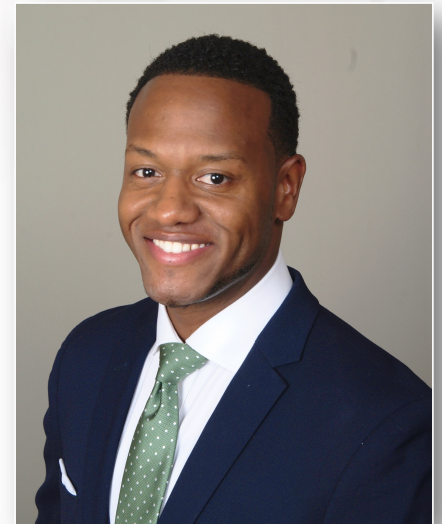


aaapa  
2021

**Atrial Fibrillation 101**  
**for the Primary Care Provider**  
**AMERICAN ACADEMY OF PHYSICIAN ASSISTANTS**

**Trevor R. Bonney Jr., MS, PA-C**  
Physician Assistant, Cardiac Electrophysiology  
Hospital of the University of Pennsylvania



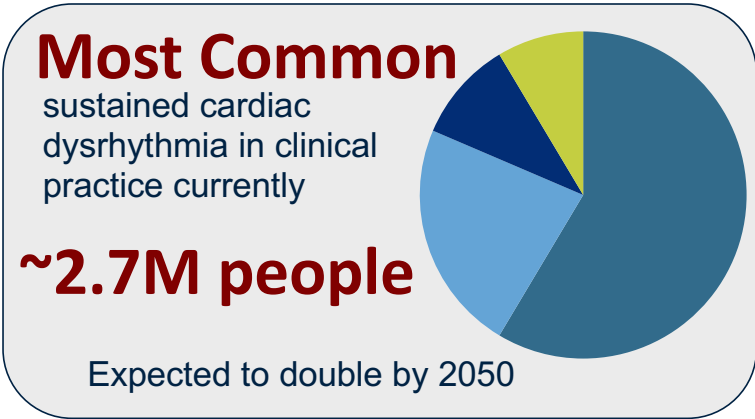
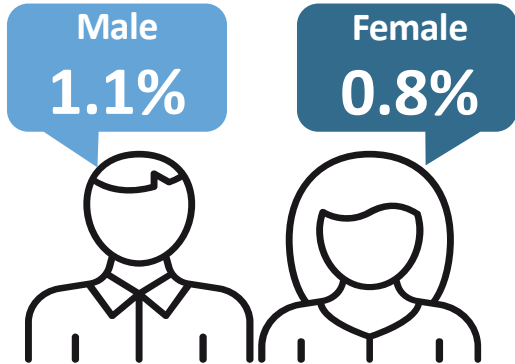
## Disclosures

- ▶ No relevant commercial relationships to disclose

## Learning Objectives

- ▶ Discuss the diagnosis and initial assessment of atrial fibrillation
- ▶ Identify the atrial fibrillation patient in need of urgent direct hospitalization or emergency department care
- ▶ Explain management options for new onset atrial fibrillation that are aimed at reducing symptoms, complications, and embolic risk
- ▶ Explain when referral to specialist for atrial fibrillation management would be beneficial
- ▶ Discuss management of atrial fibrillation for planned noncardiac surgery
- ▶ Discuss the importance of managing comorbid conditions associated with atrial fibrillation

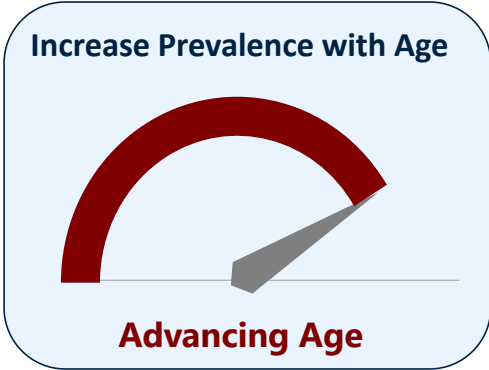
# Prevalence



- AFib costs the United States health care system an annual **\$26 BILLION.**
- Each hospitalized AFib patient costs an extra **\$8,705.**
- Readmissions within 30 days of discharge can result in **CMS HOSPITAL PENALTIES.**

AFIB PATIENTS' HEALTH-RELATED ISSUES CAN BE EVEN MORE HARMFUL.

- 2X** more hospitalizations than non-afib patients
- 3X** more likely to undergo multiple admissions
- 5X** increased risk for stroke
- 3X** increased risk of heart failure



▶ (American Heart Association, 2018)

# New Onset Atrial Fibrillation Presentation

## Ambulatory

### ROUTINE EXAMINATION

Incidental finding of irregularly irregular pulse or symptoms



### ROUTINE ECG

Routine ECG obtained for other reasons, ex. preop clearance



### WEARABLE DEVICE

Recorded from a patient-acquired recording device.



## Hospitalized

### PRESENTING CVA

Presenting CVA or during evaluation for cryptogenic CVA



### CARDIAC RHYTHM DEVICE

Incidental finding on implanted cardiac rhythm device.



### INPATIENT TELEMETRY / ECG

During unrelated hospitalization for another reason



# New Onset Atrial Fibrillation Presentation

## DETECTION

## CLINICAL SIGNIFICANCE

**Documented AF,  $\pm$  Symptoms  
and/or Structural HD**

**Rhythm management to eliminate  
symptoms and reverse structural damage**

**Documented AF,  
 $\pm$  Symptoms**

**Symptom management,  
anticoagulation if appropriate**

**Incidental Finding on  
Personal Wearable Device**

**High false positive rate for  
device-detected arrhythmias**

**Incidental Finding on  
Monitoring for Another Reason**

**Uncertain impact of symptom-arrhythmia  
correlation, burden, and risk factors**

**Detected on Evaluation  
for Cryptogenic CVA**

**Uncertain role of anticoagulation**

▶ (Noseworthy et al., 2019)



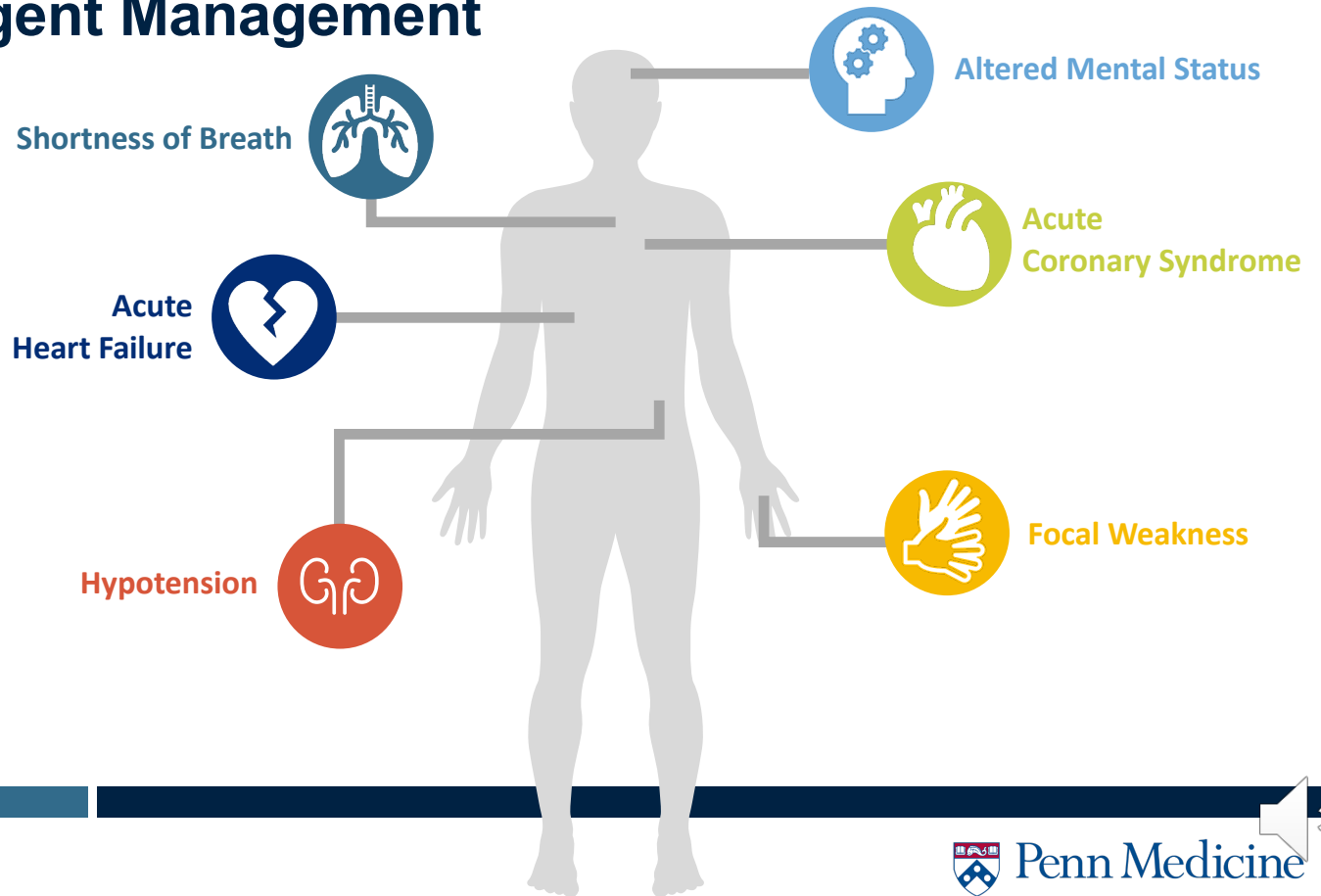
# New Onset Atrial Fibrillation Presentation



# New Onset Atrial Fibrillation Presentation

## Indications for Urgent Management

### Sign & Symptoms

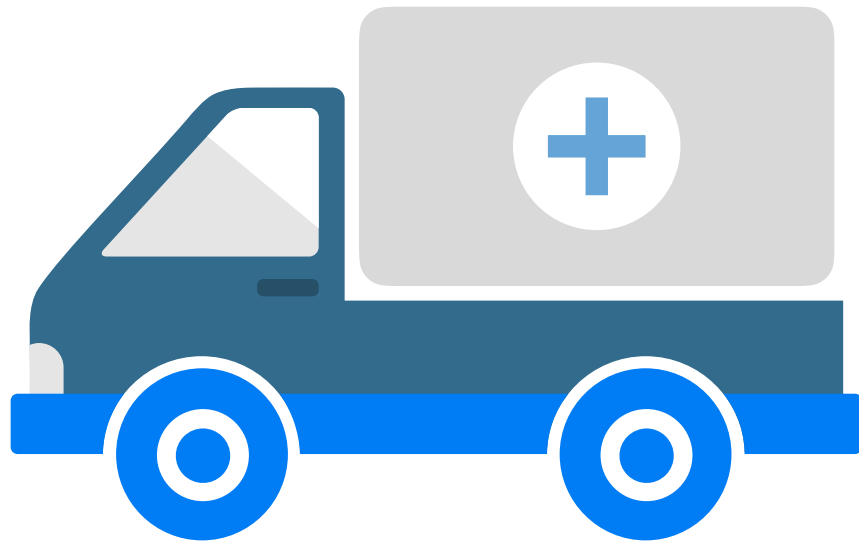




# New Onset Atrial Fibrillation Presentation

## Indications for Urgent Management

### Findings



#### HEART RATE EXTREMES

- Rapid ventricular rate  $\geq 150$  bpm
- Severe bradycardia  $\leq 30$  bpm or prolonged pauses  $\geq 5$  second



#### TREATMENT OF COMORBID CONDITION

- Ex. HTN, COPD Exacerbation, Infection, PE, persistent myocardial ischemia, or acute pericarditis.

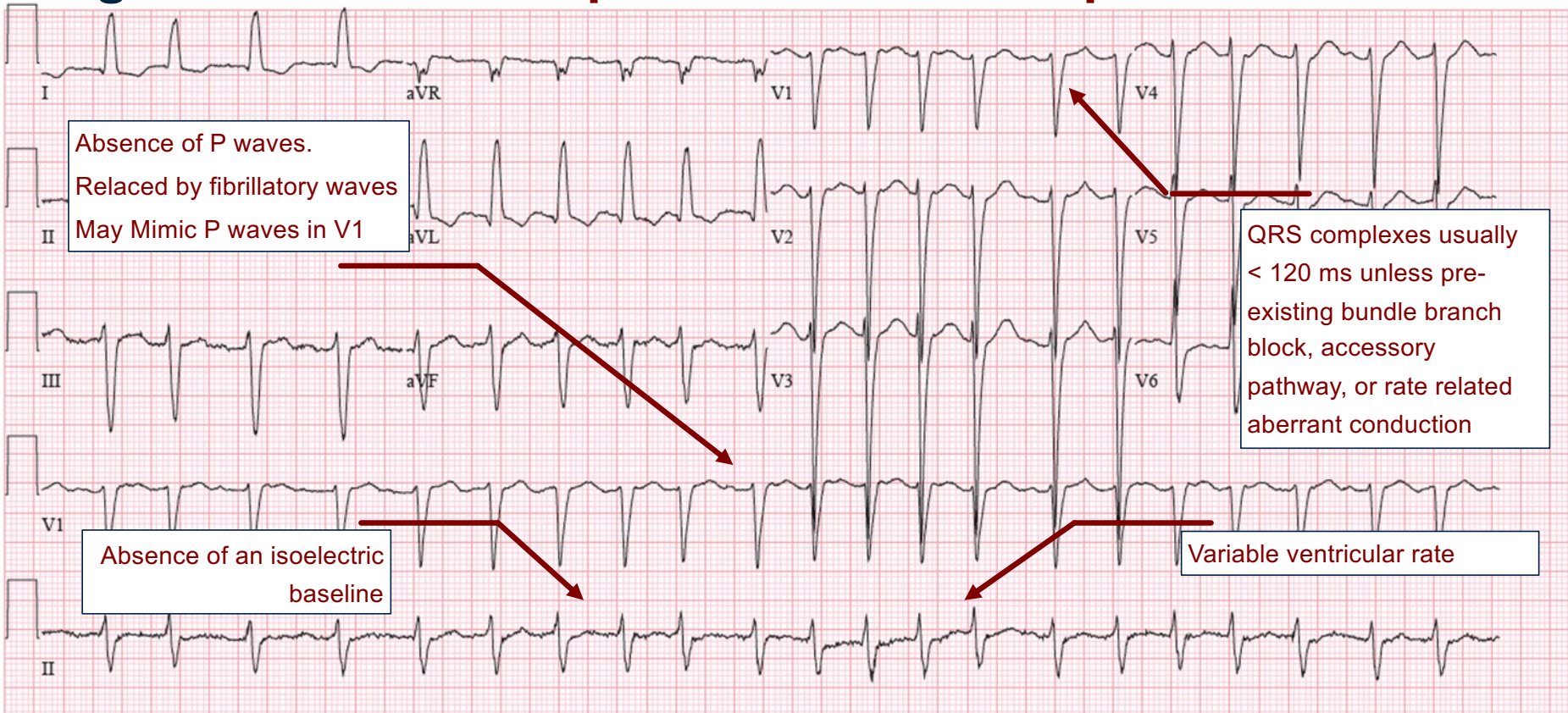


#### PREEXCITATION

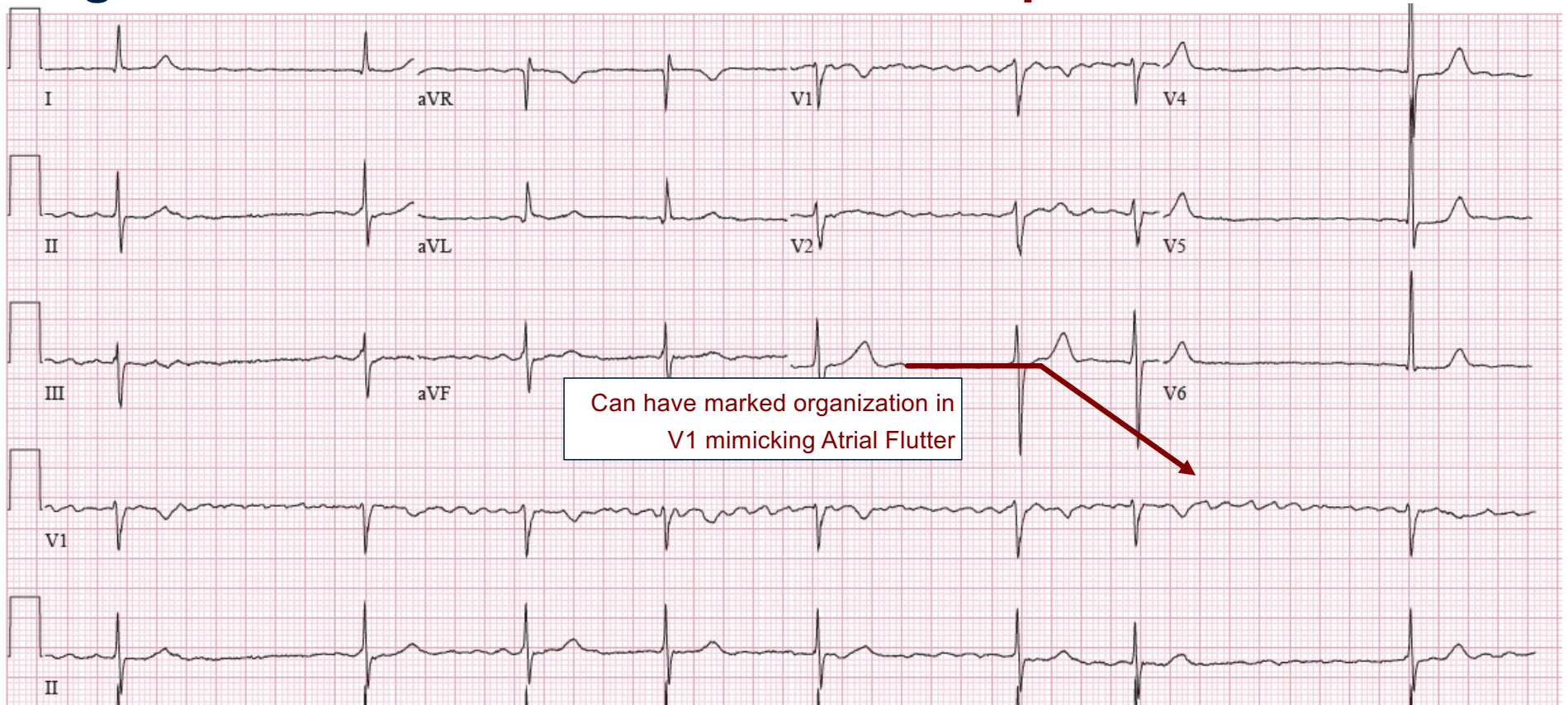
- Pre-excitation (Wolff-Parkinson-White syndrome) on the ECG



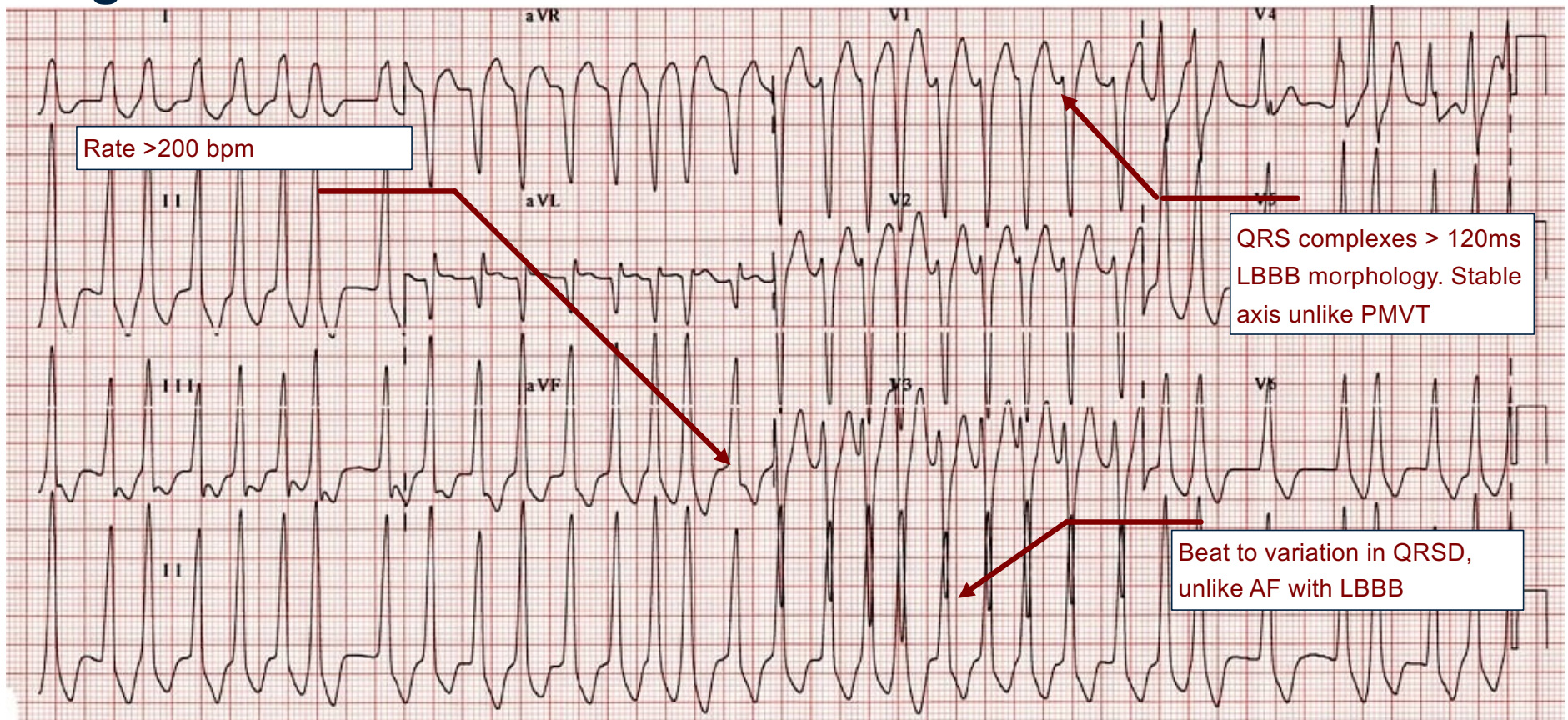
# Diagnosis: AF with Rapid Ventricular Response



## Diagnosis: AF with Slow Ventricular Response

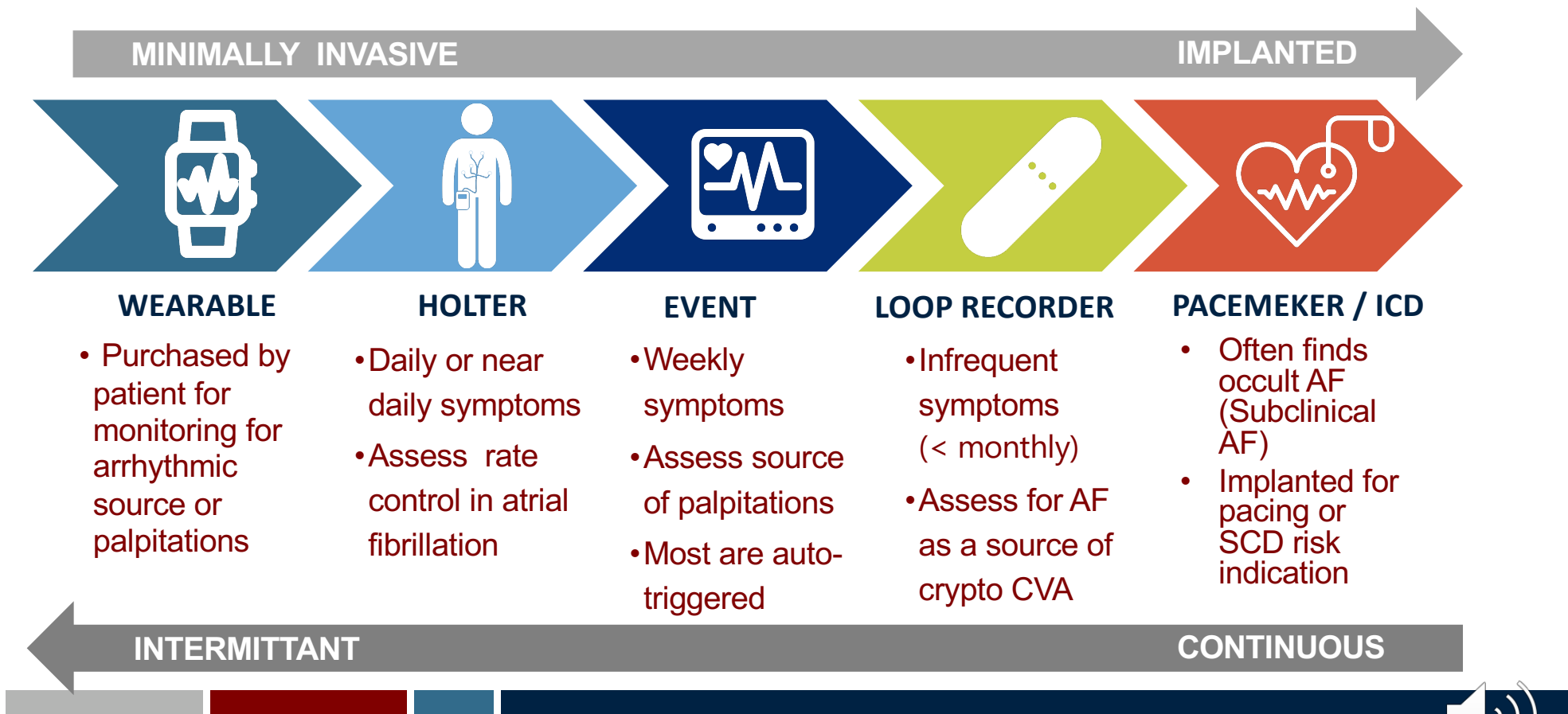


# Diagnosis: AF with Pre-excitation



► (Burns & Buttner, 2021)

# Diagnosis: Ambulatory Rhythm Monitoring Devices



## Diagnosis: Ambulatory Rhythm Monitoring Devices

|                          | Holter        | Looping Event or Patch    | Mobile Cardiac Outpatient Telemetry | Implanted Loop Recorder (ILR) | Wearable Consumer Devices                 |
|--------------------------|---------------|---------------------------|-------------------------------------|-------------------------------|---|
| Leads (Electrodes)       | 5             | 2-3 or Single Patch       | 3                                   | Subcutaneous implant          | Photoplethysmography finger plates        |
| Channels of Rhythm       | 3 or 12       | 1 or 2                    | 2                                   | 1                             | 1-2                                       |
| Study Duration           | 24 – 48 hours | 3 – 30 days               | 3 – 30 days                         | 3 years                       | 30 seconds                                |
| Symptomatic events       | ✓             | ✓                         | ✓                                   | ✓                             | ✓ *if symptoms are ongoing                |
| Auto Triggered Events    |               | ✓ *Some have auto trigger | ✓                                   | ✓                             | May have algorithm which can alert for AF |
| Full disclosure Analysis | ✓             |                           |                                     | ✓                             |   |

# Diagnosis: Related Ancillary Testing

## Routine Labs



- **BMP:** Rule out correctable electrolyte abnormalities. Renal function guides medical therapy.
- **TFTs:** Hyperthyroidism responsible for ~ 5% of SCAF.
- **A1C:** DM contributes to atrial damage and CVA risk

## Stress Testing



- Evaluate for **ischemic heart disease**.
- **Class 1C AAD contraindicated in setting of CAD**
- Assess HR control in AF

## Echocardiogram



- **LV Systolic function** or diastolic function (in SR)
- RV size and systolic function
- Valvular function and morphology
- Evaluation of **left atrial size**,
- Pericardial disease and/or effusion

# Diagnosis: **Echocardiography**

## COMORBID CONDITIONS

CHF, Pericarditis with pericardial effusion, Poor RV function with dilation = Pulmonary embolus

## EARLY RECURRENT

Increased LA size, mitral valve disease

## CVA RISK

Mitral stenosis warrants warfarin specially over DOAC

## HD BENEFIT

AF is often poorly tolerated in setting of aortic stenosis

## STRUCTURAL DAMAGE

Tachycardia-mediated cardiomyopathy, LA Dilation

## GUIDE THERAPY

Detecting impaired LV function and WMAs can guide choice of AAD therapy.



## Diagnosis: **TTE vs TEE**



Any patient with their **First episode** of AF will benefit from evaluation of left atrial size, left ventricular cavity size and regional/global systolic function, and valve morphology and function.



Any patient with high suspicion for **left ventricular apical thrombus**



Evaluation for **left atrial thrombi** to allow for early cardioversion in patients with unknown or **short-term anticoagulation**, and/or known **subtherapeutic anticoagulation**

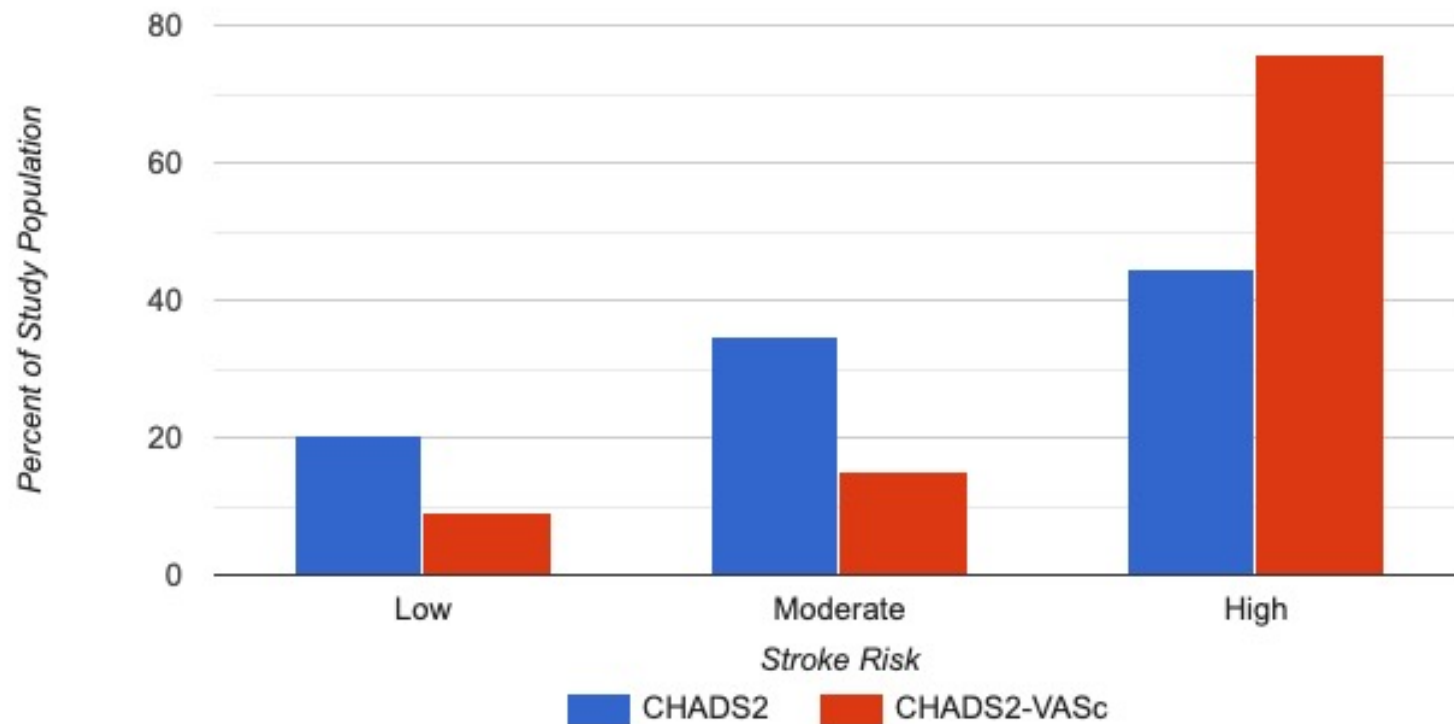


Detailed examination of **left atrial size** and **left atrial appendage function** can inform risk for future embolism



# Assessing and Managing Thromboembolic Risk

## ▶ CHADS2 Score vs CHA2DS2-VASc Score



▶ (Kane, 2018)

# Assessing and Managing Thromboembolic Risk

## CHA<sub>2</sub>DS<sub>2</sub>-VASc Score



- **CHF / LVSD**

Signs/symptoms of CHF  
w/evidence of cardiac  
dysfunction

- **HYPERTENSION**

Resting BP  
>140/90 mmHg

- **AGE**

- <65 y/o (0pt)
- 65-74 y/o (+1pt)
- ≥75 y/o (+2pts)

- **DIABETES**

Fasting glucose  
>125 mg/dL or on therapy

- **CVA/TIA (+2pts)**

Any history of cerebral  
ischemia or thromboembolism

- **VASCULAR DISEASE**

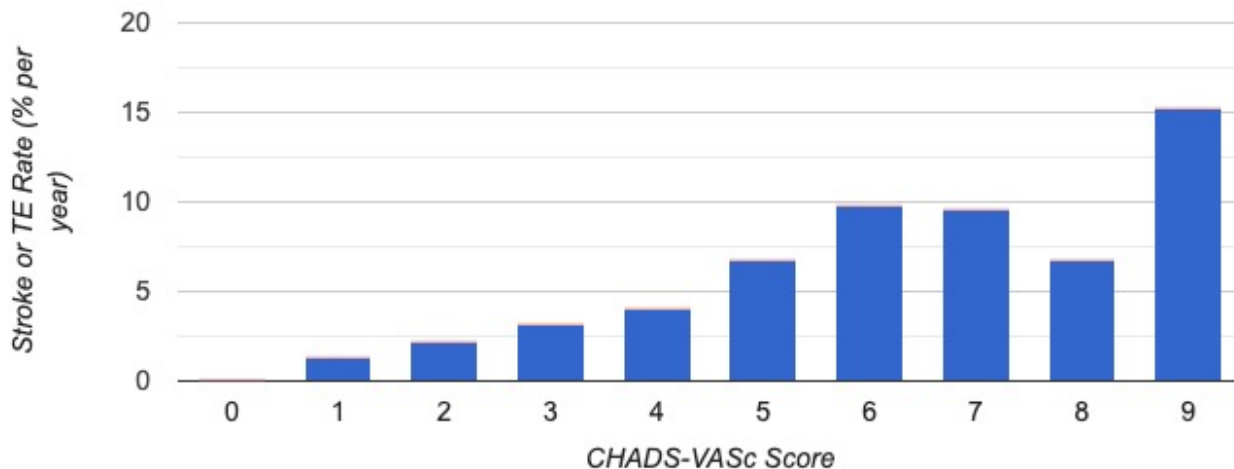
Prior MI, PAD, aortic plaque

- **SEX CATEGORY**

- Male (0pt)
- Female (+1pt)

# Assessing and Managing Thromboembolic Risk

## CHA<sub>2</sub>DS<sub>2</sub>-VASc Score



| Annual Stroke Rate* |                |
|---------------------|----------------|
| <b>0 points:</b>    | 0.2% per year  |
| <b>1 point:</b>     | 0.6% per year  |
| <b>2 points:</b>    | 2.2% per year  |
| <b>3 points:</b>    | 3.2% per year  |
| <b>4 points:</b>    | 4.8% per year  |
| <b>5 points:</b>    | 7.2% per year  |
| <b>6 points:</b>    | 9.7% per year  |
| <b>7 points:</b>    | 11.2% per year |
| <b>8 points:</b>    | 10.8% per year |
| <b>9 points:</b>    | 12.2% per year |

\*Unadjusted for possible use of aspirin. Friberg, L. (2012)

► (Lip et al., 2010, p. 264), (Kane, 2018), (Friberg et al., 2012, p. 1505)

# Assessing and Managing Thromboembolic Risk

## CHA<sub>2</sub>DS<sub>2</sub>-VASc Score

**CHA2DS2-VASc score of 0 in men or 1 in women,**

- ▶ Reasonable to omit anticoagulant therapy. (COR IIa)
- ▶ *Excluded in 2019 update: Patients with moderate-to-severe mitral stenosis or a mechanical heart valve*

**CHA2DS2-VASc score of 1 in men and 2 in women,**

- ▶ Oral anticoagulants may be considered. (COR IIb)

**CHA2DS2-VASc score of ≥ 2 in men or ≥ 3 in women,**

- ▶ Oral anticoagulants are recommended. (COR IIa)

| Annual Stroke Rate* |                |
|---------------------|----------------|
| <b>0 points:</b>    | 0.2% per year  |
| <b>1 point:</b>     | 0.6% per year  |
| <b>2 points:</b>    | 2.2% per year  |
| <b>3 points:</b>    | 3.2% per year  |
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\*Unadjusted for possible use of aspirin. Friberg, L. (2012)

- ▶ (Lip et al., 2010, p. 264), (January et al., 2019, p. 112)

# Assessing and Managing Thromboembolic Risk

## CHA<sub>2</sub>DS<sub>2</sub>-VASc Score Gender Caveat



- **EXCESS RISK?**  
Female sex is a risk **modifier**  
not a risk **factor**
- **AGE DEPENDENT**
  - <65 years old (0pt)
  - **65-74 years old (+1pt)**
  - **≥75 years old (+2pts)**
- **GENDER AS SOLE FACTOR**  
CHA<sub>2</sub>DS<sub>2</sub>-VASc score of **0** in males  
is equivalent to score of **1** in females  
<65 years old

# Assessing and Managing Thromboembolic Risk

## HAS-BLED Score



- **AGE**  
>65 y/o

- **ALCOHOL USE**  
≥8 drinks/week

- **CVA/TIA**  
Any history of cerebral ischemia

- **RENAL DISEASE**  
HD, Transplant, Cr >2.26mg/dL

- **PRIOR BLEED**  
Or bleeding predisposition

- **LIVER DISEASE**  
Cirrhosis or bilirubin >2x normal with AST/ALT/AP >3x normal

- **UNCONTROLLED HTN**  
Uncontrolled SBP >160 mmHg

- **LABILE INR**  
Unstable/high INRs, time in therapeutic range <60%

- **Rx WHICH PREDISPOSE BLEEDING**  
Aspirin, clopidogrel, NSAIDs

▶ (January et al., 2019, p. 112), (Peterson & Geison, 2017)

# Assessing and Managing Thromboembolic Risk

## HAS-BLED Score



● **AGE**  
>65 y/o

● **ALCOHOL USE**  
≥8 drinks/week

● **CVA/TIA**  
Any history of cerebral ischemia

● **RENAL DISEASE**  
HD, Transplant, Cr >2.26mg/dL

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● **Rx WHICH PREDISPOSE BLEEDING**  
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▶ (January et al., 2019, p. 112), (Peterson & Geison, 2017)



# Assessing and Managing Thromboembolic Risk

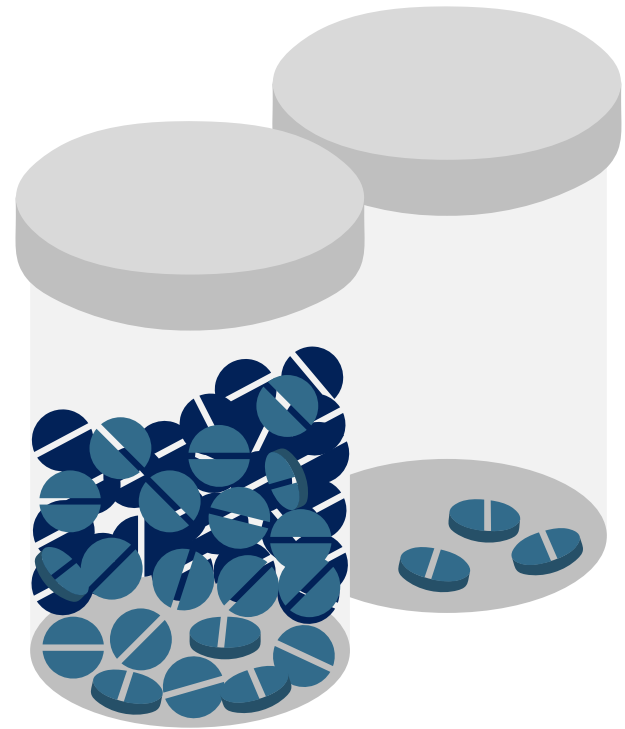
## Selecting An Anticoagulant

### Direct Oral Anticoagulants (DOACs)

are recommended **over warfarin** in DOAC-eligible patients with AF (COR I)

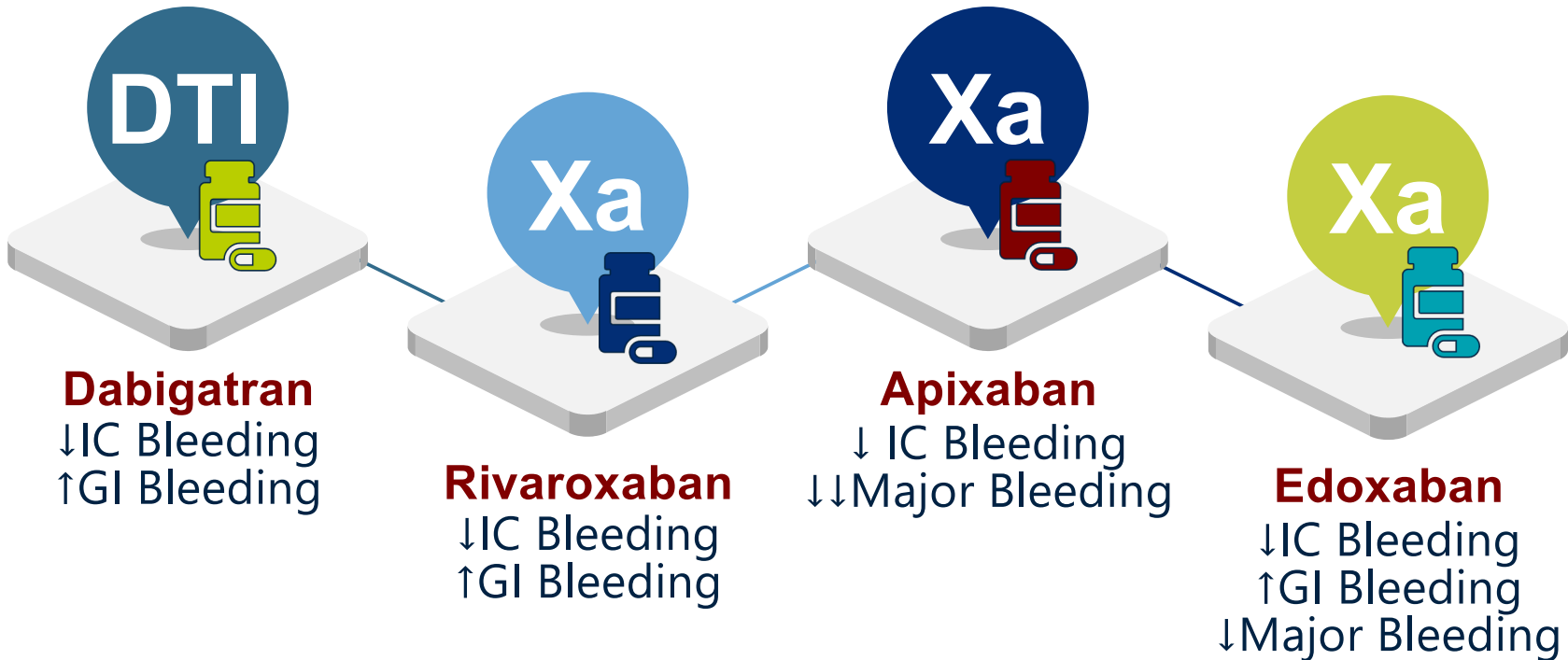
### Warfarin

is recommended for patients with AF who have moderate-to-severe mitral stenosis or a mechanical heart valve (COR I)



# Assessing and Managing Thromboembolic Risk

## Selecting An Anticoagulant



# Assessing and Managing Thromboembolic Risk

## Selecting An Anticoagulant



Dabigatran



Rivaroxaban



Apixaban



Edoxaban



Idarucizumab



Andexanet Alfa

# Assessing and Managing Thromboembolic Risk

## CAD Primary Prevention

### 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease

#### Recommendations for Aspirin Use

Referenced studies that support recommendations are summarized in [Online Data Supplements 17 and 18](#).

| COR       | LOE  | RECOMMENDATIONS   |
|-----------|------|---|
| IIb       | A    | 1. Low-dose aspirin (75-100 mg orally daily) might be considered for the primary prevention of ASCVD among select adults 40 to 70 years of age who are at higher ASCVD risk but not at increased bleeding risk (S4.6-1-S4.6-8). |
| III: Harm | B-R  | 2. Low-dose aspirin (75-100 mg orally daily) should not be administered on a routine basis for the primary prevention of ASCVD among adults >70 years of age (S4.6-9).  |
| III: Harm | C-LD | 3. Low-dose aspirin (75-100 mg orally daily) should not be administered for the primary prevention of ASCVD among adults of any age who are at increased risk of bleeding (S4.6-10).  |

▶ (January et al., 2019, p. 130)

# Assessing and Managing Thromboembolic Risk

## CAD Secondary Prevention

### Concomitant use of antiplatelet agents

#### ▶ Triple Therapy

- OAC + ASA + P2Y12inhibitor

#### ▶ Double Therapy

- ASA + P2Y12inhibitor



▶ (January et al., 2019, p. 130)

# Assessing and Managing Thromboembolic Risk

## CAD Secondary Prevention

### Triple therapy required?

- ▶ Clopidogrel > prasugrel (COR IIa)
- ▶ Transition to double therapy at 4 to 6 weeks

### Double therapy options:

- ▶ **Clopidogrel**
  - + **Warfarin** (COR IIa)
  - + **Rivaroxaban** 15 mg daily (COR IIa)
  - + **Dabigatran** 150mg twice daily (COR IIa)



▶ (January et al., 2019, p. 130)

# Rate Control vs Rhythm Control

## Outpatient Management



### HEART RATE ELEVATED

- Ventricular rate < 150 bpm



### ASYMPTOMATIC

- Or minimal symptoms
- Ex. Palpitations, fatigue, lightheadedness



### HD STABLE

# Rate Control Medications

## Selecting An Anticoagulant



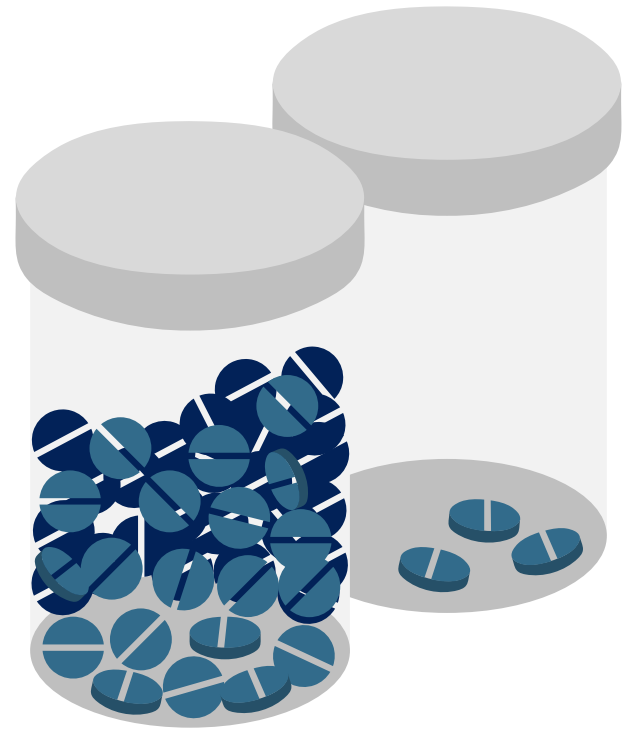
### Rate Control Options

- Agent patient is already taking
- Comorbidities

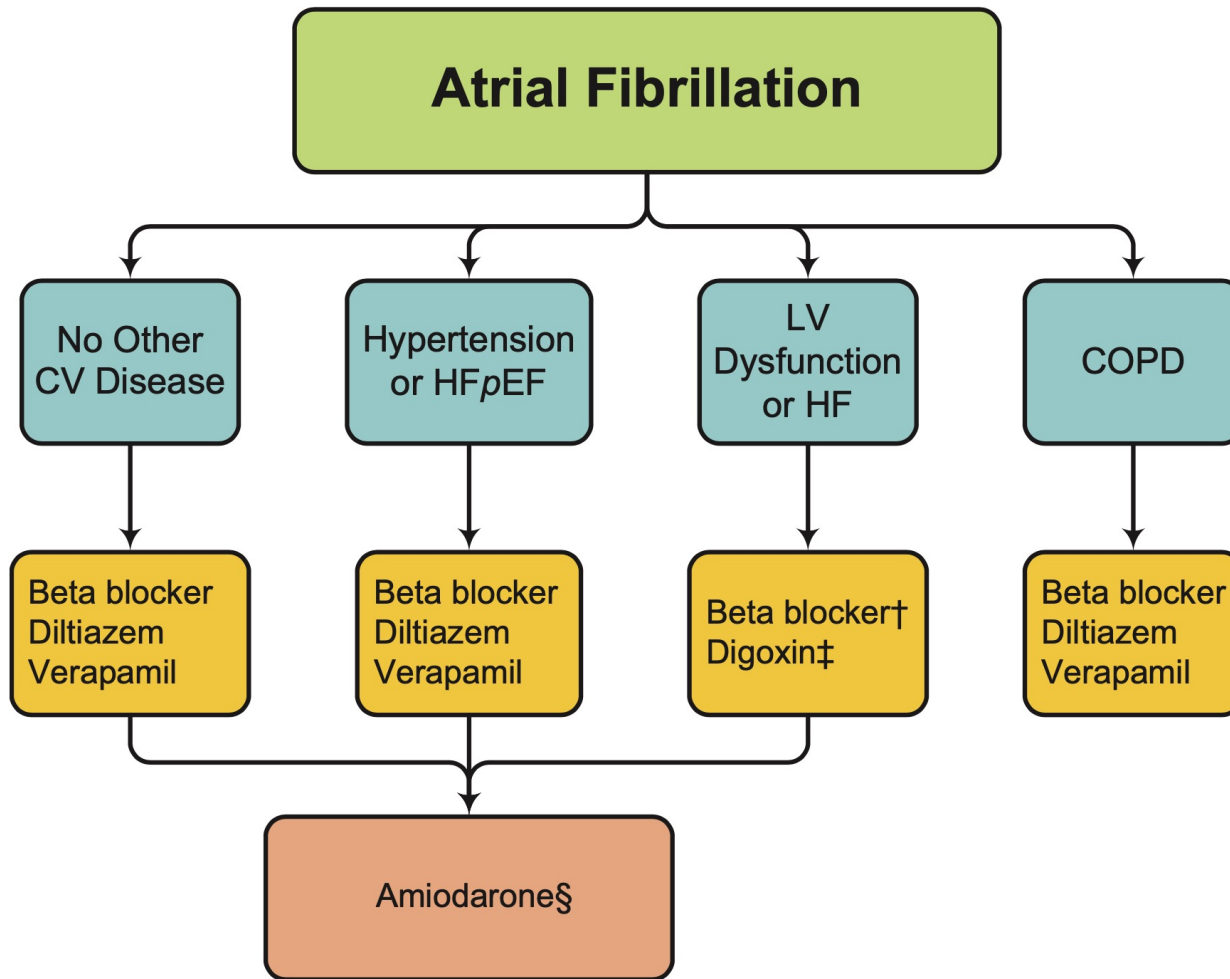


### Target HR

- **Exertion:** <110 bpm
- **At rest:** <80 bpm







► (January et al., 2014)

# Rate Control Medications

## Beta Blockers

*Atenolol*    *Pindolol*  
*Metoprolol*    *Nadolol*  
*Timolol*    *Bisoprolol*

- *Block sympathetic tone*
- Atenolol may have less CNS side effects
- Ideal in CHF/LVSD
- Ideal if sympathetic trigger
- Extended-release Metoprolol and propranolol are highly effective

## Calcium Channel Blockers

*Verapamil*  
*Diltiazem*

- *Increases refractoriness and decreases AVN conduction velocity*
- Avoid in CHF/LVSD due to negative inotropic effect.
- IV Diltiazem effective for acute control

## Digoxin

- *Decrease AVN conduction velocity, enhance vagal tone*
- Reserved for patients not controlled on or intolerant of BB and/or CCB, may be add-on therapy
- Less effective during exercise when vagal tone is low and sympathetic tone is high

## Amiodarone

- *Sympatholytic and calcium antagonistic properties that can depress AV nodal conduction*
- Many interactions
- Long-term toxicities
- May convert
- Avoid in pre-excitation



# Rhythm Control

REASONS TO PURSUE RHYTHM CONTROL

IMPROVE SYMPTOMS / QUALITY OF LIFE

DIFFICULTY IN ACHIEVING RATE CONTROL

YOUNGER PATIENT AGE

TACHY-MEDIATED CARDIOMYOPATHY

AF PRECIPITATED BY AN ACUTE ILLNESS

PATIENT PREFERENCE

# Cardioversion



## 1<sup>st</sup> ATTEMP

- Most patients should have at least one attempt cardioversion



## TIMING

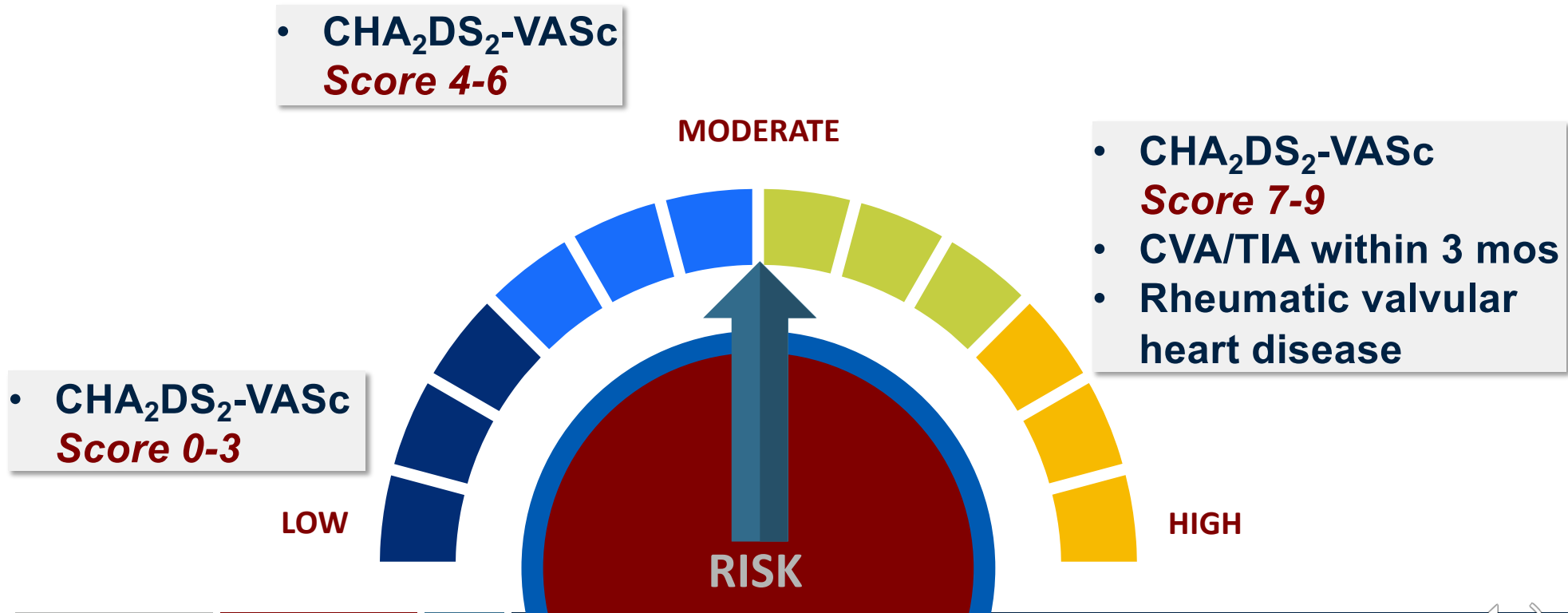
- >72 hrs
- Acute Trigger?
- Anticoagulation status?
- Symptom progression



## CVA RISK

- Increased risk x 30 days
- Anticoagulation is required pre and post cardioversion regardless of long-term OAC strategy or CHA<sub>2</sub>DS<sub>2</sub>-VASc score

# Perioperative Management of OAC



▶ (Douketis & Lip, 2020)

### LOW/VERY LOW RISK

- Dental extractions (1 or 2 teeth), endodontic (root canal) procedure,
- Subgingival scaling or other cleaning
- Cataract surgery
- Dermatologic procedures (e.g. biopsy)
- Gastroscopy or colonoscopy without biopsies
- Coronary angiography
- Permanent pacemaker insertion or internal defibrillator placement (if bridging anticoagulation is not used)
- Selected procedures (e.g. thoracentesis, paracentesis, arthrocentesis)

### MODERATE RISK

- Other intra-abdominal surgery (e.g. laparoscopic cholecystectomy, hernia repair, colon resection)
- Other general surgery (e.g. breast)
- Other intrathoracic surgery
- Other orthopedic surgery
- Other vascular surgery
- Non-cataract ophthalmologic surgery
- Gastroscopy or colonoscopy with biopsies
- Selected procedures (e.g. bone marrow biopsy, lymph node biopsy)
- Complex dental procedure (e.g. multiple tooth extractions)

### HIGH RISK

- Any surgery or procedure with neuraxial (spinal or epidural) anesthesia
- Neurosurgery (intracranial or spinal)
- Cardiac surgery (e.g. CABG, heart valve replacement)
- Major intra-abdominal surgery (e.g. intestinal anastomosis)
- Major vascular surgery (e.g. aortic aneurysm repair, aortofemoral bypass)
- Major orthopedic surgery (e.g. hip or knee replacement)
- Lung resection surgery
- Urological surgery (e.g. prostatectomy, bladder tumour resection)
- Extensive cancer surgery (e.g. pancreas, liver)
- Reconstructive plastic surgery
- Selected procedures (e.g. kidney biopsy, prostate biopsy, cervical cone biopsy, pericardiocentesis, colonic polypectomy)

▶ (Thrombosis Canada, 2015)

# Perioperative Bridging Anticoagulation in Patients with Atrial Fibrillation

James D. Douketis, M.D., Alex C. Spyropoulos, M.D., Scott Kaatz, D.O.,  
Richard C. Becker, M.D., Joseph A. Caprini, M.D., Andrew S. Dunn, M.D.,  
David A. Garcia, M.D., Alan Jacobson, M.D., Amir K. Jaffer, M.D., M.B.A.,  
David F. Kong, M.D., Sam Schulman, M.D., Ph.D., Alexander G.G. Turpie, M.B.,  
Vic Hasselblad, Ph.D., and Thomas L. Ortel, M.D., Ph.D.,  
for the BRIDGE Investigators\*

## CONCLUSIONS

In patients with atrial fibrillation who had warfarin treatment interrupted for an elective operation or other elective invasive procedure, forgoing bridging anticoagulation was noninferior to perioperative bridging with low-molecular-weight heparin for the prevention of arterial thromboembolism and decreased the risk of major bleeding. (Funded by the National Heart, Lung, and Blood Institute of the National Institutes of Health; BRIDGE ClinicalTrials.gov number, NCT00786474.)

▶ (Douketis et al., 2015b, p. 827)

## Perioperative Management of OAC

| OAC Discontinuation for Elective Surgery |  |   |
|--|--|---|
| Procedure Bleeding Risk                  | Direct Oral Anticoagulant  | Warfarin  |
| Minimal                                  | Omit OAC on <b>day of</b> the surgery<br>Totally interruption: <b>1</b> day                                  | No interruption                                   |
| Low/Moderate                             | Omit OAC <b>1</b> day prior<br>Resume OAC <b>1</b> day post procedure<br>Total interruption: <b>2</b> days   | Interrupt for <b>5</b> day<br><b>w/o</b> Bridging |
| High                                     | Omit OAC <b>2</b> days prior<br>Resume OAC <b>2</b> days post procedure<br>Total interruption: <b>4</b> days | Interrupt <b>5</b> days<br><b>w/Bridging</b>      |

▶ Based on (Tafur & Douketis, 2017, p. 1465)



# Co Management of Known AF: **Screening Studies**

|                             |   |                        |  |
|-----------------------------|---|------------------------|--|
| ECG                         | QT prolongation, AF surveillance, signs of conduction system impairment                   | Dermatotic Examination | *Amiodarone specific: Skin changed due to photosensitivity UV light, blue-grey discoloration |
| Basic Chemistry             | Electrolyte abnormalities or change in GFR/CrCl, may alter antiarrhythmic drug metabolism | CXR                    | *Amiodarone specific: Pulmonary fibrosis   |
| Thyroid Stimulating Hormone | *Amiodarone specific: Hyper/hypothyroidism  | AST / ALT              | *Amiodarone specific: Hepatotoxicity   |

## Co-Management of Known AF: **Antiarrhythmic Drug Concerns**

### Drugs Associated with QT Prolongation and TdP

#### Antiarrhythmics

Amiodarone  
Sotalol  
Quinidine  
Procainamide  
Dofetilide  
Ibutilide

#### Antimicrobials

Levofloxacin  
Ciprofloxacin  
Gatifloxacin  
Moxifloxacin  
Clarithromycin  
Erythromycin  
Ketoconazole  
Itraconazole

#### Antidepressants

Amitriptyline  
Desipramine  
Imipramine  
Doxepin  
Fluoxetine  
Sertraline  
Venlafaxine

#### Antipsychotics

Haloperidol  
Droperidol  
Quetiapine  
Thioridazine  
Ziprasidone

#### Others

Cisapride  
Sumatriptan  
Zolmitriptan  
Arsenic  
Dolasetron  
Methadone

▶ (Thompson, 2007)

## Co-Management of Known AF: Comorbid Conditions



### **HYPERTENSION**

- Reduce the risk of developing AF
- Reduce recurrent episodes
- Improve efficacy of treatment of AF
- Atrial electro-structural remodeling



### **OBSTRUCTIVE SLEEP APNEA**

- Reduce triggers for AF
- Reduce recurrent episodes
- Improve efficacy of treatment of AF



### **OBESITY**

- Atrial electro-structural remodeling
- Reduce symptom burden
- Improve OSA , DM, HTN



### **DIABETES MELLITUS**

- Linked to obesity
- Atrial electro-structural remodeling



### **ALCOHOLISM**

- Modifiable bleeding risk factor
- Bing drinking can trigger to AF

# Referral to Specialist



## CARDIOLOGIST

- ✓ Uncomfortable with diagnosis or management
- ✓ Uncertain diagnosis, prognosis, or management strategy
- ✓ Unusual findings



## ELECTROPHYSIOLOGIST

- ✓ Pacemaker or ICD indication
- ✓ Catheter ablation
- ✓ Antiarrhythmic drug therapy
- ✓ Structural heart disease

## Take Home Points

### A Avoid Thromboembolism

- Thoughtful individualized anticoagulation
- CHA2DS2-VASc score of  $\geq 2$  in men or  $\geq 3$  or greater in women, oral anticoagulants are recommended.
- Warfarin for patient with mechanical valve or ESRD.
- Consider DOAC for all other patients

### B Better (Improve) Symptoms

- Manage ventricular rate using a BB or CCB.(1<sup>st</sup> line)
- Target heart rate:
  - <80 bpm Resting
  - <110bpm Exercise
- Consider rhythm control if AF-associated symptoms are persistent despite rate control

### C Comorbidity Risk Optimization

- AF-promoting extracardiac factors:
  - HTN, OSA, Obesity, EToH abuse, Hyperthyroidism.
- Manage modifiable risk factors that may impact anticoagulation.

▶ (Lip, 2017, p. 627)

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