, in selected cases, expert consultation may be required.

   (Strong recommendation, Low Quality Evidence)

8. We suggest that hemodynamically unstable patients with AF or AFL who require emergency cardioversion be managed as follows:

   a. If the AF or AFL is known duration < 48 hours, the patient may generally undergo cardioversion without prior anticoagulation. However, if the patient is at particularly high risk of stroke (e.g. mechanical valve, rheumatic heart disease, recent stroke or TIA), the patient should receive IV UFH or LMWH before cardioversion if possible, or immediately thereafter if even a brief delay is unacceptable, and then be converted to OAC for at least 4 weeks post cardioversion.

   b. If the AF or AFL is of $\geq$ 48 hours or uncertain duration, we suggest the patient receive IV UFH or LMWH before cardioversion if possible, or immediately thereafter if even a brief delay is unacceptable. Such a patient should then be converted to OAC for at least 4 weeks post cardioversion.

Following attempted cardioversion, the guidelines for subsequent antithrombotic therapy are identical to those for the management of hemodynamically stable patients undergoing cardioversion. (Conditional Recommendation, Low Quality Evidence).

9. We suggest that hemodynamically stable patients with AF or AFL of duration ≥ 48 hours or uncertain duration, may undergo cardioversion guided by TEE, following the protocol from the ACUTE trial. (Conditional Recommendation, High Quality Evidence).

10. We suggest that patients with AF or AFL who have stable CAD should receive antithrombotic therapy selected based upon their risk of stroke (aspirin for $CHADS_2 = 0$ and OAC for $CHADS_2 \geq 1$). Warfarin is preferred over dabigatran for those at high risk of coronary events. (Conditional Recommendation, Moderate Quality Evidence).

11. We suggest that patients with AF or AFL who have experienced ACS or who have undergone PCI, should receive antithrombotic therapy selected based on a balanced assessment of their risks of stroke, of recurrent coronary artery events and of hemorrhage associated with the use of combinations of antithrombotic therapies, which in patients at higher risk of stroke may include aspirin plus clopidogrel plus OAC. (Conditional Recommendation, Low Quality Evidence).

12. We suggest that patients with AF or AFL who are receiving aspirin, clopidogrel, or OAC and are scheduled for a surgical or diagnostic procedure carrying a risk of major bleeding be stratified by their risk of stroke:

    a) If there is a very low to moderate risk of stroke ($CHADS_2 \leqq 2$), the patient should have their antithrombotic agent discontinued before the procedure (aspirin or clopidogrel for 7-10 days, warfarin for 5 days if the INR was in the range 2- 3, and dabigatran for 2 days). Once post-procedure hemostasis is established (about 24 hours) the antithrombotic therapy should be reinstated. (Conditional Recommendation, Low Quality Evidence)

    b) If there is a particularly high risk of stroke (e.g. prosthetic valve, recent stroke or TIA, rheumatic valve disease, $CHADS_2 > 3$) or of other thromboembolism (e.g.

Fontan procedure), further consideration should be given to the risk of major bleeding from the procedure:

i) If there is an acceptable perioperative bleeding risk (i.e. risk of stroke outweighs risk of bleeding) the patient should have OAC therapy continued peri-operatively or have their OAC discontinued before the procedure and be bridged with LMWH or UFH perioperatively. (Conditional Recommendation, Low Quality Evidence)

ii) If there is a substantial risk of major and potentially problematic bleeding (i.e. risk of bleeding and risk of stroke are both substantial) the patient should have their OAC discontinued before the procedure with LMWH or UFH bridging until 12-24 hours pre-procedure. Once post-procedure hemostasis is established (about 24 hours) the OAC should be reinstated with LMWH or UFH bridging. (Conditional Recommendation, Low Quality Evidence)

13. We recommend that patients with AF or AFL who experience a stroke be managed acutely according to the published guidelines of the American Heart and American Stroke Associations (Strong Recommendation, Moderate Quality Evidence).

14. We suggest that patients with AF or AFL who experience hemorrhage while on OAC be managed according to the published practice guidelines of the American College of Chest Physicians. (Conditional Recommendation, Low Quality Evidence)

Chapter 6: Emergency Department Management of Recent-onset Atrial Fibrillation and Flutter

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Recommendations

1. We recommend that in stable patients with recent-onset AF or AFL, a strategy of rate control or rhythm control could be selected (Strong Recommendation, High Quality Evidence).

2. We recommend immediate electrical conversion to sinus rhythm for patients with acute hemodynamic instability secondary to rapid recent-onset AF or AFL. (Strong Recommendation, Low Quality Evidence).

3. In hemodynamically stable patients with AF or AFL of known duration < 48 hours in whom a strategy of rhythm control has been selected:

   a) We recommend that rate-slowing agents alone are acceptable while awaiting spontaneous conversion (Strong Recommendation, Moderate Quality Evidence).

   b) We recommend that synchronized electrical cardioversion or pharmacological cardioversion may be used when a decision is made to cardiovert patients in the emergency department. See **Table 2** for drug recommendations. (Strong Recommendation, Moderate Quality Evidence).

   c) We suggest that anti-arrhythmic drugs may be used to pre-treat patients before electrical cardioversion in ED in order to decrease early recurrence of AF or AFL and to enhance cardioversion efficacy (Conditional Recommendation, Low Quality Evidence).

4. We recommend that electrical cardioversion may be conducted in the ED with 150-200 joules biphasic waveform as the initial energy setting. (Strong Recommendation, Low Quality Evidence)

5. We recommend, in patients with rapid ventricular pre-excitation during AF (Wolff-Parkinson-White Syndrome):

   a) Urgent electrical cardioversion if the patient is hemodynamically unstable (Strong Recommendation, Low Quality Evidence).

   b) Intravenous anti-arrhythmic agents procainamide or ibutilide in stable patients (Strong Recommendation, Low Quality Evidence).

   c) AV nodal blocking agents (digoxin, calcium channel blockers, beta-blockers, adenosine) are contra-indicated. (Strong Recommendation, Low Quality Evidence).

6. We recommend that hemodynamically stable patients with AF or AFL of ≥ 48 hours or uncertain duration for whom a strategy of rhythm control has been selected, should have rate control optimized and receive therapeutic OAC therapy (warfarin [INR 2-3] or dabigatran) for 3 weeks before and at least 4 weeks post cardioversion.

   Following attempted cardioversion:

   a) If AF or AFL persists or recurs or if symptoms suggest that the presenting AF or AFL has been recurrent, the patient should have antithrombotic therapy continued indefinitely (using either OAC or aspirin as appropriate).

   b) If sinus rhythm is achieved, the need for ongoing antithrombotic therapy should be based upon the risk of stroke and in selected cases expert consultation may be required.

   (Strong Recommendation, Moderate Quality Evidence)

7. We recommend that hemodynamically stable patients with AF or AFL of known duration < 48 hours, for whom a strategy of rhythm control has been selected may generally undergo cardioversion without prior or subsequent anticoagulation. However, if the patient is at particularly high risk of stroke (e.g. mechanical valve, rheumatic heart disease, recent stroke or TIA), cardioversion should be delayed and the patient should receive OAC for 3 weeks before and at least 4 weeks post cardioversion.

   Following attempted cardioversion:

   a) If AF or AFL persists, or recurs, or if symptoms suggest that the presenting AF or AFL has been recurrent, antithrombotic therapy (OAC or aspirin as appropriate) should be commenced and continued indefinitely.

   b) If NSR is achieved, the need for ongoing antithrombotic therapy should be based on the risk of stroke according to $CHADS_2$ score and early consultant follow-up should be arranged.

   (Strong recommendation, Low Quality Evidence)

8. When the duration of an episode of AF is uncertain, we suggest that patients may undergo cardioversion guided by TEE, as an alternative to anticoagulation prior to cardioversion. However, anticoagulation needs to be simultaneously started and maintained for at least 4 weeks post cardioversion. (Conditional Recommendation, High Quality Evidence).

9. We recommend hospital admission for highly symptomatic patients with decompensated heart failure or myocardial ischemia. (Strong Recommendation, Low Quality Evidence).

10. We suggest limiting hospital admission to highly symptomatic patients in whom adequate rate control cannot be achieved (Conditional Recommendation, Low Quality Evidence).

11. We suggest that after conversion to sinus rhythm has been achieved, whether anti-arrhythmic drug therapy is indicated should be based on the estimated probability of recurrence and the symptoms during AF. Long-term therapy will need to be determined by an appropriate outpatient consultation. (Conditional Recommendation, Low Quality Evidence).

Table 3. Recommended Drugs for Pharmacological Conversion in the ED

Drug	Dose	Efficacy	Risks
Class IA Procainamide	15-17 mg/kg IV over 60 min	++	5% hypotension
Class IC* Propafenone	450-600 mg PO	+++	Hypotension, 1:1 flutter, bradycardia
Flecainide	300-400 mg PO	+++	Hypotension, 1:1 flutter, bradycardia
Class III Ibutilide	1-2 mg IV over 10-20 min Pre-treat with MgSO4 1-2 mg IV	++	2-3% Torsades de pointes

*Class IC drugs should be used in combination with AV nodal blocking agents (beta-blockers or calcium-channel inhibitors).

Chapter 7: Surgical Therapy for Atrial Fibrillation

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Recommendations

1. We recommend that a surgical AF ablation procedure be undertaken in association with mitral valve surgery in patients with AF where there is a strong desire to maintain sinus rhythm and the success of the procedure is deemed to be high and the additional risk low. (Strong Recommendation, Moderate Quality Evidence).

2. We recommend that patients with asymptomatic lone AF, in whom AF is not expected to affect cardiac outcome should not be considered for surgical therapy of AF (Strong Recommendation, Low Quality Evidence).

3. In patients with AF undergoing aortic valve surgery or coronary artery bypass surgery, we suggest that a surgical AF ablation procedure be undertaken where there is a strong desire to maintain sinus rhythm and the success of the procedure is deemed to be high and the additional risk low. (Conditional Recommendation, Low Quality Evidence).

4. We recommend that closure (excision or obliteration) of the left atrial appendage be undertaken as part of the surgical ablation of AF associated with mitral valve surgery. (Strong Recommendation, Low Quality Evidence).

5. We suggest that closure of the left atrial appendage be undertaken as part of the surgical ablation of persistent AF in patients undergoing aortic valve surgery or coronary artery bypass surgery if this does not increase the risk of the surgery. (Conditional Recommendation, Low Quality Evidence).

6. We recommend that oral anticoagulant therapy be continued following surgical AF ablation in patients with a $CHADS_2$ score ≥ 2. (Strong Recommendation, Moderate Quality Evidence).

7. We suggest that oral anticoagulant therapy be continued following surgical AF ablation in patients who have undergone mechanical or bioprosthetic mitral valve replacement. (Conditional Recommendation, Low Quality Evidence).

Chapter 8: Prevention and Treatment of Atrial Fibrillation following Cardiac Surgery

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Recommendations

1. We recommend that patients who have been receiving a beta-blocker before cardiac surgery have that therapy continued through the operative procedure in the absence of the development of a new contraindication (Strong Recommendation, High Quality Evidence).

2. We suggest that patients who have not been receiving a beta-blocker before cardiac surgery have beta-blocker therapy initiated immediately after the operative procedure in the absence of a contraindication (Conditional Recommendation, Low Quality Evidence).

3. We recommend that patients who have a contra-indication to beta-blocker therapy before or after cardiac surgery be considered for prophylactic therapy with amiodarone to prevent post-operative atrial fibrillation (Strong Recommendation, High Quality Evidence).

4. We suggest that patients who have a contra-indication to beta-blocker therapy and to amiodarone therapy before or after cardiac surgery be considered for prophylactic therapy to prevent post-operative atrial fibrillation with iv magnesium (Conditional Recommendation, Moderate Quality Evidence) or with biatrial pacing (Conditional Recommendation, Low Quality Evidence).

5. We suggest that patients at high risk of post-operative atrial fibrillation be considered for prophylactic therapy to prevent post-operative atrial fibrillation with sotalol or combination therapy including two or more of a beta-blocker, amiodarone, iv magnesium, or biatrial pacing (Conditional Recommendation, Low to Moderate Quality Evidence).

6. We suggest that consideration be given to anticoagulation therapy if post-operative, continuous atrial fibrillation persists for more than 72 hours. This consideration will include individualized assessment of the risks of a thromboembolic event and the risk of post-operative bleeding (Conditional Recommendation, Low Quality Evidence).

7. We recommend that temporary ventricular epicardial pacing electrode wires be placed at the time of cardiac surgery to allow for backup ventricular pacing as necessary (Strong Recommendation, Low Quality Evidence).

8. We recommend that post-operative atrial fibrillation with a rapid ventricular response be treated with a beta-blocker, a nondihydropyridine calcium antagonist, or amiodarone to establish ventricular rate control. In the absence of a specific contraindication, the order of choice is as listed (Strong Recommendation, High Quality Evidence).

9. We suggest that post-operative atrial fibrillation may be appropriately treated with either a ventricular response rate control strategy or a rhythm control strategy (Conditional Recommendation, Low Quality Evidence).

10. We recommend that, when anticoagulation therapy, rate control therapy, and/or rhythm control therapy has been prescribed for post-operative atrial fibrillation, formal reconsideration of the ongoing need for such therapy should be undertaken six to twelve weeks later (Strong Recommendation, Moderate Quality Evidence).

Abbreviations:

AF	atrial fibrillation
AFL	atrial flutter
AV	atrioventricular
INR	International normalized ratio
OAC	oral anti-coagulant
TIA	transient ischemic attack
UFH	unfractionated heparin
LMWH	low-molecular weight heparin
CAD	coronary artery disease
ACS	acute coronary syndrome
PCI	percutaneous intervention
ED	Emergency Department
TEE	trans-esophageal echocardiogram
$CHADS_2$	Acronym for thromboembolic risk scale: **C**ongestive heart failure, **H**ypertension, **A**ge ≥ 75 years, **D**iabetes mellitus, prior **S**troke or TIA
HAS-BLED	Acronym for bleeding risk scale: **H**ypertension, **A**bnormal liver or renal function, history of **S**troke or **B**leeding, **L**abile INR's, **E**lderly age (≥ 65 years), concomitant **D**rugs that promote bleeding or excess alcohol use