

KEY ADVANCES PRACTICE ADVANCE

Emergency Department Management of Recent-Onset Atrial Fibrillation with Rapid Ventricular Response

New July 2024

Why is this topic important? Atrial fibrillation (AF) is the most common sustained dysrhythmia managed in the emergency department (ED). Despite the frequency of ED visits, there are many areas of controversy concerning AF, with a paucity of data in some areas and differences in guideline recommendations.

How will this change my clinical practice? Recent literature, including guidelines, emphasize opportunities for rhythm control and anticoagulation in the acute management of recent-onset AF with rapid ventricular response (RVR). Evaluation for secondary causes of AF with RVR is paramount. Clinicians should consider rhythm or rate control in patients with primary AF with RVR, along with anticoagulation in appropriate patients. Standardizing assessment for rate control and an approach to anticoagulation may improve outcomes for patients with recent-onset AF during and after their ED visit.

Synopsis Focus Points:

1. The management of ED patients with AF with RVR from a secondary source should focus on treating the acute illness rather than the AF. Aggressive rate or rhythm control in these patients is associated with poorer outcomes.
2. AF with RVR is a rare cause of cardiopulmonary instability; however, when encountered, patients with unstable AF should undergo direct current cardioversion (DCCV), ideally with a biphasic defibrillator at 200 J.
3. Stable patients with AF with RVR can be managed with a rhythm or rate control strategy based on patient preferences using shared decision making, although a rhythm control strategy may benefit patients without contraindications. Electrical or pharmacological

cardioversion is appropriate for patients presenting within 12 hours of known onset of AF. Cardioversion is appropriate for low-risk patients presenting within 48 hours of known onset. All other patients, including those with unknown time of AF onset, prior stroke/transient ischemic attack, mitral valve disease, or mechanical heart valve, should undergo transesophageal echocardiogram (TEE) or three weeks of anticoagulation prior to cardioversion, with rate control the preferred strategy for these patients in the ED.

4. For most patients, rate control can be achieved with either beta blockers (e.g., esmolol, metoprolol) or non-dihydropyridine calcium channel blockers (e.g., diltiazem, verapamil). Non-dihydropyridine calcium channel blockers are associated with decreased time to achieving rate control and overall greater reduction in rate. Patients with a known depressed ejection fraction EF (< 40%) or hypotension should be managed with amiodarone or digoxin for rate control.
5. Patients with AF and evidence of pre-excitation (e.g., Wolff-Parkinson-White) should not be treated with diltiazem or metoprolol. Instead, they should be treated with DCCV or procainamide.
6. Patients with recent-onset AF and a CHA₂DS₂-VASc score ≥ 2 for men and ≥ 3 for women without a contraindication should be started on anticoagulation, before cardioversion, if planned, and anticoagulation should be continued until outpatient cardiology follow-up or through the hospital admission if indicated.
7. Patients with secondary AF with RVR typically require admission. Appropriately selected patients with primary AF can be discharged on anticoagulation with cardiology follow-up if they are either cardioverted to sinus rhythm or heart rate is controlled (e.g., rate in the 100 beats/min range) in the ED.

Background:

Primary versus secondary atrial fibrillation

AF is considered “primary” if it is from an established pathophysiological process or “secondary” if due to a reversible precipitant.(1,2) Secondary AF with RVR can be caused by a variety of conditions, including acute myocardial infarction (MI), acute pulmonary disease, alcohol withdrawal, hypovolemia, pulmonary embolism, sepsis, thyrotoxicosis, or toxic ingestion.(1-3) In patients with secondary AF, aggressive rate control or rhythm control is associated with patient harm, and the management of patients with secondary AF with RVR in the ED should focus on treating the acute illness, rather than providing rate or rhythm control.(1-3)

Assessment of a patient with newly diagnosed primary AF should include a 12-lead electrocardiogram (ECG) and laboratory tests, such as serum electrolytes, as well thyroid function tests and troponin based on the clinical scenario. A transthoracic echocardiogram (TTE) is recommended by guidelines, but the optimal timeframe for TTE remains to be defined.(1) For patients stabilized in the ED, TTE can occur in the inpatient or outpatient setting.

Atrial fibrillation with instability

Acute unstable AF with RVR, defined as AF causing hypotension (e.g., systolic blood pressure < 90 mm Hg or signs of shock), acute coronary syndrome (ongoing severe chest pain and ST segment changes on ECG, despite therapy), or pulmonary edema, should undergo synchronized DCCV at 200 J.(1-3) In patients requiring emergent DCCV without a contraindication, therapeutic anticoagulation should be initiated before cardioversion, or immediately after if it cannot be started prior, using low molecular weight heparin, unfractionated heparin, or a direct oral anticoagulant (DOAC).(1-3) Instability due to AF with RVR alone is rare, and secondary AF with RVR due to a precipitant should be considered.(1-3)

Rate versus rhythm for stable patients

ED patients with AF without signs of instability may be managed with either a rate or rhythm control strategy based on patient preferences using shared decision making. Recent literature suggests that rhythm control is effective and safe in appropriately selected patients and may be associated with reduced risk of cardiovascular death and ischemic event.(1-6) Current guidelines recommend that DCCV or pharmacologic cardioversion can be considered in hemodynamically stable patients with recent-onset AF at low risk of stroke.(1,2) DCCV is the preferred method for many patients, as it is > 90% effective, reduces ED length of stay, and is relatively safe.(1,2,5,6) Pharmacologic agents (e.g., procainamide or amiodarone) may be utilized, but they have an approximately 50% successful cardioversion rate.(1-3,6)

DCCV should be performed with procedural sedation using a biphasic machine at 200 J if possible with either anterior-lateral (AL) or anterior-posterior (AP) pad placement, avoiding direct placement over the sternum or large breast tissue.(1-3) Literature suggests AL and AP pad positioning to be equally effective when energy levels > 200 J are used.(7,8) However, if using lower energy levels (e.g., 100-150 J) with a biphasic defibrillator, AL pad positioning is likely more effective.(8) Approximately one-half of patients will not convert with the first DCCV attempt, and several attempts may be required.(8) For patients with extreme obesity, manual pressure augmentation may improve the success of cardioversion.(3)

Patients with AF and evidence of pre-excitation, including WPW (e.g., wide QRS or rates approaching 300 beats/min), should be treated with DCCV or procainamide. Treatment with rate control agents, including diltiazem or metoprolol is not recommended because these agents facilitate antegrade conduction via the accessory pathway and lead to ventricular fibrillation and cardiac arrest.(1-3)

Patients who present with AF with clear symptoms of < 48 hours have historically been considered to have a low risk of ischemic event after cardioversion.(1,3,9) However, recent literature focused on patients who underwent cardioversion for AF of < 48 hours found a significantly higher 30-day post-cardioversion rate of stroke in patients not anticoagulated.(1,2) Guidelines differ in their interpretation of these data. The American Heart Association (AHA) Guidelines (3) and the National Institute for Health and Care Excellence (NICE) guidelines from the United Kingdom (10) recommend that patients with AF of less than 48 hours duration can be cardioverted, except those with prior stroke/transient ischemic attack, moderate to severe mitral stenosis, or a mechanical heart valve. According to the AHA

guidelines, patients with a CHA2DS2-VASc score of ≥ 2 in men and ≥ 3 in women undergoing cardioversion should be anticoagulated as soon as possible prior to cardioversion, with long-term anticoagulation (3).

When a patient presents after 48 hours or with an uncertain onset of AF and a rhythm control strategy is necessary before three weeks of therapeutic anticoagulation, anticoagulation should be initiated, followed by TEE to exclude left atrial (LA) thrombi.(11)

Long-term anticoagulation

The decision to start long-term anticoagulation in the ED should be determined by a scoring system, such as CHA2DS2-VASc, using shared decision making with the patient regarding the risks and benefits (Table 1). The AHA guidelines state that for patients with AF and a CHA2DS2-VASc score of 0 in men or 1 in women, it is reasonable to omit long-term anticoagulation. For men with a CHA2DS2-VASc score of 1 and women with a score of 2, long-term anticoagulation can be considered based on patient preferences and risk factors. Patients with a CHA2DS2-VASc score of ≥ 2 in men and ≥ 3 in women should receive long-term anticoagulation, preferably with a DOAC (e.g., factor Xa inhibitor or direct thrombin inhibitor), or warfarin.(3)

For patients with AF for 48 hours duration or longer, or with unknown duration of AF, TEE or anticoagulation for at least three weeks is recommended before cardioversion, regardless of the CHA2DS2-VASc score or the method (electrical or pharmacological) of cardioversion.(2-4) Eligible patients with AF not associated with mechanical heart valves or moderate to severe mitral stenosis should be started on oral anticoagulation in the ED with apixaban, dabigatran, edoxaban, or rivaroxaban.(1-3) When choosing an oral anticoagulant, apixaban and rivaroxaban are the most common agents used in the ED. Recent literature suggests apixaban may be associated with lower rates of hemorrhage compared to other anticoagulants.(12)

Table 1. CHA2DS2-VASc score

CHA2DS2-VASc Score	
Score Factors	Points
Age	
• <65	0
• 65-74	+1
• ≥ 75	+2
Sex	
• Male	0
• Female	+1
History of CHF	+1
History of hypertension	+1
History of stroke/TIA/thromboembolism	+2
History of vascular disease	+1
History of diabetes	+1

Lip GY, Nieuwlaat R, Pisters R, Lane DA, Crijns HJ. Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: the euro heart survey on atrial fibrillation. Chest. 2010 Feb;137(2):263-72. doi: 10.1378/chest.09-1584.

Ntaios G, Lip GY, Makaritsis K, Papavasileiou V, Vemou A, Koroboki E, Savvari P, Manios E, Milionis H, Vemmos K. CHADS₂, CHA₂DS₂-VASc, and long-term stroke outcome in patients without atrial fibrillation. Neurology. 2013 Mar 12;80(11):1009-17. doi: 10.1212/WNL.0b013e318287281b.

Abbreviations
CHF: Congestive heart failure TIA: Transient ischemic attack

Rate control

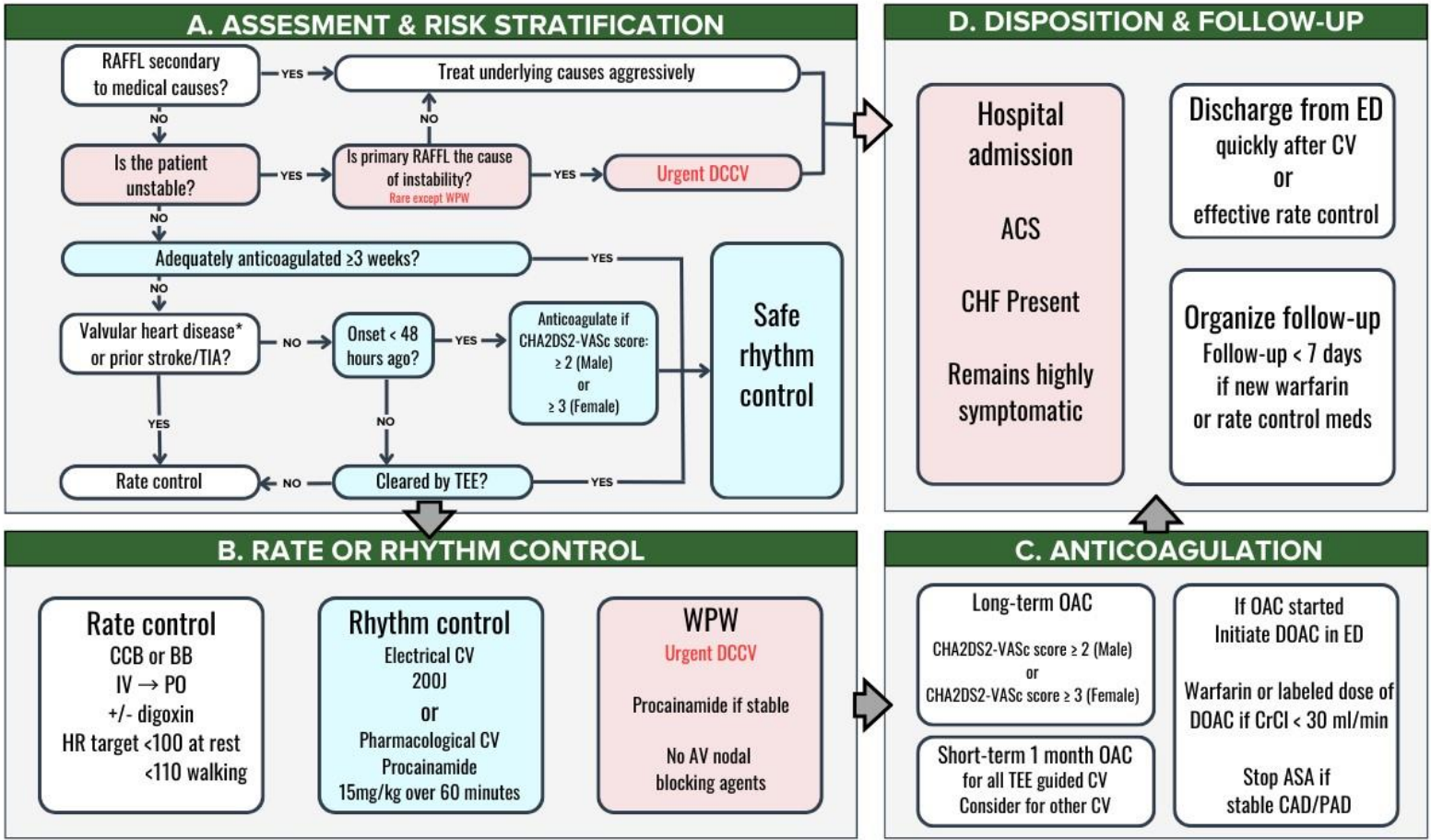
Patients who are not eligible for a rhythm control strategy should be managed with rate control. Beta blockers or non-dihydropyridine calcium channel blockers (e.g., diltiazem or verapamil) may be used as first-line agents for rate control in patients without significant left ventricle (LV) dysfunction.(1-3) Both classes are effective, and if the patient is already taking a calcium channel blocker or beta blocker, a medication from that drug class should be used first.(2) If the patient is not taking one of these agents, literature suggests diltiazem is more effective and is associated with decreased time to achieving rate control and total decrease in ventricular rate compared to metoprolol.(13,14) Intravenous (IV) diltiazem or metoprolol may be given up to three times in the first hour, with an oral dose administered within 30 minutes of achieving rate control.(2) Guidelines recommend avoiding these medications in patients with acute decompensated heart failure, hypotension, or significant LV dysfunction and instead recommend amiodarone or digoxin.(1-3,15) The target for rate control is a resting heart rate of < 100 beats/min or < 110 beats/min if walking.(1,2)

Disposition

Many patients with AF can be safely discharged home after acute management with either rate control or rhythm control, but clinicians must consider several factors.(16) Current risk stratification tools demonstrate a modest ability to predict adverse events in those with AF.(16) Patients at low risk for adverse events include those who have achieved rate or rhythm control, are able to comply with discharge instructions and medications (e.g., anticoagulants), and have follow-up. They should have no severe concurrent diseases (sepsis), severe comorbidities (decompensated heart failure), secondary AF, or evidence of a complication (hypotension). Hospitalization is often required for patients with AF due to another medical illness, highly symptomatic patients, or those in whom rate or rhythm control cannot be achieved.(1-3)

Figure 1. Atrial Fibrillation (AFIB) Treatment Algorithm

AFIB Treatment Algorithm



Abbreviations: BB: Beta Blockers; CAD: Cardiac Atherosclerotic Disease; CCB: Calcium Channel Blockers; CHF: Congestive Heart Failure; CrCl: Creatinine Clearance; CV: Cardioversion; DCCV: Direct Current Cardioversion; DOAC: Direct Oral Anticoagulant; ED: Emergency department; HR: Heart Rate; IV: Intravenous; OAC: Oral Anticoagulation; PAD: Peripheral Atherosclerotic Disease; PO: Per os; RAFFL: Rapid Atrial Fibrillation and Atrial Flutter; TIA: Transient Ischemic Attack; TEE: TransEsophageal Echocardiography; WPW: Wolff-Parkinson-White syndrome

*Valvular heart disease includes mechanical valve and moderate-severe mitral stenosis

Adapted from: Stiell IG, de Wit K, Scheuermeyer FX, et al. 2021 CAEP Acute Atrial Fibrillation/Flutter Best Practices Checklist. CJEM. 2021;23(5):604-610. doi:10.1007/s43678-021-00167-y

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Resources for Additional Learning

Atrial Fibrillation/Flutter Best Practice Checklist. <https://emottawablog.com/2022/04/atrial-fibrillation-flutter-best-practice-checklist/>

Emergency Medicine Cases – Atrial Fibrillation. <https://emergencymedicinecases.com/episode-20-atrial-fibrillation/>

Unstable Atrial Fibrillation – ED Management. <https://first10em.com/atrial-fibrillation/>

SGEM: Rhythm is Gonna Get You – Into an Atrial Fibrillation Pathway. <https://thesgem.com/2018/06/sgem222-rhythm-is-gonna-get-you-into-an-atrial-fibrillation-pathway/>

SGEM: AFIB of the Night – Chemical Vs. Electrical First Cardioversion. <https://thesgem.com/2019/09/sgem267-afib-of-the-night-chemical-vs-electrical-first-cardioversion/>

CHA2DS Score Calculator. <https://www.mdcalc.com/calc/801/cha2ds2-vasc-score-atrial-fibrillation-stroke-risk>

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