



Key Inforbits

- Overview of Atrial Fibrillation
- Risk Factors for Atrial Fibrillation
- Rate versus Rhythm treatment for Atrial Fibrillation
- Non-pharmacological Options
- Consequences of Atrial Fibrillation



Atrial fibrillation is the **most common arrhythmia** encountered today affecting 2.6 to 6.1 million Americans in 2016.¹ Atrial fibrillation, also known as “A-fib”, is defined as **uncoordinated atrial activation** in the heart leading to **inefficient atrial contraction**.^{1,2} Atrial fibrillation appears to result from **multiple atrial reentrant loops (or wavelets)**, whereas atrial flutter is caused by a single, dominant, reentrant substrate.¹ Atrial fibrillation is an **irregular and often rapid heart rate** (120-180 beats/min).

In more simple terms, normally, your heart contracts and relaxes to a regular heartbeat. In atrial fibrillation, the upper chambers of the heart (the atria) beat irregularly (quivers) instead of beating effectively to move blood into the ventricles. In a healthy adult heart at rest, the sinus node (SA node) sends an electrical signal to begin a new heartbeat 60 to 100 times a minute. From the SA node, the electrical signal travels through the right and left atria causing the atria to contract and pump blood into the ventricles. In atrial fibrillation, **the heart's electrical signals do not begin in the SA node**. Instead, they begin in another part of the atria or other areas of the heart. **These signals may spread throughout the atria in a rapid, disorganized way**. This can cause the atria to quiver instead of having one solid beat. People who have atrial fibrillation may not feel symptoms. However, even when atrial fibrillation isn't noticed, it **can lead to stroke, heart failure, and other heart related complications**.¹⁻³

Types of
ATRIAL FIBRILLATION

Types of Arrhythmias	Definition ^{1,3}
Acute	Onset within 48 hours
Paroxysmal	Atrial fibrillation that terminates spontaneously or with intervention within 7 days of onset. (episodes may recur with variable frequency)
Recurrent	Two or more episodes of atrial fibrillation
Persistent	Does not terminate atrial fibrillation with attempts at pharmacologic or electrical cardioversion.
Long-Standing	Continuous atrial fibrillation >12 months in duration.
Permanent	The term “permanent atrial fibrillation” is used when the patient and clinician make a joint decision to stop further attempts to restore and/or maintain sinus rhythm.

Symptoms^{1,3}

- Rapid heart rate/palpitations (<100 BPM)
- Worsening symptoms of heart failure
 - Dyspnea
 - Fatigue
 - Dizziness
 - Weakness



ECG results^{1,3,4}

- Irregularly irregular supraventricular rhythm with no discernible, consistent atrial activity (P waves).
- Ventricular rate is usually 120 to 180 beats/min and the pulse is irregular.

*Medical emergencies are severe heart failure (ie, pulmonary edema, hypotension [$<90/60$ mmHg]) or atrial fibrillation occurring in the setting of acute myocardial infarction.^{1,2}



- Hypertension
- Coronary artery disease (CAD)⁵
- Cardiomyopathies
- Heart failure
- Obesity
- Sleep Apnea
- Hyperthyroidism
- Use of alcohol/drugs
- Increasing age

The appearance of atrial fibrillation is often associated with exacerbation of underlying heart disease, either because atrial fibrillation is a cause or consequence of deterioration or because it contributes directly to deterioration.

1,3,5

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How to choose?

RATE VERSUS RHYTHM

Rate Treatment: Rate control is typically a **simpler** strategy than rhythm control, involving the use of generally **less toxic medications**. Everyone needs rate treatment IF they have a high heart rate; this medication slows a person's ventricular rate down. Some patients can be controlled with rate treatment alone.^{1,2}

Rhythm Treatment: Rhythm control strategies typically involve **potentially riskier antiarrhythmic medications** or **invasive procedures** such as catheter ablation or surgery, but, when successful, **provide the benefits of sinus rhythm**. A huge concern is the **increased risk for thromboembolism** to occur. Due to this risk anticoagulation with warfarin could be warranted.^{1,2}

Reasons to select rhythm treatment?²

- Difficulty in achieving rate control
- Younger patient
- Tachycardia-mediated cardiomyopathy
- First episode of atrial fibrillation
- Atrial fibrillation precipitated by acute illness
- Patient preference

****KEY POINT:** There is **NO** difference in mortality with rate or rhythm. **HOWEVER, rhythm is associated with more hospitalization.**^{2,3}

Medication Options

Rate Treatment for atrial fibrillation

Rate Control Medications ²⁻⁸		
Medications	Maintenance Doses	Notable Side Effects
Beta Blockers		
Metoprolol Tartrate (Lopressor®)	25-100 mg BID	Dizziness Fatigue Hypotension
Metoprolol Succinate (Toprol XL®)	50-400 mg daily	
Atenolol (Tenormin®)	25-100 mg daily	

Propranolol (Inderal®)	10-40 mg TID-QID	Headache Decreased heart rate Mask S/S of hypoglycemia
Nadolol (Corgard®)	10-240 mg daily	
Carvedilol (Coreg®)	3.125-25 mg BID	
Bisoprolol (Zebeta®)	2.5-10 mg daily	
Non-DHP (Dihydropyridine) Calcium Channel Blockers		
Verapamil (Calan®)	180-480 mg daily	Constipation (verapamil) Gingival Hyperplasia (verapamil) Edema Headache Decreased heart rate
Diltiazem (Cardizem®)	120-360 mg daily	
Others		
Digoxin (Digox®)	0.125-0.25 mg daily	Dizziness Headache GI problems
Amiodarone (Cordarone®)	100-200 mg daily	Anorexia Constipation/GI upset Pneumonitis Hypothyroidism



Rate Control Medications^{2,3,8}

- ◇ 1st line: beta blocker or non-DHP calcium channel blocker
 - **Beta blockers** have shown more effect and are more commonly used.
 - **Non-DHP CCB** (Diltiazem and Verapamil) should be **AVOIDED** in patients with **HFrEF (LVEF less than or equal to 40%).**
- ◇ Digoxin, then amiodarone, can be used if the patient has failed a beta blocker and non-DHP calcium channel blocker.

Medication Options

Rhythm Treatment for atrial fibrillation

Rhythm Control Medications ²⁻⁸		
Medications	Maintenance Doses	Notable Side Effects
Oral Drugs		
Amiodarone (Cordarone®)	200 mg daily	Anorexia Constipation/GI upset Pneumonitis Hypothyroidism
Dofetilide (Tikosyn®)	Varies by renal function	Chest pain Headache Dizziness GI upset
Flecainide (Tambacor®)	200-300 mg once	Dizziness Visual disturbances

		Dyspnea Chest pain GI upset AV block
Propafenone (Rythmol®)	450-600 mg once	GI upset Unusual taste Dizziness
IV drugs		
amiodarone and ibutilide are available IV		



Rhythm Control Medications^{2,3,8}

- ◇ When considering pharmacologic cardioversion, the selection should be based on whether the patient has structural heart disease (eg, left ventricular dysfunction, coronary artery disease (CAD), valvular heart disease, LV hypertrophy).
- ◇ Amiodarone is last line for rhythm control because of its toxicities.
 - For heart failure and LV hypertrophy

Rhythm Control – Electrical

- ◇ DCC or direct current cardioversion is one of the most effective means of converting atrial fibrillation into sinus rhythm.
 - **1st line choice when a patient is HEMODYNAMICALLY UNSTABLE.**

**The disadvantages of pharmacologic cardioversion are risk of significant side effects (eg, drug-induced TdP), potential drug-drug interactions (eg, digoxin-amiodarone), and lower efficacy of AADs when compared with DCC.

**Pharmacologic cardioversion appears to be most effective when initiated within 7 days after the onset of AF.

What to do....

WHEN A PATIENT IS CURRENTLY EXPERIENCING ATRIAL FIBRILLATION

Atrial Fibrillation lasting > 48 hours^{2,3,7,8,9}

Patients undergoing elective cardioversion (electrical or pharmacologic) the following medications should be given for at least **3 weeks before cardioversion** is performed to ensure no clots:

- Warfarin (INR target range 2 to 3) – 1st line
- Apixaban 2.5 or 5 mg BID – 2nd line
- Dabigatran 150 mg BID – 2nd line
- Rivaroxaban 20 mg daily – 2nd line

If 3 weeks of therapeutic oral anticoagulant therapy is not feasible → patient can undergo a transesophageal echocardiogram (TEE) prior to cardioversion.

- If no thrombus is observed on TEE, the patient can undergo cardioversion.
- In these patients, anticoagulant therapy with either IV unfractionated heparin (UFH loading dose of 80 units/kg followed by infusion 18 units/kg/hour) or a low-molecular-weight heparin (LMWH 1 mg/kg SC BID) should be initiated at the time the TEE will be performed.
- Cardioversion should then be performed within 24 hours of the TEE.

AF lasting < 48 hours^{2,3}

Anticoagulation prior to cardioversion is unnecessary because there has not been sufficient time to form atrial thrombi.

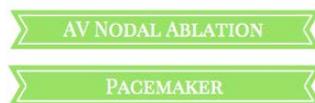
****Anticoagulation should be continued for at least 4 weeks after cardioversion unless contraindicated.

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Non-pharmacological

Treatment for atrial fibrillation



Reference¹⁻³

CONCERNS WITH ATRIAL FIBRILLATION

- Atrial fibrillation can lead to an increased risk of stroke and/or peripheral thromboembolism. Patients with atrial fibrillation increases stroke risk by 5x.^{1,2}
- With the heart not contracting fully and just “quivering” this allows blood to become more stagnant. When blood sits still it tends to clot, when this is pumped out of the heart this clot may go to the brain and cause a stroke.²



- Anticoagulant therapy^{1,2,4}
 - UFH
 - LMWH
 - Warfarin
 - Direct thrombin inhibitors
 - Direct Xa inhibitors
- Antiplatelet therapy^{1,2,4}
 - Aspirin

How to choose?

WHO NEEDS STROKE PREVENTION TREATMENT

- **CHA2DS2-VASc* score is recommended for assessment of stroke risk.**¹
 - More factors; more clearly defines anticoagulant recommendations
 - Preferred scale

	Condition ^{1,2}	Points
C	Congestive Heart Failure	1
H	Hypertension	1
A	Age ≥ 75 years	2
D	Diabetes	1
S	Stroke (prior stroke/TIA/thromboembolism)	2
V	Vascular Disease (MI, PVD, aortic plaque)	1
A	Age 65 – 74 years	1
S	Sex category (female)	1



IF THE PATIENT HAS A CHA₂DS₂ – VASC SCORE OF 1, YOU DO NOT HAVE TO GIVE AN ORAL ANTICOAGULANT. BUT, YOU CAN CONSIDER GIVING THEM AN ANTICOAGULANT OR ASPIRIN.

Reference^{1,2,4}



IF THE PATIENT HAS A CHA₂DS₂–VASC SCORE OF 2 OR GREATER, **ORAL ANTICOAGULANTS ARE RECOMMENDED.** OPTIONS INCLUDE WARFARIN (INR 2.0 TO 3.0), DABIGATRAN, RIVAROXABAN, OR APIXABAN.

Reference^{1,2,4}

Anticoagulants ^{1,3-7}	Maintenance Doses	Key Points
Warfarin**	INR target range 2 to 3 (usually begin at 2.5 or 5 mg daily)	The main common side effect is bleeding: <ul style="list-style-type: none"> ◇ Signs and symptoms of bleeding: <ul style="list-style-type: none"> ○ Bleeding gums ○ Blood in urine, stool ○ ○ Nose bleeds ○ Bruising easy Black Box Warning (BBW): <ul style="list-style-type: none"> ◇ Warfarin can cause major or fatal bleeding ◇ Premature discontinuation increases the risk of thrombotic events (all) ◇ Epidural or spinal hematomas have occurred in patients receiving neuraxial anesthesia or undergoing spinal puncture (all, but warfarin)
Rivaroxaban	20 mg daily	
Apixaban	2.5 or 5 mg BID	
Dabigatran	150 mg BID	

**1st line choice (only choice if patient has mechanical heart valve)

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The last “dose” ... It’s ironic how you feel most alive when your heart skips a few beats. – Anonymous

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