



# Atrial Fibrillation: Management - Adult - Inpatient/Ambulatory/Emergency Department Clinical Practice Guideline

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## **Introduction**

Atrial fibrillation (AF) is a common cardiac rhythm disturbance and increases in prevalence with advancing age. Up to 12% of patients between 75 to 84 years of age have atrial fibrillation.<sup>1</sup> AF is associated with a 5-fold increased risk of stroke<sup>2</sup>, a 3-fold risk of heart failure<sup>3-5</sup>, and a 2-fold increased risk of both dementia<sup>6</sup> and mortality.<sup>2</sup>

## **Scope**

**Intended User(s):** Physicians, Advanced Practice Providers, Registered Nurses, Pharmacists, Cardiac Rehabilitation Therapists

**Objective(s):** To provide evidence-based recommendations for the most effective therapeutic treatment and management of atrial fibrillation (AF) across all care settings (inpatient, ambulatory and the Emergency Department.)

**Target Population:** Adult patients diagnosed with atrial fibrillation or atrial flutter. Atrial flutter (typical) may be amendable to ablation; providers should have a low threshold to consult Cardiovascular Medicine/Electrophysiology early in clinical course.

### **Clinical Questions Considered:**

- When is antithrombotic therapy recommended in nonvalvular AF patients?
- Which patients are eligible for cardioversion in the Emergency Department setting?
- When should Cardiology be consulted for a patient with atrial fibrillation being managed in the primary care setting?

## **Recommendations**

UW Health has agreed to endorse the 2019 AHA/ACC/HRS Focused Update and the 2014 AHA/ACC/HRS Guideline for the Management of Patients with Atrial Fibrillation.<sup>7,8</sup>

In addition, listed below are tables and algorithms based on the 2019 AHA/ACC/HRS guideline that were developed to aid in clinician management of atrial fibrillation patients.

### **Drug related tables**

- [Table 1](#) provides dosing and drug information on select oral anticoagulant medications
- [Table 2](#) gives guidance on transitioning between anticoagulant drugs.

### **Algorithms**

- [Appendix A](#)- Selecting an Oral Anticoagulant for an Atrial Fibrillation
- [Appendix B](#)- Emergency Department Management of Atrial Fibrillation
- [Appendix C](#)- Outpatient Management of Atrial Fibrillation
- [Appendix D](#)- Inpatient Management of Atrial Fibrillation: Management for General Care and Intermediate Medical Care (IMC) – Non- Cardiothoracic (CT) Surgery
- [Appendix E](#)- Inpatient Management Atrial Fibrillation Algorithm for General Care and IMC (CT Surgery)
- [Appendix F](#)- Digestive Health Center Endoscopy Atrial Fibrillation Algorithm
- [Appendix G](#)- Atrial Fibrillation – Rate Control Drugs

**Table 1. Select Anticoagulant Medications**

Drug	Dosing		Contraindications	Drug Interactions	Notes
	CrCl (mL/min)	Suggested Dose			
<b>Apixaban</b> (Eliquis®)  <i>Factor Xa inhibitor</i>	≥15	5 mg BID  2.5 mg BID with concomitant use of strong CYP3A4 and P-gp inhibitors  2.5 mg BID if 2 of the following: - age ≥80 years - body weight ≤60 kg - SCr ≥1.5 mg/dL	<ul style="list-style-type: none"> <li>Active bleeding,</li> <li>Hypersensitivity to apixaban</li> <li>Major regional or lumbar block analgesia</li> <li>Pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>Strong CYP3A4 inhibitors (e.g. azole antifungals, nifedipine, ritonavir) may increase the serum concentrations</li> <li>Strong CYP3A4 inducers (e.g. carbamazepine, nafcillin, phenobarbital, phenytoin, rifampin) may decrease serum concentrations</li> <li>P-gp inhibitors (e.g. amiodarone, cyclosporine, ketoconazole, quinidine, verapamil) may increase the serum concentration</li> <li>P-gp inducers (e.g. carbamazepine, dexamethasone, phenytoin, prazosin, rifampin) may decrease the serum concentration</li> </ul>	<ul style="list-style-type: none"> <li>Avoid use in nursing</li> <li>Adverse reactions include bleeding, nausea, anemia increased transaminases</li> <li><b>Black Box warning:</b> Increased risk of ischemic events when stopped without adequate anticoagulation with an alternative agent</li> </ul> <p><u>Black Box warning:</u> Epidural or spinal hematomas may occur in those who are receiving neuraxial anesthesia or are undergoing spinal puncture.</p>
	<15 (on HD)	5 mg BID  2.5 mg BID if either: - age ≥80 years - body weight ≤60 kg			
	<15 (not on HD)	Avoid use			
<b>Edoxaban</b> (Savaysa®)  <i>Factor Xa inhibitor</i>	>95	Avoid use	<ul style="list-style-type: none"> <li>Active pathological bleeding</li> <li>Pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>Strong CYP3A4 inhibitors (e.g. azole antifungals, nifedipine, ritonavir) may increase the serum concentrations</li> <li>Strong CYP3A4 inducers (e.g. carbamazepine, nafcillin, phenobarbital, phenytoin, rifampin) may decrease serum concentrations</li> <li>P-gp inhibitors (e.g. amiodarone, cyclosporine, ketoconazole, quinidine, verapamil) may increase the serum concentration</li> <li>P-gp inducers (e.g. carbamazepine, dexamethasone, phenytoin, prazosin, rifampin) may decrease the serum concentration</li> </ul>	<ul style="list-style-type: none"> <li>Adverse reactions include bleeding events, anemia, abnormal hepatic function tests</li> <li><b>Black Box warning:</b> Increased risk of ischemic events when stopped without adequate anticoagulation with an alternative agent</li> </ul> <p><u>Black Box warning:</u> Epidural or spinal hematomas may occur in those who are receiving neuraxial anesthesia or are undergoing spinal puncture.</p>
	50-95	60 mg once daily			
	15-50	30 mg once daily			
	<15	Avoid use			
<b>Rivaroxaban</b> (Xarelto®)  <i>Factor Xa inhibitor</i>	>50	20 mg once daily			<p><u>Black Box warning (for edoxaban only):</u> CrCl &gt;95 mL/min; reduced efficacy in non-valvular AF</p>
	15-50	15 mg once daily			
	<15	Avoid use			

Table 1. Anticoagulant Dosing Table (continued)

Drug	Dosing		Contraindications	Drug Interactions	Notes
	CrCl (mL/min)	Suggested Dose			
<b>Dabigatran</b> (Pradaxa®)  <i>Direct thrombin inhibitor</i>	>30	150 mg BID  75 mg BID with concomitant use of P-gp inhibitor	<ul style="list-style-type: none"> <li>Active bleeding</li> <li>Hypersensitivity to dabigatran</li> <li>Major regional or lumbar block analgesia</li> <li>Mechanical prosthetic heart valves</li> <li>Pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>P-gp inhibitors (e.g. amiodarone, cyclosporine, ketoconazole, quinidine, verapamil) may increase the serum concentration</li> <li>P-gp inducers (e.g. carbamazepine, dexamethasone, phenytoin, prazosin, rifampin) may decrease the serum concentration</li> </ul>	<ul style="list-style-type: none"> <li>Adverse reactions include bleeding, dyspepsia, anemia increased ALT</li> <li>Dyspepsia may be minimized by taking with food</li> <li><u>Black Box warning</u> Increased risk of ischemic events when stopped without adequate anticoagulation with an alternative agent</li> </ul> <p><u>Black Box warning:</u> Epidural or spinal hematomas may occur in those who are receiving neuraxial anesthesia or are undergoing spinal puncture.</p>
	15-30	75 mg BID  Avoid use if concomitant use of P-gp inhibitor			
	<15	Avoid use			
<b>Aspirin</b> <i>COX-inhibitor</i>	No adjustment needed for renal dysfunction	81 mg once daily	<ul style="list-style-type: none"> <li>Hypersensitivity to salicylates</li> <li>Rhinitis</li> <li>Nasal polyps</li> <li>Inherited or acquired bleeding disorders</li> <li>Patients &lt; 16 years for viral infections</li> </ul>		<ul style="list-style-type: none"> <li><u>Adverse reactions include</u> dyspepsia, nausea, and bleeding events</li> </ul>
<b>Warfarin</b> (Coumadin®)  <i>Vitamin K Antagonist</i>	No adjustment needed for renal dysfunction	Dose varies based on patient-specific factors	Pregnancy (can be safely used when breastfeeding)	<ul style="list-style-type: none"> <li>Strong CYP3A4 inhibitors (e.g. azole antifungals, nifedipine, ritonavir) may increase the serum concentrations</li> <li>Strong CYP3A4 inducers (e.g. carbamazepine, nafcillin, phenobarbital, phenytoin, rifampin) may decrease serum concentrations</li> <li>P-gp inhibitors (e.g. amiodarone, cyclosporine, ketoconazole, quinidine, verapamil) may increase the serum concentration</li> <li>P-gp inducers (e.g. carbamazepine, dexamethasone, phenytoin, prazosin, rifampin) may decrease the serum concentration</li> </ul>	<ul style="list-style-type: none"> <li><u>Adverse reactions include</u> increased risk for bleeding/bleeding events; less common hepatitis, skin necrosis, and "purple toe" syndrome</li> <li>Potential food interactions (e.g., alcohol, foods high in vitamin K such as green leafy vegetables)</li> <li><u>Black Box warning:</u> Can cause major or fatal bleeding</li> </ul>

**Table 2. Anticoagulant Transitioning<sup>10-13</sup>**

Switch	Procedure
<b>Warfarin → Dabigatran</b>	Stop warfarin, start dabigatran when INR <2.0
<b>Warfarin → Rivaroxaban</b>	Stop warfarin, start rivaroxaban when INR <3.0
<b>Warfarin → Apixaban</b>	Stop warfarin, start apixaban when INR <2.0
<b>Warfarin → Edoxaban</b>	Stop warfarin, start edoxaban when INR ≤2.5
<b>Dabigatran → Warfarin</b>	<p><i>Dabigatran affects the INR – measuring INRs during co-administration may not be useful for determining an appropriate dose of warfarin</i></p> <ul style="list-style-type: none"> <li>Start warfarin while patient is still taking dabigatran</li> <li>Stop dabigatran 1-3 days later, depending on INR and CrCl <ul style="list-style-type: none"> <li>If CrCl &gt;50 mL/min: initiate warfarin 3 days prior to discontinuation of dabigatran</li> <li>If CrCl 31-50 mL/min: initiate warfarin 2 days before discontinuation of dabigatran</li> <li>If CrCl 15-30 mL/min: initiate warfarin 1 day before discontinuation of dabigatran</li> </ul> </li> </ul>
<b>Rivaroxaban → Warfarin</b>	<p><i>Rivaroxaban affects the INR – measuring INRs during co-administration may not be useful for determining an appropriate dose of warfarin</i></p> <ul style="list-style-type: none"> <li>Initiate warfarin and a parenteral anticoagulant 24 hours after discontinuation of rivaroxaban*</li> </ul>
<b>Apixaban → Warfarin</b>	<p><i>Apixaban affects the INR – measuring INRs during co-administration may not be useful for determining an appropriate dose of warfarin</i></p> <ul style="list-style-type: none"> <li>If continuous anticoagulation is necessary, discontinue apixaban and begin both a parenteral anticoagulant with warfarin when the next dose of apixaban is due; discontinue parenteral anticoagulant when INR reaches an acceptable range*</li> </ul>
<b>Edoxaban → Warfarin</b>	<p><i>Oral option:</i></p> <ul style="list-style-type: none"> <li>For patients receiving 60 mg of edoxaban, reduce dose to 30 mg and begin warfarin concomitantly. For patients receiving 30 mg of edoxaban, reduce the dose to 15 mg and begin warfarin concomitantly.</li> <li>INR must be measured at least weekly and just prior to the daily dose of edoxaban to minimize the influence of edoxaban on INR measurements. Once a stable INR ≥2 is achieved, edoxaban should be discontinued and the warfarin continued.</li> </ul> <p><i>Parenteral option:</i></p> <ul style="list-style-type: none"> <li>Discontinue edoxaban and administer a parenteral anticoagulant (UFH or enoxaparin) and warfarin at the time of the next scheduled edoxaban dose. Once a stable INR ≥2 is achieved, edoxaban should be discontinued and warfarin continued.</li> </ul>
<b>Unfractionated heparin (UFH) → Direct oral anti-coagulant (DOAC)</b>	<ul style="list-style-type: none"> <li>Start dabigatran, rivaroxaban, or apixaban at the time of heparin discontinuation</li> <li>Start edoxaban 4 hours after heparin discontinuation</li> </ul>
<b>DOAC → IV UFH or enoxaparin</b>	<p>Dabigatran:</p> <ul style="list-style-type: none"> <li>If CrCl &gt;30 mL/min, start UFH or enoxaparin 12 hours after the last dose of dabigatran</li> <li>If CrCl &lt;30 mL/min, consider starting UFH or enoxaparin 24 hours after the last dabigatran dose, based on the clinical interpretation of the patients bleeding and thrombosis risk</li> </ul> <p>Rivaroxaban:</p> <ul style="list-style-type: none"> <li>Start UFH or enoxaparin 24 hours after the last rivaroxaban dose, based on the clinical interpretation of the patients bleeding and thrombosis risk</li> </ul> <p>Apixaban:</p> <ul style="list-style-type: none"> <li>Start UFH or enoxaparin 12 hours after the last apixaban dose</li> </ul> <p>Edoxaban:</p> <ul style="list-style-type: none"> <li>Start UFH or enoxaparin at the time of the next dose of edoxaban</li> </ul>

\*Overall risk stratification should focus on the patient's risk of thromboembolism since the consequences of a thromboembolic event are more likely to have serious, lasting effects compared to consequences of major bleeding. It is recommended to provide continuous therapeutic anticoagulation for patients with a recent stroke or TIA (within 3 months). Note that not all patients will require bridging with a parenteral anticoagulant.

## **Disclaimer**

Clinical practice guidelines assist clinicians by providing a framework for the evaluation and treatment of patients. This guideline outlines the preferred approach for most patients. It is not intended to replace a clinician's judgment or to establish a protocol for all patients. It is understood that some patients will not fit the clinical condition contemplated by a guideline and that a guideline will rarely establish the only appropriate approach to a problem.

## **Methodology**

### **Development Process**

Each guideline is reviewed and updated a minimum of every 3 years. All guidelines are developed using the guiding principles, standard processes, and styling outlined in the UW Health Clinical Practice Guideline Resource Guide. This includes expectations for workgroup composition and recruitment strategies, disclosure and management of conflict of interest for participating workgroup members, literature review techniques, evidence grading resources, required approval bodies, and suggestions for communication and implementation.

### **Methods Used to Collect the Evidence:**

The following criteria were used by the guideline author(s) and workgroup members to conduct electronic database searches in the collection of evidence for review.

#### Literature Sources:

- Electronic database search (e.g., PubMed)

Time Period: September 2018 to February 2019

The following is a list of various search terms that were used individually or in combination with each other for literature searches on PubMed: Atrial fibrillation, guideline, management, Emergency, anticoagulation.

### **Methods to Select the Evidence:**

Literary sources were selected with the following criteria in thought: English language, publication in a MEDLINE core clinical journal and strength of expert opinion (e.g., professional organization or society).

### **Methods Used to Formulate the Recommendations:**

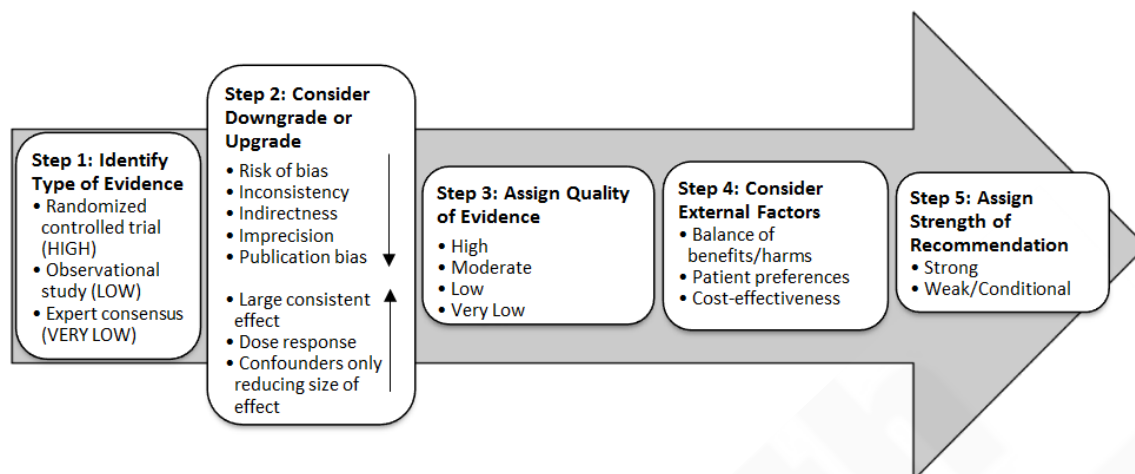
The workgroup members agreed to adopt recommendations developed by external organizations and/or created recommendations internally via a consensus process using discussion of the literature and expert experience/opinion. If issues or controversies arose where consensus could not be reached, the topic was escalated appropriately per the guiding principles outlined in the UW Health Clinical Practice Guideline Resource Guide.

### **Methods Used to Assess the Quality of the Evidence/Strength of the Recommendations:**

Recommendations developed by external organizations maintained the evidence grade assigned within the original source document and were adopted for use at UW Health.

Internally developed recommendations, or those adopted from external sources without an assigned evidence grade, were evaluated by the guideline workgroup using an algorithm adapted from the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology (see **Figure 1**).

**Figure 1. GRADE Methodology adapted by UW Health**



**Rating Scheme for the Strength of the Evidence/Recommendations:**

**GRADE Ranking of Evidence**

<b>High</b>	We are confident that the effect in the study reflects the actual effect.
<b>Moderate</b>	We are quite confident that the effect in the study is close to the true effect, but it is also possible it is substantially different.
<b>Low</b>	The true effect may differ significantly from the estimate.
<b>Very Low</b>	The true effect is likely to be substantially different from the estimated effect.

**GRADE Ratings for Recommendations For or Against Practice**

<b>Strong (S)</b>	Generally should be performed (i.e., the net benefit of the treatment is clear, patient values and circumstances are unlikely to affect the decision.)
<b>Conditional (C)</b>	May be reasonable to perform (i.e., may be conditional upon patient values and preferences, the resources available, or the setting in which the intervention will be implemented.)

**Recognition of Potential Health Care Disparities:** Disparities have been identified in the way patients of different racial groups are managed and in the way patients with different types of atrial fibrillation (AF) are treated. In cross-sectional analyses of United Kingdom patients, eligible patients with paroxysmal atrial fibrillation were half as likely to be treated with anticoagulants in 2000 as patients with other types.<sup>15</sup> In 2015, this treatment gap improved, but still illustrated that paroxysmal AF patients were around 20% less likely to be prescribed anticoagulant therapy.<sup>15</sup> Racial variations in the diagnosis and management of AF are also recognized in the literature.<sup>16</sup>



## **Collateral Tools & Resources**

The following collateral tools and resources support staff execution and performance of the evidence-based guideline recommendations in everyday clinical practice.

### Metrics

- Describe metrics which could be used to assess compliance with the stated recommendations or to Proportion of patients discharged from Emergency Department vs. admitted following implementation of ED Algorithm
- Number of patients which receive follow-up within 48 hours following discharge from Emergency Department

### eConsults

eConsult to Cardiology – Atrial Fibrillation

### Guidelines

1. Hypertension – Adult – Inpatient/Ambulatory
2. Heart Failure – Adult – Inpatient/Ambulatory

### Order Sets & Smart Sets

IP – Atrial Fibrillation – Initial Onset – Adult – Supplemental [2170]

ED – Clinical Decision Unit – Atrial Fibrillation [#####]

### Patient Resources

1. Health Facts For You #6252: Atrial Fibrillation (A-Fib)
2. Health Facts For You #6900: Warfarin (Coumadin, Jantoven) (English)
3. Health Facts For You #7085: Warfarin (Coumadin, Jantoven) (Spanish)
4. Healthwise: Atrial Fibrillation
5. Healthwise: Atrial Fibrillation: Cardioversion or Medicines: Deciding About

### Policies

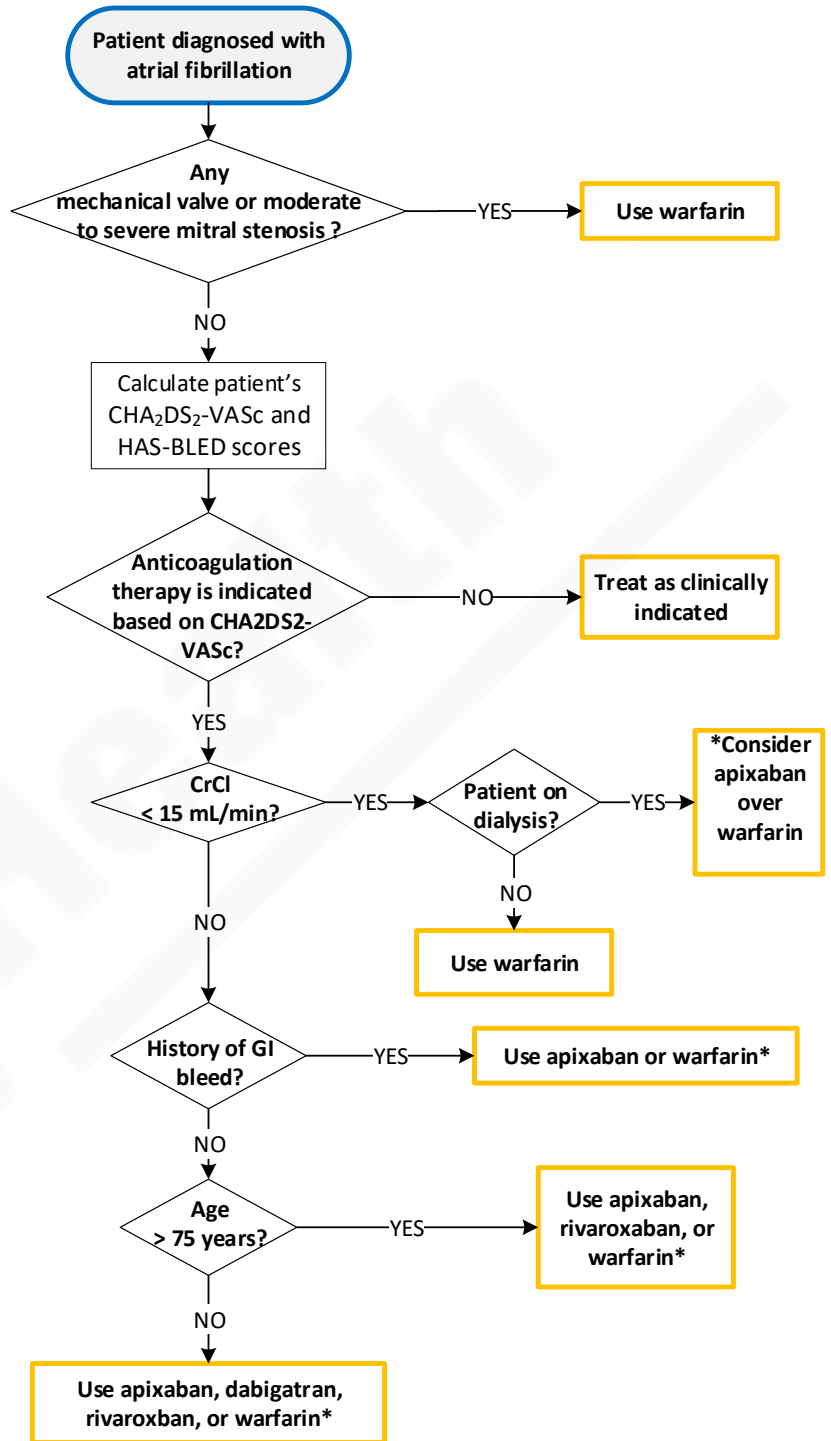
1. UWHC Policy 1.38- Elective Direct Current (DC) Cardioversion – Adult & Pediatric

# Appendix A. Selecting an Oral Anticoagulant for an Atrial Fibrillation Patient 8,17-19



CHA <sub>2</sub> DS <sub>2</sub> VASc Score	
Factors	Points
Congestive Heart Failure	1
Hypertension	1
Age ≥75	2
Diabetes Mellitus	1
Stroke/TIA/Thromboembolism	2
Vascular Disease (MI, PAD, aortic plaque)	1
Age 65-74	1
Sex Category – Female	1
Scoring	
0 in men, 1 in women	No anti-thrombotic therapy
≥ 1 non-sex CHA <sub>2</sub> DS <sub>2</sub> -VASc risk factors	Consider anticoagulation
≥ 2 CHA <sub>2</sub> DS <sub>2</sub> -VASc risk factors	Oral anticoagulation recommended
<i>For patients with non-valvular AF with high CHA<sub>2</sub>DS<sub>2</sub>-VASc score and who are at high risk for bleeding/not candidate for long-term anti-coagulation, consider referral for percutaneous left atrial appendage closure device program.</i>	

HAS-BLED Score	
Factors	
Hypertension (SBP >160 mmHg)	
Abnormal lab values	
<ul style="list-style-type: none"> <li>• Creatinine &gt;2.26 mg/dL</li> <li>• Bilirubin &gt;2x the upper limit of normal (ULN) <i>and</i> AST/ALT/AP &gt;3x ULN</li> </ul>	
Stroke history	
Bleeding history or predisposition	
Labile INRs: Time in Therapeutic Range <60%	
Elderly: >65 years	
Drugs	
<ul style="list-style-type: none"> <li>• EtOH abuse</li> <li>• ASA or NSAID use</li> </ul>	
Scoring	
Score = 0-1: Low risk	
Score = 2: Moderate risk	
Score ≥3: High risk	
High bleed risk considerations:	
<ul style="list-style-type: none"> <li>- Optimize blood pressure control</li> <li>- Check INRs frequently</li> <li>- Utilize anticoagulation clinic</li> <li>- Focus on fall prevention</li> <li>- Utilize direct oral anti-coagulant (DOAC)</li> </ul>	



\*Based on the 2019 ACC/AHA Focused Update, direct oral anticoagulants (e.g., apixaban) are recommended over warfarin.

### Direct Oral Anticoagulant Monitoring

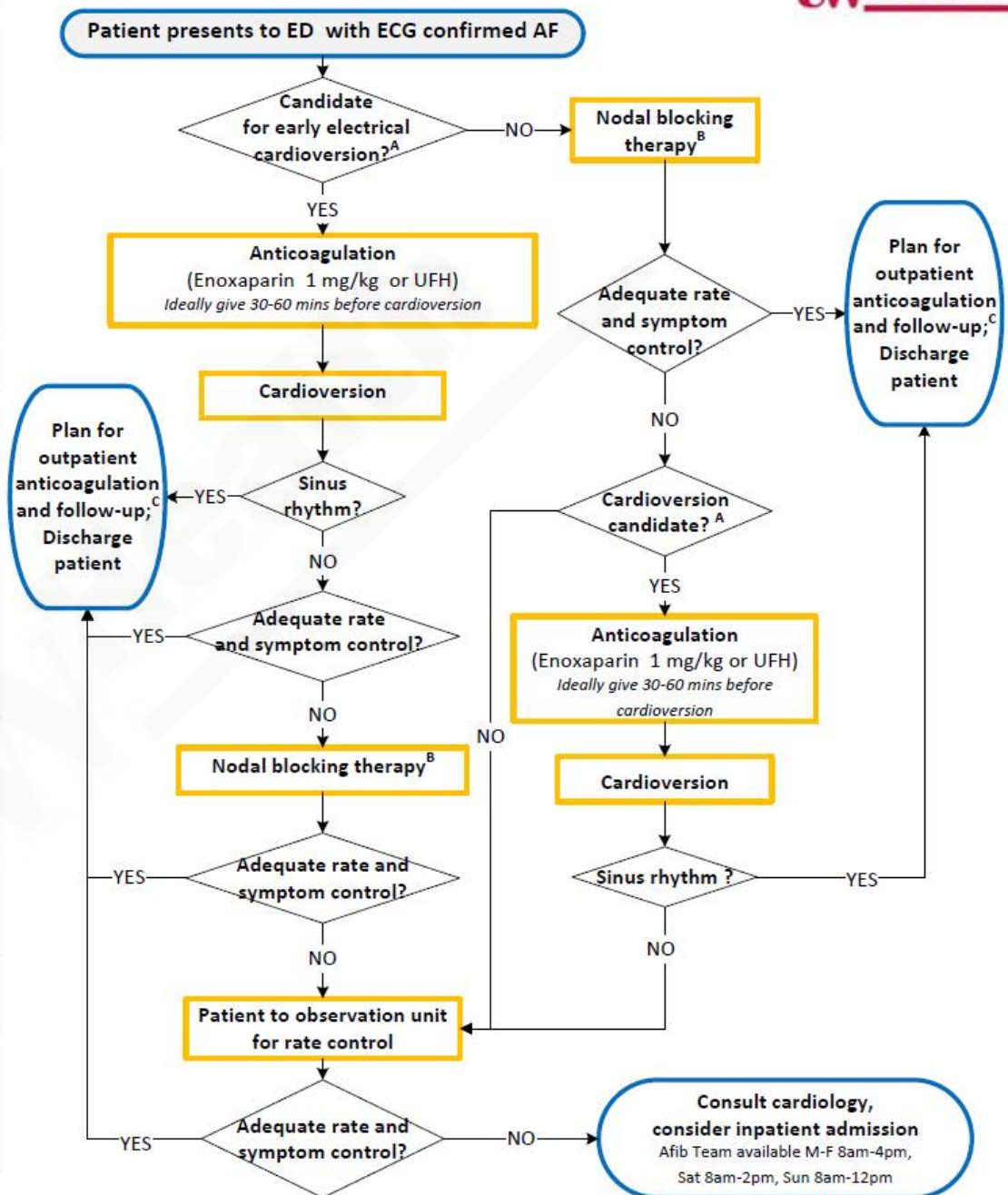
	CrCl: 15-29 mL/min	CrCl: 30-60 mL/min or Age ≥ 75 years	CrCl: >60 mL/min
Cr (w/CrCl)	Baseline and every 3 months	Baseline, and at 3,6, and 12 months for 1 <sup>st</sup> year, then every 6 months thereafter	Baseline, and at 3,6, and 12 months for 1 <sup>st</sup> year, then annually thereafter
Hgb/Plts	Baseline, and at 3,6, and 12 months for 1 <sup>st</sup> year, then annually thereafter (if stable)		
ALT	Baseline and every 12 months thereafter (if stable)		
Bilirubin	Baseline and every 12 months thereafter (if stable)		

\*\*\*Lab results that fall outside of normal limits should be repeated at least every 3-6 months.\*\*\*

## Appendix B. Emergency Department Management of Atrial Fibrillation<sup>8,14,20</sup>



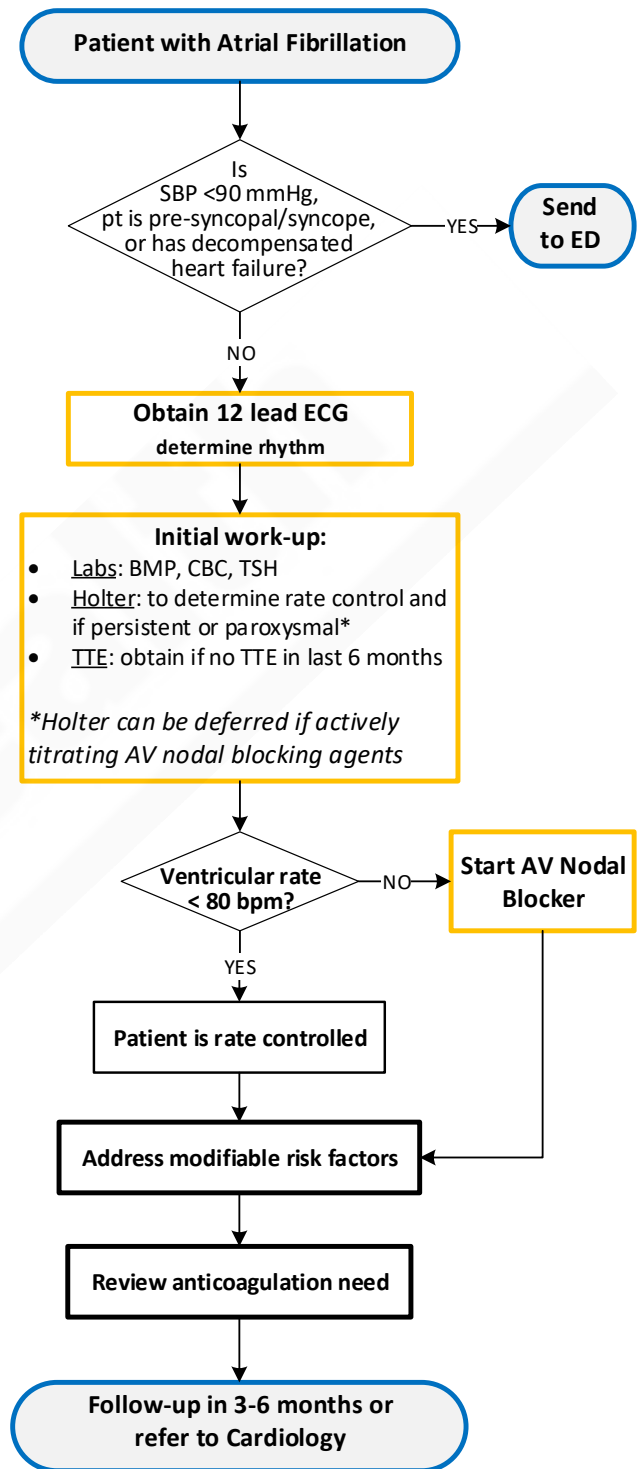
PATHWAY EXCLUSION CRITERIA	
- ST depressions $\geq 2$ mm or ST elevation	- Hemodynamic instability
- Heart failure exacerbation (e.g., pulmonary edema, elevated JVP, elevated BNP)	- New/severe anemia
- New/worsening infection	- Renal failure
- Troponin > 0.5 and/or increasing	- Pulmonary embolism
	- Hyperthyroidism
A. CARDIOVERSION CANDIDATE CRITERIA	
AF duration <48 hours and patient not at high risk for clots (no prior TIA or stroke, thromboembolism, rheumatic heart disease, artificial valve, or systolic heart failure) OR	
On stable anticoagulation therapy for >3 weeks:	
- Direct oral anticoagulant/enoxaparin	
- Warfarin with weekly INR >2 x 3 weeks	
Consider TEE if unclear, w/therapeutic anticoagulation peri/post-procedure	
B. NODAL BLOCKING THERAPY (Metoprolol is 1 <sup>st</sup> line)	
<b>Metoprolol</b> 5 mg over 2 mins, every 5 minutes for up to total 15 mg.	
IV to PO Metoprolol	
Can start 1 <sup>st</sup> oral dose <b>within 20 mins</b> of initial IV to estimate dosing needs.	Up-titrate PO dose if HR>110 after 2 hours from 1 <sup>st</sup> oral dose
• Total 5 mg IV → start 12.5 mg PO Q6H	• 12.5 mg PO Q6H → 25 mg PO Q6H
• Total 10 mg IV → start 2.5 mg PO Q6H	• on 25 mg PO Q6H → 37.5 mg PO Q6H
• Total 15 mg IV → start 37.5 mg PO Q6H	• on 37.5 mg PO Q6H → 50 mg PO Q6H
<b>Diltiazem</b> 0.25 mg/kg (Max dose 25 mg) IV bolus x1. Start drip at 5 mg/hr. Consider addition 30mg PO IR diltiazem q6 hours or home dose to reduce need for drip. Drip can be titrated to 15 mg/hr, with re-bolus 0.25 mg/kg with each increase. Caution use of diltiazem if known EF < 40% or clinical signs hypoperfusion	
<b>IV to PO diltiazem: Oral dose = (IV drip rate [in mg/hr] x 3 + 3) x 10</b>	
Steps to covert from diltiazem IV to PO	
1. Calculate total daily oral dose	Std rates for diltiazem generally convert as follows:
2. Round dose to a 30 mg increment, divide this daily dose by 4 to give Q6H dosing	
3. Give first PO dose 1 hour prior to titrating drip	
4. One hour after PO dose, titrate drip down by 2.5 mg/hr until drip is running at 0 mg/hour	
<b>Verapamil:</b> 0.1 mg/kg bolus (Max dose 10 mg) IV bolus x1. Start drip at 5 mg/hr and titrate to goal heart rate (max 20mg/hr) with re-bolus of 0.1 mg/kg with each increase	
C. DISCHARGE PLANNING	
- Cardioverted pts should have anticoagulation for <i>at least</i> 4 weeks	
- Indefinite anticoagulation for all patients with a CHA <sub>2</sub> DS <sub>2</sub> VASc $\geq 2$	
- If warfarin is used for cardioverted patients, bridge w/enoxaparin until INR is therapeutic. Bridge not needed unless patient is successfully cardioverted.	
- Refer to <a href="#">Selecting Anticoagulation for Atrial Fibrillation Patient algorithm</a>	



## Appendix C. Outpatient Management of Atrial Fibrillation<sup>8,14</sup>



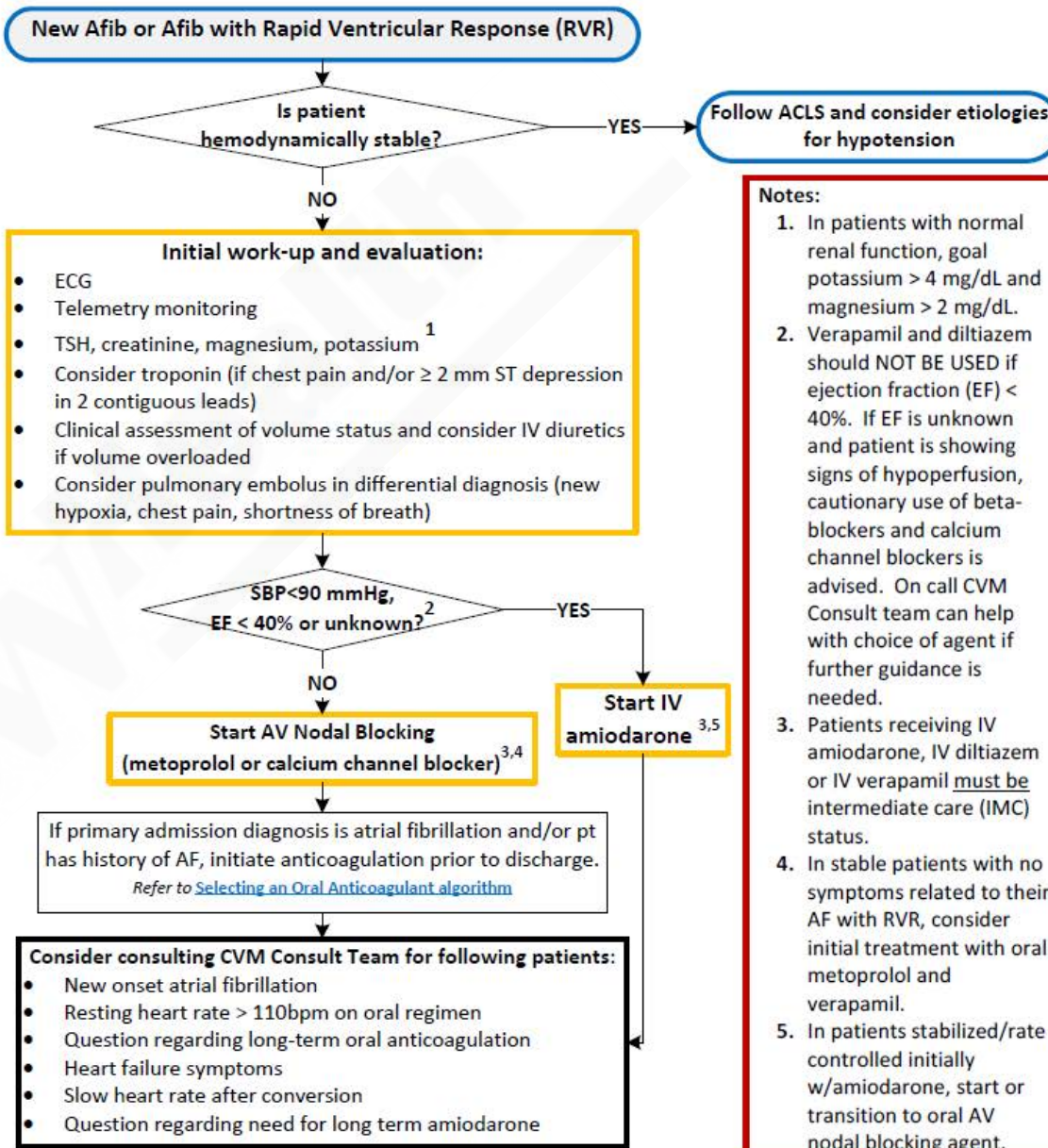
<p><b>CONSIDER EARLY CONSULTATION WITH CARDIOLOGY</b></p> <p>If any of the following are present, recommend Cardiology consult:</p> <ul style="list-style-type: none"> <li>• Concern for tachycardia-bradycardia syndrome (sinus rate &lt; 50bpm, unable to titrate AV nodal agent due to slow sinus rates)</li> <li>• Abnormal LV function/concern for tachycardia mediated cardiomyopathy</li> <li>• Typical atrial flutter</li> <li>• Significant valve disease (moderate or greater MS, MR, AS, AR)</li> </ul>
<p><b>AV NODAL BLOCKING THERAPY</b></p> <p><b>Metoprolol</b></p> <ul style="list-style-type: none"> <li>• Metoprolol is 1<sup>st</sup> line unless prior intolerance or severe asthma</li> <li>• <u>Initial dosing:</u> Metoprolol tartrate 25 mg PO twice daily (or succinate 50 mg daily)</li> <li>• If already taking metoprolol, add above amount to total daily dose to a maximum of 200 mg/day; if already at 200 mg/day metoprolol, add diltiazem</li> <li>• Titrate accordingly for goal heart rate average &lt; 80 bpm in AFIB and sinus rhythm &gt; 50</li> </ul> <p><b>Diltiazem</b></p> <ul style="list-style-type: none"> <li>• Diltiazem is 2nd line therapy</li> <li>• <u>Initial dosing:</u> Long acting formulation 120 mg daily (24 hr ER formulation)</li> <li>• If already taking diltiazem, add above amount to total daily dose</li> </ul>
<p><b>MODIFIABLE RISK FACTORS FOR AFIB</b></p> <ul style="list-style-type: none"> <li>• Screen for obstructive sleep apnea (OSA); if symptoms suggested of OSA, refer to Sleep medicine</li> <li>• If overweight, counsel on importance of weight loss; consider referral to Preventive medicine for dietician and exercise prescription</li> <li>• If sedentary, counsel on importance of light to moderate exercise</li> <li>• Counsel on smoking cessation</li> <li>• Reduce/limit weekly alcohol use to 3 drinks/week</li> <li>• Management of co-morbidities (<a href="#">hypertension</a> and <a href="#">diabetes</a>) per UW Health guidelines</li> </ul>
<p><b>ANTI-COAGULATION NEED</b></p> <ul style="list-style-type: none"> <li>• No anti-thrombotic therapy recommended if CHA<sub>2</sub>DS<sub>2</sub>-VASc=0 in men, 1 in women</li> <li>• If ≥ 1 non-sex CHA<sub>2</sub>DS<sub>2</sub>-VASc risk factors, consider anti-coagulation</li> <li>• If ≥ 2 CHA<sub>2</sub>DS<sub>2</sub>-VASc risk factors, anti-coagulation recommended.</li> <li>• Discuss risks and benefits of anti-coagulation versus no therapy.</li> <li>• Discuss options for anticoagulation; consider direct oral anti-coagulants over warfarin if not cost-prohibitive. Aspirin has not been shown to reduce stroke risk in AF. (refer to <a href="#">Appendix A</a>)</li> </ul>
<p><b>CARDIOLOGY FOLLOW-UP</b></p> <p>After initial management, consider Cardiology consult for following patients:</p> <ul style="list-style-type: none"> <li>• Ongoing symptoms despite rate control (in patients w/persistent AF)</li> <li>• Continued symptomatic paroxysmal episodes</li> </ul>



## Appendix D. Inpatient Management of Atrial Fibrillation for General Care and IMC Patients (Non-CT Surgery)



Metoprolol IV Dosing	
5 mg over 2 mins, every 5 mins for up to total 15 mg	
Metoprolol IV Conversion to PO dosing	
Can start 1 <sup>st</sup> oral dose <b>within 20 mins</b> of initial IV to estimate dosing needs.	Up-titrate PO dose if HR>110 after 2 hours from 1 <sup>st</sup> oral dose
<ul style="list-style-type: none"> <li>• Total 5 mg IV→ start 12.5 mg PO Q6H</li> <li>• Total 10 mg IV→ start 2 5mg PO Q6H</li> <li>• Total 15 mg IV→ start 37.5 mg PO Q6H</li> </ul>	<ul style="list-style-type: none"> <li>• 12.5 mg PO Q6H→ 25 mg PO Q6H</li> <li>• on 25 mg PO Q6H→ 37.5 mg PO Q6H</li> <li>• on 37.5 mg PO Q6H→ 50 mg PO Q6H</li> </ul>
<i>If at 50mg q6 and HR &gt;110, consider adding diltiazem.</i>	
Calcium Channel Blockers	
<b>**DO NOT USE diltiazem or verapamil if EF &lt;40%**</b>	
Diltiazem IV Dosing	
0.25mg/kg (Max dose: 25mg) IV bolus x1. Start drip at 5mg/hr. Consider addition 30mg PO IR Diltiazem q6 hours or home dose to reduce need for drip. Drip can be titrated to 15mg/hr, with re-bolus of 0.25mg/kg with each increase.	
IV to PO diltiazem: Oral dose = (IV drip rate [in mg/hr] x 3 + 3) x10	
Steps to covert from diltiazem IV to PO	Std rates for diltiazem generally convert as follows:
<ol style="list-style-type: none"> <li>1. Calculate total daily oral dose</li> <li>2. Round dose to a 30 mg increment, divide this daily dose by 4 to give Q6H dosing</li> <li>3. Give first PO dose 1 hour prior to titrating drip</li> <li>4. One hour after PO dose, titrate drip down by 2.5 mg/hr until drip is running at 0 mg/hr</li> </ol>	<ul style="list-style-type: none"> <li>• 3 mg/hour = 120 mg/day</li> <li>• 5 mg/hr = 180 mg/day</li> <li>• 7.5 mg/hr = 260 mg/day</li> <li>• 10 mg/hr = 330 mg/day</li> <li>• 15 mg/hr = 480 mg/day</li> </ul>
Verapamil IV Dosing	
0.1mg/kg bolus (Max dose: 10mg) IV bolus x 1. Start drip at 5mg/hr and titrate to goal heart rate (Max 20mg/hr) with re-bolus of 0.1mg/kg with each increase.	
Verapamil PO Dosing	
240 - 320 mg daily. Divide over 3-4 doses if short acting (Q6H) Once daily if extended release (ER)	
Amiodarone IV Dosing	
150mg bolus then 1mg/minute x 6 hours and 0.5mg/minute x 18 hrs <b>If rates &gt;110 after 1 hour optional 2nd 150mg IV bolus and continue 1mg/minute gtt.</b>	
Amiodarone PO dosing in hospital	
After converts to NSR or after 24 hrs, 400mg PO BID up to 10g load (includes IV), then 200mg daily. <b>Upon discharge:</b> 200 mg daily for 1-3 months. Decrease in-hospital dose by 50% if sinus <50 bpm; d/c if sinus <40 bpm or symptoms. <i>Depending on clinical situation and duration of AF, outpatient amiodarone may not be warranted.</i>	



- Notes:**
1. In patients with normal renal function, goal potassium > 4 mg/dL and magnesium > 2 mg/dL.
  2. Verapamil and diltiazem should NOT BE USED if ejection fraction (EF) < 40%. If EF is unknown and patient is showing signs of hypoperfusion, cautionary use of beta-blockers and calcium channel blockers is advised. On call CVM Consult team can help with choice of agent if further guidance is needed.
  3. Patients receiving IV amiodarone, IV diltiazem or IV verapamil must be intermediate care (IMC) status.
  4. In stable patients with no symptoms related to their AF with RVR, consider initial treatment with oral metoprolol and verapamil.
  5. In patients stabilized/rate controlled initially w/amiodarone, start or transition to oral AV nodal blocking agent.

## Appendix E. Inpatient Management of Atrial Fibrillation for General Care and IMC Patients (CT Surgery)



*Mechanical circulatory device and heart transplant patients are excluded from algorithm*

**Follow ACLS**  
Consider other etiologies for hypotension

**New AF or AF with Rapid Ventricular Response (RVR)**

Is patient hemodynamically stable?

NO

YES

- Initial work-up and evaluation:**
- ECG
  - Telemetry monitoring
  - Magnesium, Potassium  
*In patients with normal renal function, goal potassium > 4 mg/dL and magnesium > 2 mg/dL. Check and treat Mg/K per orders.*
  - TTE (if no TTE in last 6 months)
  - Clinical assessment of volume status  
*Consider IV diuretics if volume overloaded*
  - If on inotropes, consider alternatives

SBP < 90 mmHg or decompensated HFrEF (< 40%)?

YES

NO

**Start metoprolol**

**Start IV amiodarone**

Allow at least 20 minutes for IV metoprolol peak effect. If metoprolol ineffective despite dose escalation, consider addition of calcium channel blocker (i.e., diltiazem or verapamil)

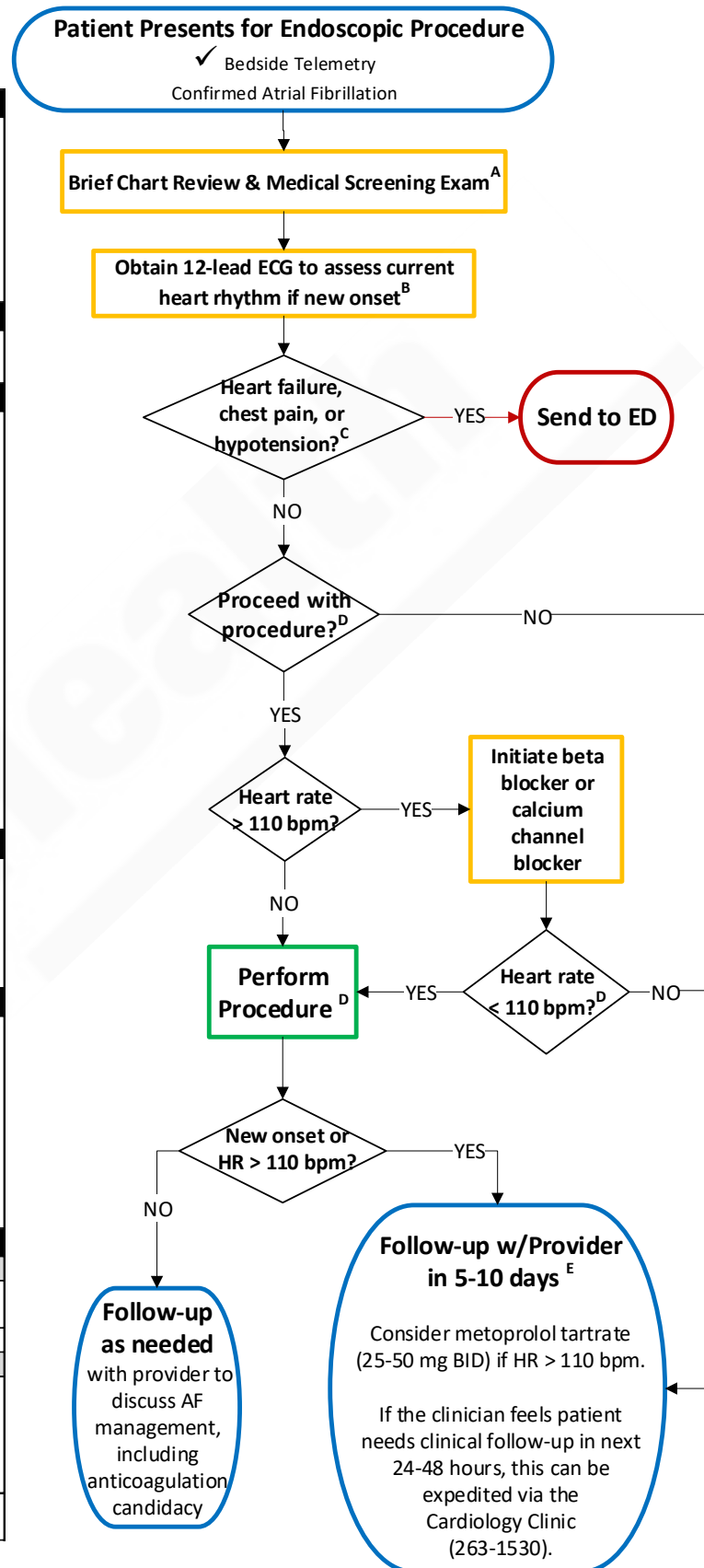
If symptomatic bradycardia, can utilize epicardial wires\* for back up pacing +/- 60 bpm.  
\* APP or physician to confirm adequate threshold of epicardial wires daily.

Metoprolol	
IV Dosing	
5 mg over 2 mins, every 5 mins for up to total 15 mg	
IV Conversion to PO dosing	
Can start 1 <sup>st</sup> oral dose <b>within 20 mins</b> of initial IV to estimate dosing needs.	Up-titrate PO dose if HR > 110 after 2 hours from 1 <sup>st</sup> oral dose
<ul style="list-style-type: none"> <li>• Total 5 mg IV → start 12.5 mg PO Q6H</li> <li>• Total 10 mg IV → start 25 mg PO Q6H</li> <li>• Total 15 mg IV → start 37.5 mg PO Q6H</li> </ul>	<ul style="list-style-type: none"> <li>• 12.5 mg PO Q6H → 25 mg PO Q6H</li> <li>• on 25 mg PO Q6H → 37.5 mg PO Q6H</li> <li>• on 37.5 mg PO Q6H → 50 mg PO Q6H</li> </ul>
<i>If at 50mg q6 and HR &gt; 110, consider adding diltiazem. If NSR with HR &lt; 60 and &gt; 40 or Mobitz I, decrease by 1/2; if sinus &lt; 40 hold until &gt; 40 and resume 1/4 dose. If high grade AV block, D/C &amp; seek EP consultation.</i>	
Calcium Channel Blockers	
<b>**DO NOT USE diltiazem or verapamil if EF &lt; 40%**</b>	
Diltiazem IV Dosing	
0.25mg/kg (Max dose: 25mg) IV bolus x1. Start drip at 5mg/hr. Consider addition 30mg PO IR Diltiazem q6 hours or home dose to reduce need for drip. Drip can be titrated to 15mg/hr, with re-bolus of 0.25mg/kg with each increase.	
IV to PO diltiazem: Oral dose = (IV drip rate [in mg/hr] x 3 + 3) x 10	
<b>Steps to covert from diltiazem IV to PO</b> <ol style="list-style-type: none"> <li>1. Calculate total daily oral dose</li> <li>2. Round dose to a 30 mg increment, divide this daily dose by 4 to give Q6H dosing</li> <li>3. Give first PO dose 1 hour prior to titrating drip</li> <li>4. One hour after PO dose, titrate drip down by 2.5 mg/hr until drip is running at 0 mg/hr</li> </ol>	Std rates for diltiazem generally convert as follows: <ul style="list-style-type: none"> <li>• 3 mg/hour = 120 mg/day</li> <li>• 5 mg/hr = 180 mg/day</li> <li>• 7.5 mg/hr = 260 mg/day</li> <li>• 10 mg/hr = 330 mg/day</li> <li>• 15 mg/hr = 480 mg/day</li> </ul>
Verapamil IV Dosing	
0.1mg/kg bolus (Max dose: 10mg) IV bolus x 1. Start drip at 5mg/hr and titrate to goal heart rate (Max 20mg/hr) with re-bolus of 0.1mg/kg with each increase.	
Verapamil PO Dosing	
240 - 320 mg daily. Divide over 3-4 doses if short acting (Q6H) Once daily if extended release (ER)	
Amiodarone	
IV Dosing	
150mg bolus then 1mg/minute x 6 hours and 0.5mg/minute x 18 hrs <b>If rates &gt; 110 after 1 hour</b> optional 2nd 150mg IV bolus and continue 1mg/minute gtt.	
PO dosing in hospital	
After converts to NSR or after 24 hours, 400mg PO BID up to 10g load (includes IV), then 200mg daily. <b>Upon discharge:</b> 200 mg daily for 1-3 months. Decrease in hospital dose by 50% if sinus < 50 bpm; discontinue if sinus < 40 bpm or symptoms.	

# Appendix F. Digestive Health Center Endoscopy Atrial Fibrillation Algorithm



<p><b>A. CHART REVIEW AND MEDICAL EXAM</b></p> <ul style="list-style-type: none"> <li>• RN should obtain vital signs, assess for related symptoms and known history of arrhythmia.</li> <li>• Perform brief chart review for any previously documented cardiac history (i.e., prior EKGs for comparison) or treatment.</li> <li>• Notify the physician (or anesthesiologist if present) performing the endoscopic procedure</li> </ul>
<p><b>B. 12-LEAD ECG</b></p> <p>If known history A fib and rate well controlled, no need to confirm with ECG.</p>
<p><b>C. HEART FAILURE, CHEST PAIN, HYPOTENSION</b></p> <ul style="list-style-type: none"> <li>• In general, it is ok to proceed with procedural sedation in patients with A fib that are compensated (no heart failure or hypotension). Symptoms of heart failure may include: new or worsening lower extremity edema, orthopnea, PND, elevated JVP, rales, dyspnea at rest or inability to climb one flight of stairs.</li> <li>• If patient is tachycardic or hypotension limits administration of AV nodal blocking agents, it is not recommended to proceed with the procedure.</li> <li>• <u>Evaluate volume status.</u> If no symptoms of heart failure and patient appears volume depleted, consider 500 mL fluid bolus.</li> <li>• <b>Recommended labs:</b> Sodium, Potassium, Chloride, Total Carbon Dioxide, BUN, Creatinine, Magnesium, TSH</li> </ul>
<p><b>D. PHYSICIAN PREFERENCE</b></p> <p>Provided the above criteria are met, most patients may undergo an endoscopic procedure. However, if the physician feels otherwise, he/she may cancel the procedure with provider follow-up in 5-10 days particularly in cases of newly diagnosed AF.</p>
<p><b>E. SUGGESTED FOLLOW-UP</b></p> <p>By Primary Care Provider:</p> <ul style="list-style-type: none"> <li>• Patients with known AF w/o heart failure or high risk features previously managed by PCP</li> <li>• Patients with new onset (first occurrence) to discuss AF management including anticoagulation candidacy</li> </ul> <p>By Cardiology:</p> <ul style="list-style-type: none"> <li>• Patients with known AF and regularly followed by cardiologist (or seen by cardiologist within last 2 yrs)</li> </ul>
<p><b>NODAL BLOCKING THERAPY</b></p> <p><b>Metoprolol (Considered 1<sup>st</sup> line)</b></p> <p><b>Metoprolol IV</b> 5 mg over 2 mins, every 5 minutes for up to total 15 mg.</p> <p><b>Metoprolol oral maintenance dose</b> 25-100 mg twice daily</p> <p><b>Diltiazem ** DO NOT USE if EF &lt; 40%**</b></p> <p><b>Diltiazem IV</b> 0.25 mg/kg (Max dose 25 mg) IV bolus x1. Start drip at 5 mg/hr. Consider addition 30mg PO IR diltiazem q6 hours or home dose to reduce need for drip. Drip can be titrated to 15 mg/hr, with re-bolus 0.25 mg/kg with each increase. Caution use of diltiazem if known EF &lt; 40%</p> <p><b>Diltiazem oral maintenance dose</b> 120-360 mg once daily (24 hr extended release formulation)</p>



## Appendix G. Atrial Fibrillation – Rate Control Drugs<sup>7,8,14</sup>

<b>Metoprolol IV Dosing</b>	
5 mg over 2 mins, every 5 mins for up to total 15 mg	
<b>Metoprolol IV Conversion to PO dosing</b>	
<p>Can start 1<sup>st</sup> oral dose <b>within 20 mins</b> of initial IV to estimate dosing needs.</p> <ul style="list-style-type: none"> <li>• Total 5 mg IV→ start 12.5 mg PO Q6H</li> <li>• Total 10 mg IV→ start 25 mg PO Q6H</li> <li>• Total 15 mg IV→ start 37.5 mg PO Q6H</li> </ul> <p><i>If at 50mg q6 and HR &gt;110, consider adding diltiazem.</i></p>	<p>Up-titrate PO dose if HR&gt;110 after 2 hours from 1<sup>st</sup> oral dose</p> <ul style="list-style-type: none"> <li>• 12.5 mg PO Q6H→ 25 mg PO Q6H</li> <li>• on 25 mg PO Q6H→ 37.5 mg PO Q6H</li> <li>• on 37.5 mg PO Q6H→ 50 mg PO Q6H</li> </ul>
<b>Metoprolol – Key Points to Remember for Management in Outpatient Setting</b>	
<ul style="list-style-type: none"> <li>• Metoprolol is 1<sup>st</sup> line for AV nodal blocking therapy unless prior intolerance or severe asthma</li> <li>• <u>Initial dosing</u>: Metoprolol tartrate 25 mg PO twice daily (or succinate 50 mg daily)</li> <li>• If already taking metoprolol, add suggested initial dosing amount to patient's total daily dose, up to a maximum of 200 mg/day; if patient already taking 200 mg/day metoprolol, add diltiazem</li> <li>• Titrate accordingly for goal heart rate average &lt; 80 bpm in AFIB and sinus rhythm &gt; 50</li> </ul>	

<b>Calcium Channel Blockers</b>	
<b>**DO NOT USE diltiazem or verapamil if EF &lt;40%**</b>	
<b>Diltiazem IV Dosing</b>	
0.25mg/kg (Max dose: 25mg) IV bolus x1. Start drip at 5mg/hr. Consider addition 30mg PO IR Diltiazem q6 hours or home dose to reduce need for drip. Drip can be titrated to 15mg/hr, with re-bolus of 0.25mg/kg with each increase.	
<b>IV to PO diltiazem: Oral dose = (IV drip rate [in mg/hr] x 3 + 3) x10</b>	
<p><b>Steps to covert from diltiazem IV to PO</b></p> <ol style="list-style-type: none"> <li>1. Calculate total daily oral dose</li> <li>2. Round dose to a 30 mg increment, divide this daily dose by 4 to give Q6H dosing</li> <li>3. Give first PO dose 1 hour prior to titrating drip</li> <li>4. One hour after PO dose, titrate drip down by 2.5 mg/hr until drip is running at 0 mg/hour</li> </ol>	<p>Std rates for diltiazem generally convert as follows:</p> <ul style="list-style-type: none"> <li>• 3 mg/hour = 120 mg/day</li> <li>• 5 mg/hr = 180 mg/day</li> <li>• 7.5 mg/hr = 260 mg/day</li> <li>• 10 mg/hr = 330 mg/day</li> <li>• 15 mg/hr = 480 mg/day</li> </ul>
<b>Verapamil IV Dosing</b>	
0.1mg/kg bolus (Max dose: 10mg) IV bolus x 1. Start drip at 5mg/hr and titrate to goal heart rate (Max 20mg/hr) with re-bolus of 0.1mg/kg with each increase.	
<b>Verapamil PO Dosing</b>	
240 - 320 mg daily. Divide over 3-4 doses if short acting (Q6H) Once daily if extended release (ER)	

<b>Amiodarone IV Dosing</b>	
150mg bolus then 1mg/minute x 6 hours and 0.5mg/minute x 18 hours	
<b>If rates &gt;110 after 1 hour</b> optional 2nd 150mg IV bolus and continue 1mg/minute gtt.	
<b>Amiodarone PO dosing in hospital</b>	
After converts to NSR or after 24 hrs, 400mg PO BID up to 10g load (includes IV), then 200mg daily. <b>Upon discharge</b> : 200 mg daily for 1-3 months. Decrease in-hospital dose by 50% if sinus <50 bpm; d/c if sinus <40 bpm or symptoms. <i>Depending on clinical situation and duration of AF, outpatient amiodarone may not be warranted.</i>	



## **References**

1. Wolf PA, Benjamin EJ, Belanger AJ, Kannel WB, Levy D, D'Agostino RB. Secular trends in the prevalence of atrial fibrillation: The Framingham Study. *Am Heart J*. 1996;131(4):790-795.
2. Kannel WB, Wolf PA, Benjamin EJ, Levy D. Prevalence, incidence, prognosis, and predisposing conditions for atrial fibrillation: population-based estimates. *Am J Cardiol*. 1998;82(8A):2N-9N.
3. Wang TJ, Larson MG, Levy D, et al. Temporal relations of atrial fibrillation and congestive heart failure and their joint influence on mortality: the Framingham Heart Study. *Circulation*. 2003;107(23):2920-2925.
4. Krahn AD, Manfreda J, Tate RB, Mathewson FA, Cuddy TE. The natural history of atrial fibrillation: incidence, risk factors, and prognosis in the Manitoba Follow-Up Study. *The American journal of medicine*. 1995;98(5):476-484.
5. Stewart S, Hart CL, Hole DJ, McMurray JJ. A population-based study of the long-term risks associated with atrial fibrillation: 20-year follow-up of the Renfrew/Paisley study. *The American journal of medicine*. 2002;113(5):359-364.
6. Ott A, Breteler MM, de Bruyne MC, van Harskamp F, Grobbee DE, Hofman A. Atrial fibrillation and dementia in a population-based study. The Rotterdam Study. *Stroke*. 1997;28(2):316-321.
7. January CT, Wann LS, Alpert JS, et al. 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 Practice Guidelines and the Heart Rhythm Society. *Circulation*. 2014.
8. 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*. 2019:25873.
9. Weitz JI. Antiplatelet, Anticoagulant, and Fibrinolytic Drugs. In: Jameson JL, Fauci AS, Kasper DL, Hauser SL, Longo DL, Loscalzo J, eds. *Harrison's Principles of Internal Medicine, 20e*. New York, NY: McGraw-Hill Education; 2018.
10. Eliquis [package insert]. Princeton, NJ: Bristol-Myers Squibb Company; 2015.
11. Pradaxa [package insert]. Ridgefield, CT: Boehringer Ingelheim Pharmaceuticals, Inc; 2015.
12. Savaysa [package insert]. Parsippany, NJ: Daiichi Sankyo, Inc; 2015.
13. Xarelto [package insert]. Titusville, NJ: Janssen Pharmaceuticals, Inc; 2015. In.
14. Lexi-Drugs Online. Wolters Kluwer Clinical Drug Information, Inc. Accessed 12/10/18.
15. Isaew A, Adderley NJ, Ryan R, Fitzmaurice D, Marshall T. The treatment of paroxysmal atrial fibrillation in UK primary care. *Heart (British Cardiac Society)*. 2017;103(19):1502-1507.
16. Amponsah MKD, Benjamin EJ, Magnani JW. Atrial Fibrillation and Race - A Contemporary Review. *Current cardiovascular risk reports*. 2013;7(5):10.1007/s12170-12013-10327-12178.
17. Connolly SJ, Ezekowitz MD, Yusuf S, et al. Dabigatran versus warfarin in patients with atrial fibrillation. *The New England journal of medicine*. 2009;361(12):1139-1151.
18. Kai B, Bogorad Y, Nguyen LN, et al. Warfarin use and the risk of mortality, stroke, and bleeding in hemodialysis patients with atrial fibrillation. *Heart rhythm*. 2017;14(5):645-651.
19. Yao X, Abraham NS, Sangaralingham LR, et al. Effectiveness and Safety of Dabigatran, Rivaroxaban, and Apixaban Versus Warfarin in Nonvalvular Atrial Fibrillation. *Journal of the American Heart Association*. 2016;5(6).
20. Baugh CW, Clark CL, Wilson JW, et al. Creation and Implementation of an Outpatient Pathway for Atrial Fibrillation in the Emergency Department Setting: Results of an Expert Panel. *Acad Emerg Med*. 2018;25(9):1065-1075.