

## Chronic Atrial Fibrillation Management

### Learning objectives:

1. Apply principles of stroke risk assessment and prevention in atrial fibrillation (AF)
2. Select appropriate anticoagulant in common clinical scenarios
3. Describe goals of rate control in AF and select an appropriate management strategy
4. List factors that would favor a rhythm over rate control strategy

### Introduction / Outline:

Plan to spend at least 20 minutes preparing for this talk by using the Interactive board for Learning/Preparing, clicking through the graphics, and becoming familiar with the order the content appears on the graphic. The teaching script below details how to walk through the talk. Every interactive or “clickable” element is denoted with a mouse icon.

**Anticipated time to deliver the talk with and without cases or other features: without cases 20 minutes. The cases may take an additional 15 min.**

The talk can be presented in two ways:

1. Project the “Interactive Board” OR
2. Reproduce your own drawing of the presentation on a whiteboard.

With either method, print out copies of the Learner’s Summary Handout so they may have this for reference after the discussion. Begin with reviewing the objectives for the session.

This talk will cover three major principles of the chronic management of atrial fibrillation (AF): stroke prevention, rate control, and rhythm control. For the evaluation of new onset atrial fibrillation and management of rapid ventricular response, see TeachIM talk “[Management of Atrial Fibrillation with Rapid Ventricular Response.](#)”

### **Objective 1: Apply principles of stroke risk assessment and prevention in atrial fibrillation (Stroke Prevention and Risk Assessment)**

It is well established that patients with AF are at elevated risk of stroke and that anticoagulation can reduce that risk. The decision to start anticoagulation involves balancing the benefits of clot prevention with the risk of bleeding. When indicated, anticoagulation can and should be initiated by primary care providers, hospitalists, or other general medicine providers without needing specialist consultation. Minimizing delays in treatment can aid in stroke prevention.

### **Risk Assessment**

**Stroke risk assessment: CHADS<sub>2</sub>-VA<sub>2</sub>Sc** - Ask learners to name the stroke risk assessment tool and then click to reveal the CHADS<sub>2</sub>-VA<sub>2</sub>Sc score. The CHA<sub>2</sub>DS<sub>2</sub>-VASc score is the most widespread risk assessment tool to assess stroke risk in atrial fibrillation and is used to make decisions on when to initiate anticoagulation. Increasing scores are associated with increasing annual risk of stroke. The components of the score are listed below. Click on each of the letters to reveal the risk factor.

## Chronic Atrial Fibrillation Management

- **Congestive heart failure**: Any history of symptomatic heart failure (preserved or reduced ejection fraction) OR even asymptomatic left ventricular dysfunction on cardiac imaging
- **Hypertension**: history of hypertension, regardless of control
- **Age**: +1 for age 65-74, +2 for age  $\geq 75$
- **Diabetes**: any history of diabetes regardless of severity
- **Stroke/TIA/systemic embolism (+2)**: Any history of stroke, transient ischemic attack, or systemic thromboembolism. Of note systemic embolism includes arterial embolism (i.e. deep venous thrombosis/pulmonary embolism is not included)
- **Vascular disease**: includes any history of coronary artery disease (including prior myocardial infarction, disease noted on angiography/other imaging, or angina) or peripheral vascular disease (including symptomatic claudication, history of peripheral intervention)
- **Sex category**: Female sex is a “risk modifier,” in that for each non-sex risk factor, females tend to have a higher stroke risk than males

**Bleeding risk assessment: HAS-BLED** - Ask learners to name the bleeding risk assessment tool and then the individual components of the HAS-BLED. The most common tool used to assess bleeding risk is the HAS-BLED tool. The components are listed below. Note that there is significant overlap between the two risk scores: many risk factors that increase risk of stroke also increase risk of bleeding.

- **Hypertension (uncontrolled)**: systolic blood pressure  $> 160$  mm Hg
- **Abnormal renal/liver function**: 1 point for each, based on history (e.g. on dialysis) or laboratory values
- **Stroke**: history of ischemic or hemorrhagic stroke
- **Bleeding history or predisposition**: predisposition is not well defined, but would include coagulopathy and thrombocytopenia
- **Labile INR**: for patients on warfarin
- **Elderly**: Age  $> 65$
- **Drugs**: Concomitant use of medications such as NSAIDs or antiplatelet, as well as “excessive” alcohol use

Click on the “Calculate annual risk” button to practice applying these risk tools in two clinical vignettes. Click on the link to be directed to the SPARC tool, a useful online risk estimator.

### **Objective 2: Select appropriate anticoagulant in common clinical scenarios (Therapies and Clinical Scenarios)**

#### **Therapies**

Ask your learners each of the prompting questions and click to reveal the answer.

- **When to anticoagulate?**: The decision to prescribe anticoagulation is based on a patient’s CHA<sub>2</sub>DS<sub>2</sub>-VASc score.
  - Current guidelines recommend anticoagulation for a score of 2 or greater in males and 3 or greater in females (i.e., if a patient has multiple non-sex risk factors) (Class I recommendation).

## Chronic Atrial Fibrillation Management

- Guidelines recommend against anticoagulation for CHA<sub>2</sub>DS<sub>2</sub>-VASc of 0 in males or 1 in females (Class IIa recommendation). In between (1 in males or 2 in females) is less clear, and guidelines offer that anticoagulation “may be considered” (Class IIb recommendation), and this should prompt a risk/benefit discussion with the patient.
- The chart provided is from a 2012 validation study which highlights the high absolute risk of stroke in patients with atrial fibrillation, nearly 10% or great for patients with CHA<sub>2</sub>DS<sub>2</sub>-VASc 6 or more.<sup>1</sup>
- **High bleeding risk?**: In general, outside of an acute episode of bleeding, guidelines do not recommend withholding anticoagulation due to an elevated risk of bleeding, for the following reasons:
  - Anticoagulation is *very* effective, with >60% relative risk reduction of stroke and >25% relative mortality reduction.<sup>2</sup> As discussed previously, as there is high overlap between bleeding and stroke risk, patients at high bleeding risk can actually derive more absolute benefit.
  - The clinical significance and consequences to the patient of an ischemic stroke are often more severe than an episode of bleeding (often defined by a hemoglobin drop or transfusion requirement in studies of bleeding risk).
- **First line therapy?**: Direct oral anticoagulants (DOACs) have been shown to be more effective and have lower bleeding risk than warfarin, and current guidelines recommend DOAC as first line for most patients. There is emerging evidence comparing one DOAC to another, but for now guidelines do not recommend one over the other.
- **Paroxysmal vs persistent?**: While it seems logical that patients with a higher burden of atrial fibrillation are at higher risk of stroke, a patient with only paroxysmal atrial fibrillation as well as patients after successful cardioversion should still be offered anticoagulation if at elevated risk on CHA<sub>2</sub>DS<sub>2</sub>-VASc.
- **Non-medication options?**: For patients who cannot tolerate anticoagulation, there are a number of procedural options that reduce risk of stroke. Percutaneously placed devices (e.g. WATCHMAN) occlude the left atrial appendage, which is where clots tend to form in atrial fibrillation. It is important to note that patients are at high thrombotic risk peri-procedurally and require anticoagulation or antiplatelet therapy for a period of time. For patients undergoing other cardiac surgery, surgical left atrial appendage ligation during the procedure reduces risk of stroke, but it is still recommended that patients continue oral anticoagulation.

### Clinical Scenarios

Ask your learners about how the following scenarios impact choice of anticoagulation. Click on each of the scenarios to reveal the answer.

- **Valve disease** - the term “valvular” AF refers only to moderate or severe mitral stenosis or a mechanical valve. Any other valvular lesion (e.g. aortic stenosis, mitral regurgitation) still falls under “non-valvular” atrial fibrillation.
  - Patients with moderate to severe mitral stenosis were excluded from trials evaluating efficacy of DOACs and current guidelines recommend warfarin for these patients, though there may be more data in the future.

## Chronic Atrial Fibrillation Management

- Patients with mechanical valves require warfarin. DOACs have been studied in this population and were found to be inferior.<sup>3</sup>
- Obesity - there is some concern about efficacy of fixed dose DOAC in patients with obesity as they were not included or under-represented in initial clinical trials. There is data to suggest all DOACs are safe and effective at BMI <40, that apixaban and rivaroxaban are safe and effective up to a BMI of 50.<sup>4</sup> Similar recommendations are given in guidelines for anticoagulation for the treatment of venous thromboembolism, which acknowledge a paucity of data for BMI above 50.<sup>5</sup> Decisions on anticoagulation for patients with BMI>50 should include a risk benefit discussion with the patient and consultation with an anticoagulation pharmacist if available.
- Cardioversion - Patients who are undergoing cardioversion are at elevated stroke risk in the peri-cardioversion period.
  - It is thought that if a clot has formed in the left atrial appendage, return to sinus rhythm could dislodge that clot and lead to systemic emboli. Current guidelines recommend at least 3 weeks of anticoagulation prior to cardioversion if atrial fibrillation has been present for >48 hours (or unknown duration). An alternative (frequently seen for patients admitted to the hospital) is to perform transesophageal echocardiogram (TEE) prior to cardioversion to ensure there is no clot in the left atrial appendage. It is often difficult to definitively determine the exact timing of onset and there is data questioning the “48-hour rule” (retrospective data showing increased risk of stroke after only 12 hours, particularly in elderly patients). Thus, patients rarely proceed directly to cardioversion without TEE or preceding anticoagulation.
  - After cardioversion, patients require 4 weeks of anticoagulation regardless of their CHA<sub>2</sub>DS<sub>2</sub>-VASc score. Atrial stunning, or reduced left atrial systolic function, in the post-cardioversion state may increase the risk of a clot forming for about 4 weeks following cardioversion.<sup>6</sup>
- Frequent falls - Frequent falls (especially without history of associated bleeding) should *not* be a reason to withhold anticoagulation. One study estimated that a “average-risk” elderly patient would have to fall 295 times per year for the risk of anticoagulation to outweigh the benefit.<sup>7</sup>
- Coronary artery disease - In general, in most patients with stable coronary disease (defined as at least 1 year from myocardial infarction or revascularization), adding aspirin to anticoagulation therapy only increases bleeding risk without decreasing thrombotic events. Most patients can be treated with anticoagulation alone. Recent [ACC guidelines](#) have helpful diagrams for management of antiplatelet and anticoagulant medications in a variety of clinical scenarios.<sup>8</sup>
- Chronic kidney disease - For patients with end-stage renal disease or a creatinine clearance (CrCl) <15 mL/min, apixaban or warfarin can be used.

**Objective 3: Describe goals of rate control in atrial fibrillation and select an appropriate medical or procedural strategy (Rate Control)**

What is the target heart rate?: In general, all patients should be rate controlled to achieve a target heart rate of <110 bpm, which comes from randomized trials that did not show benefit with stricter rate control.<sup>9</sup>

However, if patients have symptoms, declining LV function, or other complications from atrial fibrillation they should have a lower target heart rate (or consider rhythm control, as discussed later in this lecture)

3 medication classes?: Ask students 3 classes of medications used for rate control. All 3 classes of medication act to block the AV node (digoxin indirectly inhibits by modifying parasympathetic tone)

- Beta-blockers: metoprolol (tartrate or succinate), carvedilol, bisoprolol, atenolol. Choice depends on provider preference and other comorbidities (e.g., carvedilol if hypertensive)
  - o Evidence-based beta blockers are preferred in patients with heart failure with reduced ejection fraction (HFrEF): metoprolol succinate (not tartrate), carvedilol, or bisoprolol). However, beta-blockers have negative inotropic effect and should be used with caution in patients with *decompensated* HFrEF.
  - o Use with caution in patients with severe bronchospasm. Patients with COPD tend to tolerate beta blockers quite well, while it may be best to find alternative medication in patients with asthma / reactive airway disease. Cardio-selective beta blockers (metoprolol, bisoprolol) may be best tolerated.
- Calcium channel blockers: Diltiazem is the most common calcium channel blocker used for rate control, available in short and long-acting formulations. It is contraindicated in patients with HFrEF as it is a stronger negative inotrope.
- Digoxin: Digoxin is not first line for rate control but is a useful adjunctive medication, especially in patients with severe or decompensated heart failure, as it is a positive inotrope (whereas beta blockers and calcium channel blockers are negative inotropes). It is renally cleared and should be avoided or used very cautiously in patients with renal dysfunction as they may develop digoxin toxicity.
- Procedural option?: A last line option for rate control in atrial fibrillation is AV node ablation with pacemaker placement. This strategy is often seen in patients who are otherwise refractory to rate and rhythm control, particularly in patients with tachy-arrhythmia induced cardiomyopathy.

**Objective 4: List factors that would favor a rhythm control strategy for chronic atrial fibrillation (Rhythm Control)**

Rate versus rhythm control in atrial fibrillation is an area of rapidly changing debate. In general, there is current movement towards broader and earlier use of rhythm control in most patients.<sup>10</sup> Older studies of rate vs. rhythm control were done with anti-arrhythmic drugs, which can have significant side effects compared to newer catheter ablation techniques. The decision to pursue rhythm control, and the exact choice of therapy, is outside the scope of

## Chronic Atrial Fibrillation Management

practice for an internal medicine resident, but the goal of this talk is to think about factors that cardiologists consider that would tend to favor a rhythm control strategy.

- Factors that favor rhythm control?:

- Age / younger patients
- Fewer comorbidities
- Recent onset of atrial fibrillation: patients more recent onset AF are more likely to successfully maintain sinus rhythm
- Symptoms attributable to atrial fibrillation
  - At present, the strongest guideline recommendation is to attempt rhythm control for patients with ongoing symptoms attributable to AF
  - Symptoms can be independent of heart rate. Some patients feel poorly even with rate-controlled atrial fibrillation and sometimes the only way to know if their symptoms are related to atrial fibrillation is to see how they feel in sinus rhythm
- Inability to achieve adequate rate control
- Tachycardia-induced cardiomyopathy
- There is also growing evidence that all patients with LV dysfunction of any cause may benefit from rhythm control<sup>11</sup>

- Therapies?: There are 3 broad categories of rhythm control methods.

1. Electrical cardioversion
2. Anti-arrhythmic medications
3. Ablation: a variety of different techniques are available, and this is a rapidly growing area of study

- Anti-arrhythmic medications?: 4 common anti-arrhythmic medications include amiodarone, sotalol, dofetilide, and flecainide. Generalists often encounter patients who are on these medications, and it is important to understand key toxicities and side effects to monitor

- a. Amiodarone: one of the most common and effective antiarrhythmics but has a wide range of toxicities. Amiodarone requires routine monitoring of pulmonary function with PFTs, as well as liver and thyroid function.
- b. Sotalol and dofetilide both prolong the QTc interval and increase the risk of Torsades, so much so that they require initiation in the hospital for continuous telemetry monitoring. They are renally dosed so watch for changing renal function.
- c. Flecainide is a well-tolerated antiarrhythmic but is contraindicated in patients with structural heart disease/coronary artery disease.

- Risk reduction?: Comorbidity management plays an important role in the management of atrial fibrillation. Appropriate management of comorbidities enhances the success of both rate and rhythm control strategies.

- Alcohol and smoking cessation
- Optimization of physical activity
- Management of metabolic syndrome
  - Hypertension and hyperlipidemia as per guidelines

## Chronic Atrial Fibrillation Management

- >10% weight reduction to target BMI <27 kg/m<sup>2</sup>
- Sleep apnea – screen for OSA and manage

**Cases:** Encourage your learners to pull up [www.sparctool.com](http://www.sparctool.com) while going through the cases to aid in decision making about anticoagulation.

### References:

Unless otherwise specified, material is drawn from the 2019 AHA/ACC/HRS<sup>12</sup> and the 2020 ESC<sup>13</sup> guidelines for the management of atrial fibrillation. Images from Biorender.com.

#### References

1. Friberg L, Rosenqvist M, Lip GY. Evaluation of risk stratification schemes for ischaemic stroke and bleeding in 182 678 patients with atrial fibrillation: the Swedish Atrial Fibrillation cohort study. *Eur Heart J* 2012;33(12):1500-10. DOI: 10.1093/eurheartj/ehr488.
2. Hart RG, Pearce LA, Aguilar MI. Meta-analysis: antithrombotic therapy to prevent stroke in patients who have nonvalvular atrial fibrillation. *Ann Intern Med* 2007;146(12):857-67. DOI: 10.7326/0003-4819-146-12-200706190-00007.
3. Eikelboom JW, Connolly SJ, Brueckmann M, et al. Dabigatran versus warfarin in patients with mechanical heart valves. *N Engl J Med* 2013;369(13):1206-14. DOI: 10.1056/NEJMoa1300615.
4. Wang SY, Giugliano RP. Non-Vitamin K Antagonist Oral Anticoagulant for Atrial Fibrillation in Obese Patients. *Am J Cardiol* 2020;127:176-183. DOI: 10.1016/j.amjcard.2020.04.016.
5. Martin KA, Beyer-Westendorf J, Davidson BL, Huisman MV, Sandset PM, Moll S. Use of direct oral anticoagulants in patients with obesity for treatment and prevention of venous thromboembolism: Updated communication from the ISTH SSC Subcommittee on Control of Anticoagulation. *J Thromb Haemost* 2021;19(8):1874-1882. DOI: 10.1111/jth.15358.
6. Manning WJ, Silverman DI, Katz SE, et al. Impaired left atrial mechanical function after cardioversion: relation to the duration of atrial fibrillation. *J Am Coll Cardiol* 1994;23(7):1535-40. DOI: 10.1016/0735-1097(94)90652-1.
7. Man-Son-Hing M, Nichol G, Lau A, Laupacis A. Choosing antithrombotic therapy for elderly patients with atrial fibrillation who are at risk for falls. *Arch Intern Med* 1999;159(7):677-85. DOI: 10.1001/archinte.159.7.677.
8. Kumbhani DJ, Cannon CP, Beavers CJ, et al. 2020 ACC Expert Consensus Decision Pathway for Anticoagulant and Antiplatelet Therapy in Patients With Atrial Fibrillation or Venous Thromboembolism Undergoing Percutaneous Coronary Intervention or With Atherosclerotic Cardiovascular Disease: A Report of the American College of Cardiology Solution Set Oversight Committee. *J Am Coll Cardiol* 2021;77(5):629-658. DOI: 10.1016/j.jacc.2020.09.011.
9. Van Gelder IC, Groenveld HF, Crijns HJ, et al. Lenient versus strict rate control in patients with atrial fibrillation. *N Engl J Med* 2010;362(15):1363-73. DOI: 10.1056/NEJMoa1001337.

## Chronic Atrial Fibrillation Management

10. Camm AJ, Naccarelli GV, Mittal S, et al. The Increasing Role of Rhythm Control in Patients With Atrial Fibrillation: JACC State-of-the-Art Review. *J Am Coll Cardiol* 2022;79(19):1932-1948. DOI: 10.1016/j.jacc.2022.03.337.
11. Heidenreich PA, Bozkurt B, Aguilar D, et al. 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation* 2022;145(18):e895-e1032. DOI: 10.1161/CIR.0000000000001063.
12. January CT, Wann LS, Calkins H, et al. 2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol* 2019;74(1):104-132. DOI: 10.1016/j.jacc.2019.01.011.
13. Hindricks G, Potpara T, Dagres N, et al. 2020 ESC Guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association for Cardio-Thoracic Surgery (EACTS): The Task Force for the diagnosis and management of atrial fibrillation of the European Society of Cardiology (ESC) Developed with the special contribution of the European Heart Rhythm Association (EHRA) of the ESC. *Eur Heart J* 2021;42(5):373-498. DOI: 10.1093/eurheartj/ehaa612.