



Heart Beats

Uncontrolled atrial fibrillation in adults

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Fifty-year-old Mrs. J is resting comfortably in her hospital bed. She was admitted last evening for a syncopal episode due to an episode of uncontrolled atrial fibrillation (AF). She has a history of persistent AF and hypertension. Mrs. J reports she usually doesn't have any symptoms with her AF, but she's been taking pseudoephedrine for nasal congestion. Her medications include warfarin and lisinopril. Her current international normalized ratio (INR) is 2.5. She works full time at a museum as an exhibit designer but is extremely tired most of the time and has had difficulty keeping up her regular pace.

On arrival to the ED, a calcium channel blocker infusion was begun for persistent uncontrolled AF with a ventricular rate greater than 120 beats/minute. Her current cardiac rhythm is controlled AF at a rate of 80 beats/minute with a BP of 130/80 mm Hg.

Characteristics of AF

In AF, there's firing of multiple electrical impulses from several pacemaker sites in the atria. AF is the most common cardiac dysrhythmia, characterized by an irregularly irregular rhythm, nondiscernable P waves (fibrillatory or f waves), and a variable ventricular response.^{1,2} (See *Identifying atrial fibrillation and Atrial fibrillation: Uncontrolled.*)³

The most common risk factors for AF include: older age, coronary artery disease, and hypertension.⁴ AF increases in frequency over a lifetime with up to 10% of adults over the age of 75 living with this dysrhythmia. The risk of AF doubles every year with currently 33.5 million people worldwide identified with AF.² Adults have a one in four chance of having at least one episode of AF in their lifetime.³

AF has been estimated to cause more than 99,000 deaths annually.⁵ Comorbidities associated with AF include: alcohol intake, ischemic heart disease, chronic obstructive pulmonary disease, obstructive

sleep apnea, heart failure, and diabetes.^{2,5} Infection, hyperthyroidism, and electrolyte imbalances may trigger episodes of AF.⁶ AF has been found to increase the risk of fatal and nonfatal myocardial infarctions especially in Black women.⁷

Signs and symptoms of AF

AF is the most common cardiac dysrhythmia seen in clinical practice causing more than 467,000 annual hospital admissions.⁵ Adults with AF seek medical attention when they experience serious signs and symptoms. Clinical manifestations of AF stem from tachycardia and involve chest pain, palpitations, lightheadedness, dyspnea, and fatigue.^{2,4,8} Adults with AF have a higher resting heart rate when compared with adults with normal sinus rhythm, and has been related to the renin-angiotensin-aldosterone system.^{9,10} Drugs such as pseudoephedrine activate the sympathetic nervous system causing the higher resting heart rate to rise to unsafe levels.⁵

A significantly lower cardiac output (CO) is found in adults with AF, as compared with adults with normal sinus rhythm.^{5,9} When the rate of the variable ventricular response rises above 120 beats/minute, acute decompensation occurs from the atrial dysfunction resulting in hypotension with a systolic BP (SBP) less than 90 mm Hg.⁵ Mrs. J felt dizzy and lightheaded when her SBP fell to less than 90 mm Hg, and experienced a presyncopal episode.

Dyspnea is a common symptom reported in adults with AF and limits activity and ability to complete daily tasks.⁵ Pulmonary pressures are higher in adults with AF, with higher pulmonary artery mean pressures and pulmonary capillary wedge pressures that cause dyspnea.⁵ Compared with adults with paroxysmal AF, adults with persistent or permanent AF are more likely to report dyspnea (See *General classification of AF*).¹⁰

Identifying atrial fibrillation



Rhythm

- Atrial: Irregularly irregular
- Ventricular: Irregularly irregular

Rate

- Atrial: Almost indiscernible, usually above 400 beats/minute; far exceeds ventricular rate because most impulses aren't conducted through the atrioventricular junction
- Ventricular: Usually 100 to 150 beats/minute but can be below 100 beats/minute

P wave

- Absent
- Replaced by baseline fibrillatory waves that represent atrial tetanization from rapid atrial depolarizations

PR interval

- Indiscernible

QRS complex

- Duration and configuration usually normal

T wave

- May be indiscernible

QT interval

- May be unmeasurable

Other

- Atrial rhythm may vary between fibrillatory and flutter waves (called *atrial fib-flutter*)
- May be difficult to differentiate atrial fibrillation from atrial flutter and multifocal atrial tachycardia

Atrial fibrillation: Uncontrolled



Rhythm: Irregularly irregular

Rate: Atrial—indiscernible; ventricular—130 beats/minute

P wave: Absent; replaced by fibrillatory waves

PR interval: Indiscernible

QRS complex: Normal

T wave: Indiscernible

QT interval: Unmeasurable



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Fatigue is a common symptom reported in adults with AF and appears as physical fatigue, reduced activity, and reduced motivation.^{5,11,12}

Fatigue is the result of poor atrial contractility, lack of atrioventricular synchrony, and high variable R-R interval reducing CO by up to one-third.⁹ This results in a reduction in maximal oxygen consumption with subjective reports of overwhelming fatigue.¹² Mrs. J didn't realize her overwhelming fatigue was related to AF, stating that she blamed her fatigue on just getting older.

Paroxysmal AF lasting less than 7 days can advance to persistent AF lasting more than 7 days.^{3,5} Older age, inflammation from pericarditis and cardiac surgery, atrial fibrosis, and atrial hypertrophy can cause atrial remodeling.⁵ Eventually, the compliance in the atria is reduced and the elastic recoil is significantly less causing permanent AF.¹³ Overtime, heart failure with reduced ejection fraction (EF) develops from the

continued reduction in compliance and elastic recoil.⁵ (See *General classification of AF.*)

Emergent care

Treatment of AF costs over \$6 billion U.S. dollars annually and is associated with a significant burden on healthcare costs.⁸ Rate control versus rhythm control depends on the signs and symptoms and goals for each adult. Compared with rhythm control, rate control provides better overall management with less ED admissions.¹⁴

Treatment of AF is dependent on the ventricular rate, hemodynamic status, and presence of ischemia.⁵ The goal of treatment in an acute episode of uncontrolled AF is to reduce the ventricular heart rate to less than 100 beats/minute.⁵ Medications to control rate and rhythm include beta-blockers, calcium channel blockers, digoxin, and antiarrhythmics.^{5,8} (See *Pharmacotherapy to control AF rate.*)

When the EF is greater than 50%, control of the resting heart rate is recommended using a

Pharmacotherapy to control AF rate.^{5,19,20}

Drug	Indications
• Metoprolol	Beta-blocker used in acute-onset AF in adults with acute thyrotoxicosis or ACS, without hypotension (SBP < 90) or HF (EF < 50%).
• Esmolol	Beta-blocker used to control ventricular rate in operative or postoperative adults without hypotension (SBP < 90) or HF (EF < 50%).
• Propranolol	Beta-blocker used to control ventricular rate without hypotension (SBP < 90) or HF (EF < 50%).
• Diltiazem	Calcium channel blocker used in acute-onset AF in adults without hypotension (SBP < 90) or HF (EF < 50%), or in adults with COPD and ACS.
• Verapamil	Calcium channel blocker used in acute-onset AF in adults without hypotension (SBP < 90) or HF (EF < 50%).
• Digoxin	A cardiac glycoside (digitalis) used in AF with HF (EF < 50%). Use with caution in adults with AF. Increases risk of mortality.
• Amiodarone	A Class III antiarrhythmic used in AF with ACS, severe LV dysfunction, HF (EF < 50%), or hypertrophic cardiomyopathy.
• Dronedarone	A benzofuran derivative used in AF with ACS, severe LV dysfunction, HF (EF < 50%), or hypertrophic cardiomyopathy.

AF = Atrial fibrillation, SBP = systolic blood pressure, COPD = chronic obstructive pulmonary disease, ACS = acute coronary syndromes, HF = heart failure, EF = ejection fraction, LV = left ventricular

Treatment to convert AF to sinus rhythm.^{6,20}

Drug	Indications
• Synchronized electrical cardioversion	New-onset AF < 48 hours of known duration and low risk of stroke, for HR > 150 beats/minute, hypotension (SBP < 90) and symptomatic palpitations, and shortness of breath. AF > 48 hours will need pre-anticoagulation.
• Dofetilide	If without drug contraindications, HR > 120, symptomatic palpitations and shortness of breath
• Ibutilide	If without drug contraindications, HR > 120, symptomatic palpitations and shortness of breath
• Amiodarone	AF with ACS, severe LV dysfunction, HF (EF < 50%), or hypertrophic cardiomyopathy
• Dronedaron	EF with ACS, severe LV dysfunction, or HF (EF < 50%). AF with hypertrophic cardiomyopathy.
• Propafenone	Pill-in-the-pocket approach to terminate AF out of hospital. First dose in monitored setting. Avoid in patients with CAD, valvular heart diseases, and LV dysfunction.
• Flecainide	Pill-in-the-pocket approach to terminate AF out of hospital. First dose in monitored setting. Avoid in patients with CAD, valvular heart diseases, and LV dysfunction.

AF = Atrial fibrillation, HR = heart rate, SBP = systolic blood pressure, ACS = acute coronary syndromes, HF = heart failure, EF = ejection fraction, LV = left ventricular, CAD = coronary artery disease

beta-blocker or calcium channel blocker. A two-dimensional transthoracic echocardiogram identifies the EF to determine if heart failure is present.⁵ Mrs. J's EF was previously measured at 55%, so a diltiazem infusion was started. Mrs. J can now receive an oral dose of diltiazem daily and be weaned off the infusion. BP, heart rate, and cardiac rhythm should be monitored every 15 minutes during transitioning of the infusion.¹⁵

Amiodarone is used if heart failure is present. Amiodarone, a member of a class of antiarrhythmic drugs with predominantly Class III (Vaughan Williams' classification) effects, is used to slow the ventricular response rate and may convert the rhythm to a sinus rhythm.⁵ Amiodarone is used with caution as it'll increase the serum concentration of many drugs including warfarin, HMG-CoA reductase inhibitors (statin drugs), and digoxin.⁵

Dronedaron can slow the ventricular rate in an acute episode of AF in adults with normal EF, but has a boxed warning for an increased risk of death, stroke, and heart failure in patients with

permanent AF.⁵ Both amiodarone and dronedaron can cause bradycardias and QT interval prolongation.⁵

Synchronized electrical cardioversion is recommended for unstable AF if the ventricular rate is above 150 beats/minute and the patient has serious signs and symptoms due to the rapid AF, including hypotension (defined as SBP less than 90 mm Hg).⁵ Careful consideration is given to determine the time of onset of AF, risk of stroke, and hemodynamic status. Adults with AF of more than 48 hours' duration or unknown duration may require immediate cardioversion for hemodynamic instability. To prevent stroke, anticoagulation should be initiated as soon as possible and continued for at least 4 weeks after cardioversion unless contraindicated.⁵ Transesophageal echocardiography can be performed to identify the presence of left atrial thrombi, before proceeding with cardioversion.⁵ (See *Treatment to convert AF to sinus rhythm.*)

Pharmacologic cardioversion can be used within 7 days of an initial onset of AF. Dofetilide or



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ibutilide is used to convert AF to sinus in an effort to reduce signs and symptoms without hemodynamic compromise. Monitoring for hypokalemia and premedication with magnesium sulfate helps to prevent polymorphic ventricular tachycardia.⁵ Ibutilide can also be used to improve electrical cardioversion success as a premedication.⁵

Preventing strokes

Adults with asymptomatic AF are twice as likely to die from stroke.⁵ Atrial thrombi form from the variable diastolic filling and can result in an embolic acute ischemic stroke.^{1,2,5,6}

Warfarin for nonvalvular AF has been the gold standard of therapy to prevent strokes, and may also prevent myocardial infarctions in adults with AF.^{5,7} The goal is to keep the INR at 2.0 to 3.0 for nonvalvular AF, with ongoing monitoring required.⁵ A stable diet of foods containing vitamin K are recommended to prevent varying INR levels.⁵

Newer anticoagulant drugs with shorter half-lives are currently FDA approved and may be better tolerated without dietary restrictions and lab monitoring. Dabigatran, rivaroxaban, and apixaban are among these, and are currently available without a reversal agent, have important drug-to-drug interactions, and should be dosed based on renal function.^{3,5} Compared with warfarin, taking 2 days to get to peak drug levels, peak levels occur with these

newer drugs within 2 to 4 hours of dose administration and should be started when the INR falls to less than 2.0.¹⁵ Mrs. J should be evaluated to determine if changing to a newer anticoagulant would be of benefit.

Bleeding is the major risk factor of anticoagulants. Older adults (over 65) and adults with a history of hypertension, renal or liver dysfunction, stroke, gastrointestinal bleeding, and alcohol or drug abuse are at a higher risk for bleeding and may require complex management. Dual antiplatelet therapy with aspirin and clopidogrel may provide a reasonable alternative for high-risk adults with AF.⁵

Improving quality of life

Episodes of intermittent uncontrolled AF can reduce exercise tolerance and may prevent patients from participating in social activities.^{8,16} Nurses should educate patients with AF to stop activities and rest during these episodes to prevent syncope and prevent trips to the ED.

Patients with persistent,¹² paroxysmal¹⁷ AF are able to participate in moderate levels of physical activity as recommended by the American Heart Association.¹² Regular physical activity has been found to be safe and helpful in lowering resting heart rate and improving exercise capacity by 20%.¹² Signs and symptoms are less frequent and less severe with regular physical activity.^{12,17}

Depression has been found in up to 33% of adults with 58% persistent AF and 42% paroxysmal AF. Multiple studies have shown increased rates of anxiety and depression in patients with severe AF signs and symptoms.^{4,8} Depression screening using a valid and reliable screening tool is recommended.⁵ Mrs. J should be screened for depression during the current hospital admission and encouraged to participate in regular physical activity, as recommended by her healthcare provider (HCP), to reduce anxiety and depression.¹⁷

Psychological stress increases comorbidities and places an increased burden on adults with AF.⁸ The emotional impact may keep adults with AF from talking about their signs and symptoms and may prevent others from recognizing their risk for serious complications. Women, more than men, are more likely to share concerns with their

General classification of AF²¹

Paroxysmal AF - AF that terminates spontaneously or with intervention within 7 days of onset. Episodes may recur with variable frequency.

Persistent AF - AF that fails to self-terminate within seven days.

Long-standing persistent AF - Continuous AF >12 months in duration.

Permanent AF - The term "permanent AF" is used when the patient and clinician make a joint decision to stop further attempts to restore and/or maintain sinus rhythm.

Nonvalvular AF - AF in the absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair.

HCP. The nurse has an opportunity to implement therapeutic communication to allow the patient to verbalize his or her concerns and fears. This may help increase the patient's confidence, thus better informing the healthcare team regarding control of AF.¹⁸

Discharge instructions

Mrs. J may spend only 1 or 2 days in an acute care setting and then will be discharged to home.

Critical care and step-down nurses have an opportunity to discuss signs and symptoms, medications, and patient concerns. A plan is created so Mrs. J is aware when to call the HCP, what actions to take to reduce episodes of uncontrolled AF severe signs and symptoms, and strategies to reduce hospital readmissions.

Education about medications is discussed prior to discharge. Mrs. J is taught to avoid taking pseudoephedrine, and other decongestants, to prevent episodes of intermittent uncontrolled AF.⁵ She's encouraged to eat a heart-healthy diet with a consistent intake of foods high in vitamin K, limit caffeine and alcohol, reduce salt intake, quit smoking, and manage stress.¹ Regular physical activity is recommended to reduce sympathetic nervous system stimulation, improve signs and symptoms, and improve her quality of life.¹⁷

Summary

Atrial fibrillation can have a significant impact on the life of adults. Frequent contacts with the healthcare system, medication management, and treatment strategies can be expensive and time consuming. Nurses can help adults with AF by actively listening to their subjective experiences and helping them to understand their symptoms. Nurses can help adults develop communication strategies to use with their HCP to facilitate patient-centered care and the patient experience. ♦

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