I Got Rhythm, or Not-----
Managing Atrial Fibrillation

Midge Bowers DNP, FNP-BC, CHSE, FAANP, FAAN, FACC

Description

- During this session you will learn about treatment options for patients with atrial fibrillation. Using a case-based approach you will learn about pharmacologic strategies for anticoagulation, rate and rhythm control as well as when to refer to cardiology for advanced interventions.

Objectives

Identify	Describe	Recognize	Discuss
Identify risk factors for the development of atrial fibrillation	Describe the basic pathophysiology of atrial fibrillation.	Recognize symptoms and EKG findings of atrial fibrillation	Discuss evidence-based treatment options for managing atrial fibrillation

Why is recognition significant?

Epidemiology

Worldwide epidemic

- >33 million people affected
- ~5 million new cases annually

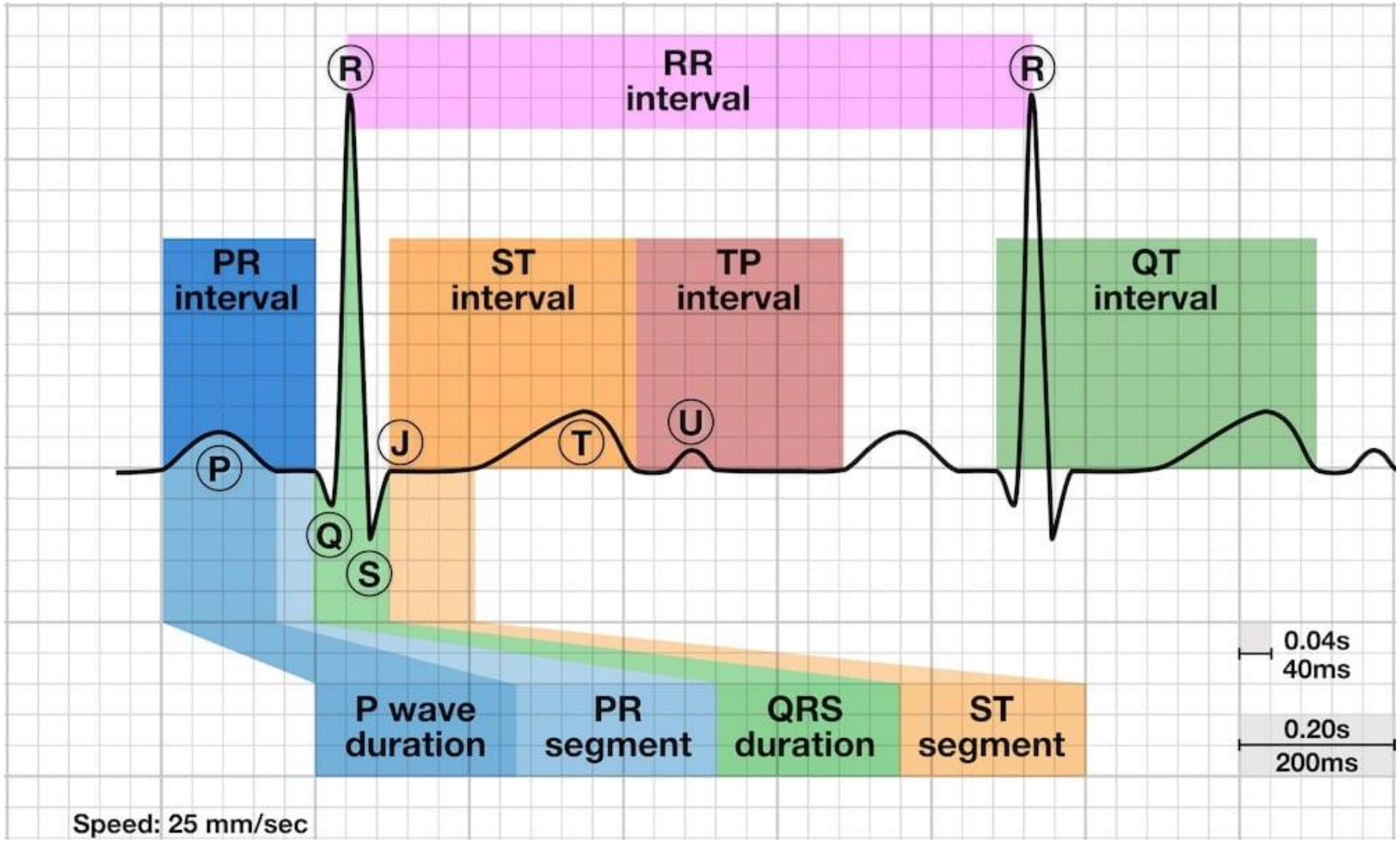
USA

- ~2.7-6.1 Million: number of people affected
- ~12.1-15.9 Million: estimated number to be affected by 2050
- Lifetime risk in age >55 yr = 37%

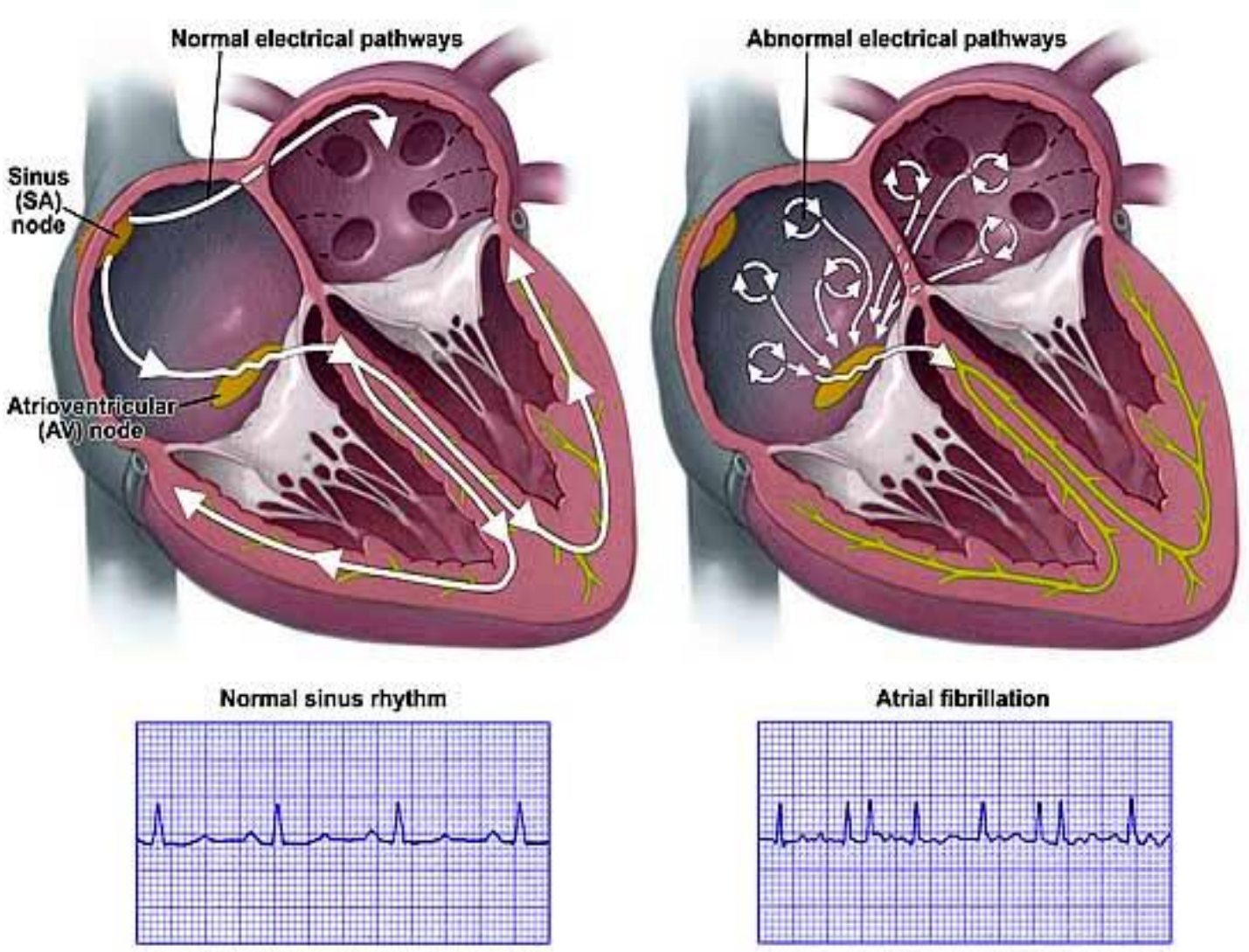
Financial impact of atrial fibrillation

- Factors to consider:
  - Diagnostic workup
  - Medications
    - Anticoagulation monitoring if indicated
  - Impact on comorbidities
    - Heart failure
  - Lost productivity
- Projected annual cost to increase from $6 Billion to $26 Billion

EKG Snapshot



Atrial Fibrillation (AF)



Atrial fibrillation. http://www.health-res.com/EX/07-29-05/atrial-fibrillation-lg.jpg. Accessed July 2012.

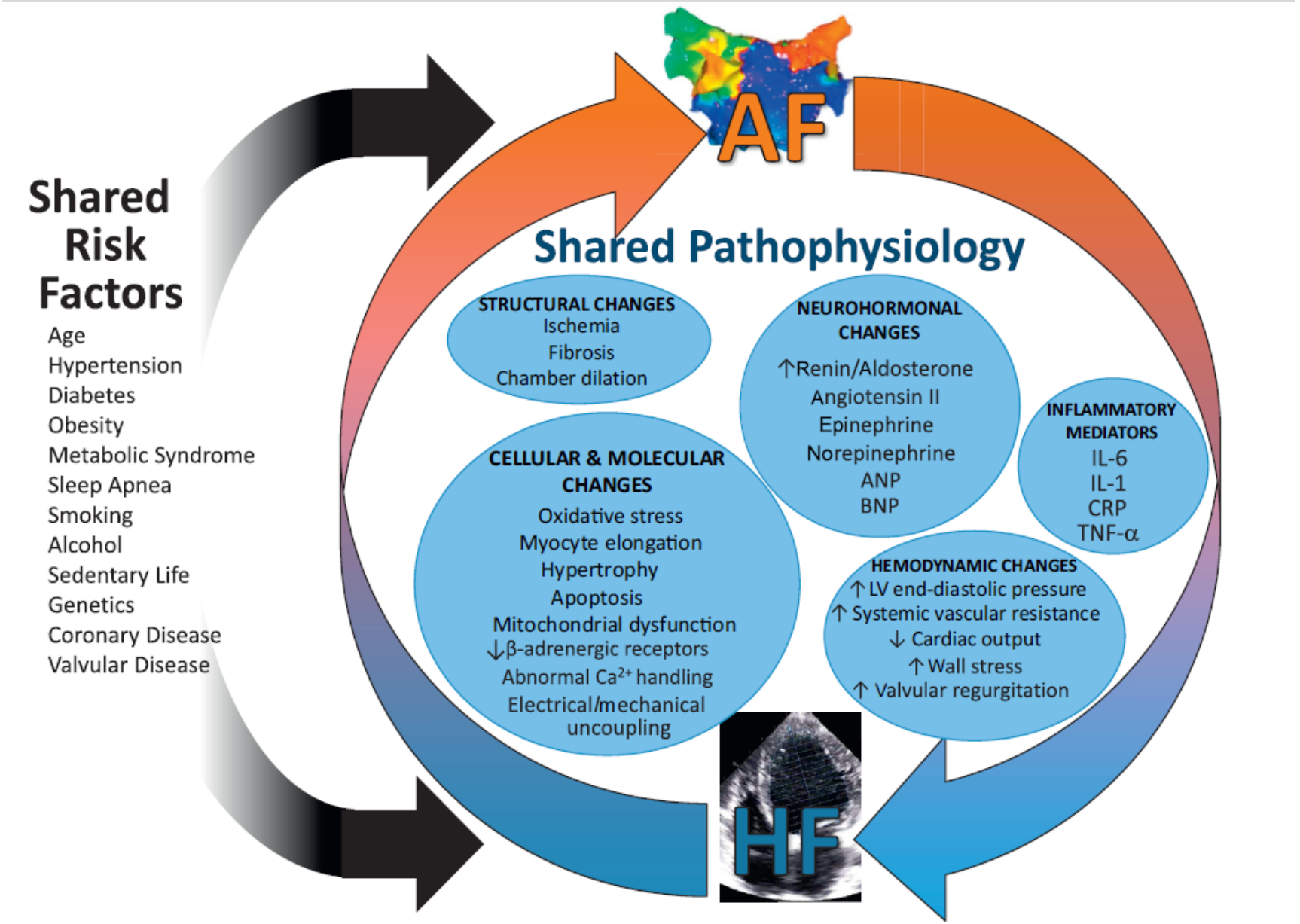


Fig. 1. AF and HF share common risk factors and pathophysiology that lead to the development of each other. CO, cardiac output; CRP, C reactive protein; IL, interleukin; LVEDP, left ventricular end diastolic volume; SVR, systemic vascular resistance; TNF, tumor necrosis factor.

Karnik, A., Gopal, D., Ko, D., Benjamin, E. and Helm, R. Cardiol Clin 37 (2019) 119–129https://doi.org/10.1016/j.ccl.2019.01.00107 33-8651/19/Ó2019 Elsevier Inc

Non-Modifiable Risk Factors

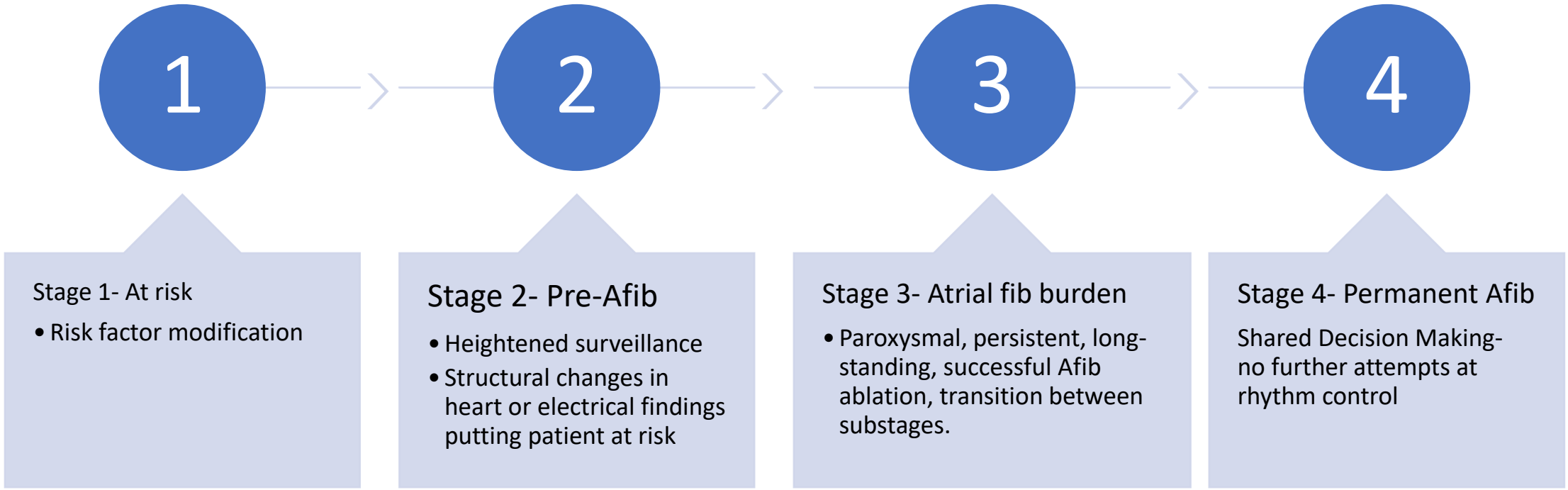
Age

- Risk increases over age 65

Genetics

- Smaller size atria in some populations

Stages of Atrial fibrillation



Definitions

Paroxysmal

- Recurrent and terminates spontaneously within 7 days

Persistent

- Sustained and lasts > 7 days or < 7 days but requires pharmacologic or electrical cardioversion.

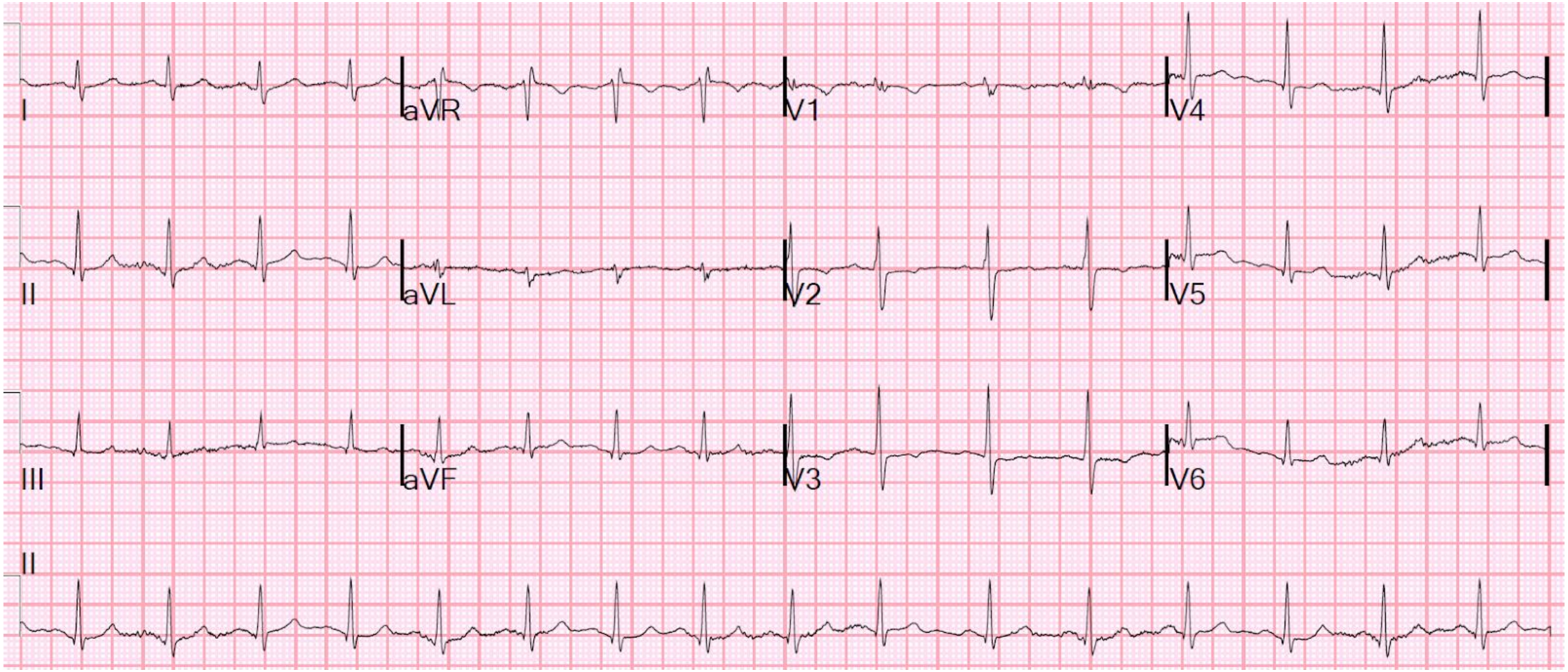
Determine stroke risk and treatment

- Use risk tool to assess yearly thromboembolic event

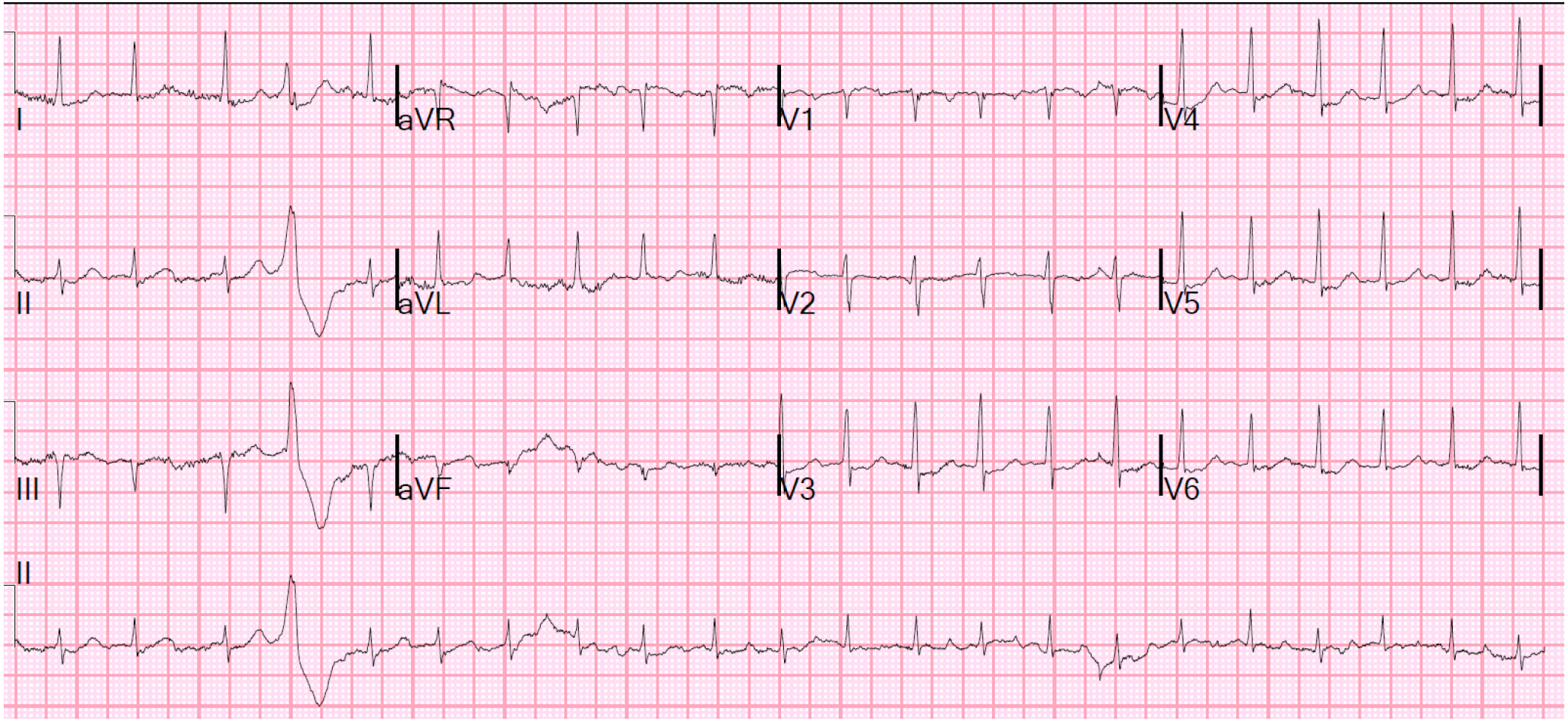
Long-standing

- Lasting greater than 12 months.

What is this rhythm?



What is this rhythm?



Modifiable Risk Factors

Chung, M. et al, Lifestyle and Risk Factor Modification for Reduction of Atrial Fibrillation: A Scientific Statement From the American Heart Association. Circulation. 2020;141:e750–e772. https://doi.org/10.1161/CIR.0000000000000748

Hypertension

Elevated BP leads to remodeling in both LA and LV

Remodeling stimulated by RAAS

Target RAAS blocker for possible prevention of Atrial fib

Obesity

Pericardial and epicardial fat are arrhythmogenic

Strong association in pt with BMI ≥30 kg/m^2

Sustained weight loss ≥10 % associated with reduced risk of afib recurrence

Bariatric surgery associated with reduced recurrence of afib after ablation and decreased risk of new afib

Physical Inactivity

- Independent risk factor for afib
- Increased cardiorespiratory fitness associated with reduced risk of afib
- Regular aerobic exercise improves symptoms and reduces afib burden
- Extreme exercise may increase risk of afib

Sleep Disordered Breathing

Highly prevalent in patients with afib

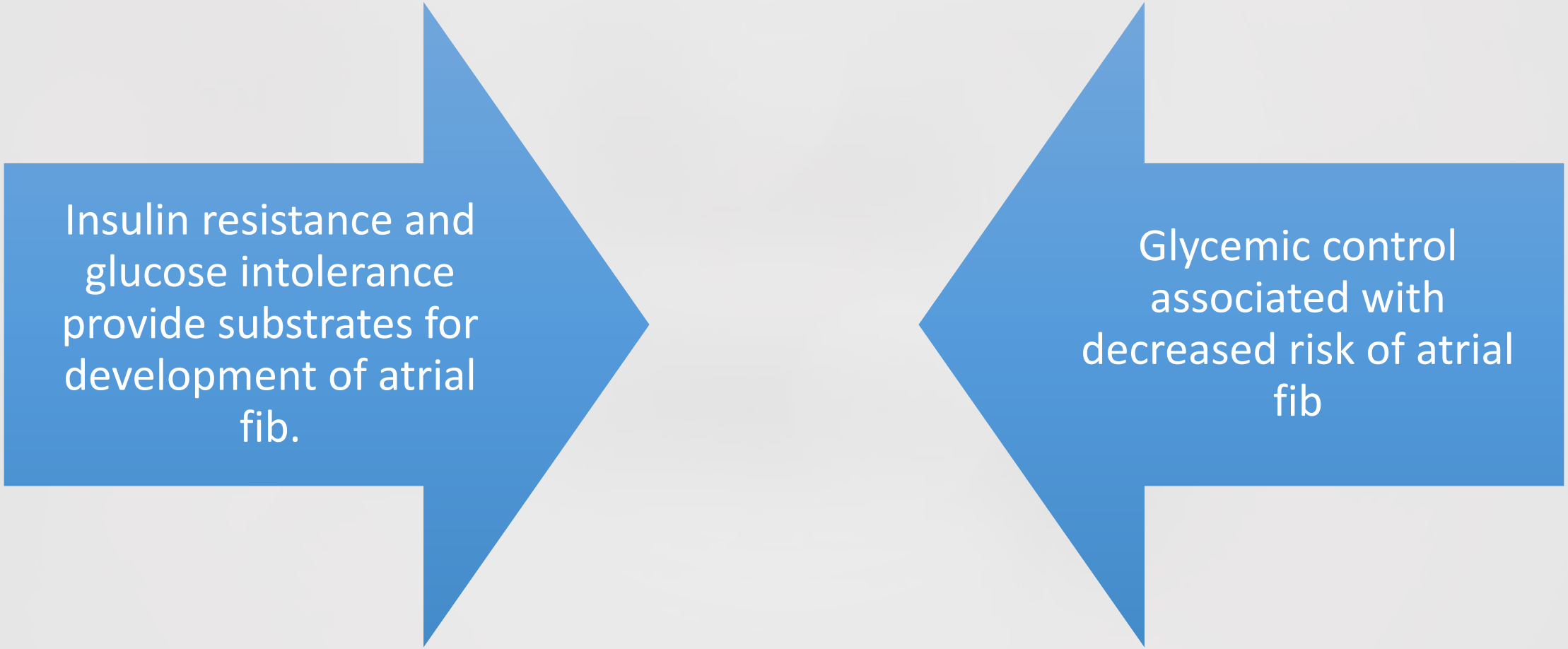
Screening for SDB should be part of treatment plan.

Associated with autonomic, hemodynamic and inflammatory changes

If severe SDB less likely to respond to antiarrhythmic meds

Treatment with CPAP may reduce recurrence of afib

Diabetes Mellitus



Tobacco Use Disorder

Nicotine acts as a profibrotic and stimulates inflammation

Nicotine is a stimulant that activates catecholamines to increase blood pressure, induce coronary vasospasm and myocardial ischemia.

Vaping as a risk for atrial fib needs to be studied.

Alcohol

Contributes to autonomic stimulation and atrial remodeling

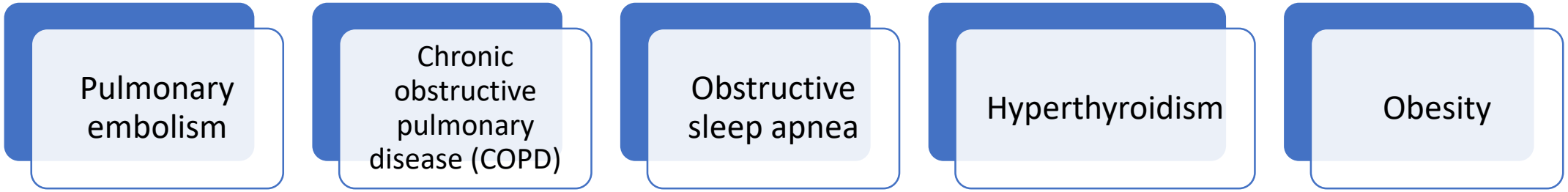
In moderate to high level consumers of alcohol, rhythm control may improve with reduction in alcohol consumption

Beyond Risk Factors: Comorbidities & Afib

- Hypertension
- Coronary artery disease
- Valvular heart disease
- Heart failure
- Cardiomyopathy
- Pericarditis
- Congenital heart disease
- Cardiac surgery

Ananthapanyasut, W., Napan, S., Rudolph, S., Harindhanavudhi, H., Guglielmi, K., Lerma, E. (2010). Prevalence of Atrial Fibrillation and Its Predictors in Nondialysis Patients with Chronic Kidney Disease. *Clin J Am Soc Nephrol. 5(2):* 173–181.
doi: 10.2215/CJN.03170509

Noncardiac Comorbidities Associated With Afib



Ananthapanyasut, W., Napan, S., Rudolph, S., Harindhanavudhi, H., Guglielmi, K., Lerma, E. (2010). Prevalence of Atrial Fibrillation and Its Predictors in Nondialysis Patients with Chronic Kidney Disease. *Clin J Am Soc Nephrol. 5(2):* 173–181.
doi: 10.2215/CJN.03170509

3 pillars of afib management SOS

Stroke- Assess and treat

Optimize- All modifiable risk factors

Symptom Management- rate vs rhythm control, atrial fib burden

Respond- Treatment Options

Anticoagulation

- Stroke risk vs. Bleeding risk

Rate control

- Medications

** Early Rhythm control

- Cardioversion

Ablation- Class I indication as first line

Goals of Acute and Chronic Therapy

- Prevent stroke
- Slow ventricular response
- Restore and maintain normal sinus rhythm
- Improve symptoms
- Improve quality of life
- Reduce cost
- Prolong survival

Approach to anticoagulation

Anticoagulant should be patient specific and involve shared decision-making

For patients with AF (except with moderate-to-severe mitral stenosis or a mechanical heart valve) who are unable to maintain a therapeutic INR level with warfarin, use of a NOAC is recommended.

CHA_2DS_2 VASc

Scoring Differences Between $CHADS_2$ and CHA_2DS_2-VASc

	$CHADS_2$ (Maximum score, 6)	CHA_2DS_2-VASc (Maximum score, 9)
Risk Factor	**Points**	**Points**
Congestive heart failure	1	1
Hypertension	1	1
Diabetes	1	1
Vascular disease	N/A	1
Age 65-74	N/A	1
Age ≥75	1	2
Female sex	N/A	1
Previous stroke/TIA	2	2

N/A – not applicable

Journal WATCH

Atrial Fibrillation: Established and Innovative Methods of Evaluation and Treatment. Dtsch Arztebl Int 2012; 109(1-2): 1-7.
DOI: 10.3238/arztebl.2012.0001

Garfield AF Risk Calculator

- If intermediate risk and unsure about anticoagulation
  - Use shared-decision making

- Includes a variety of other variables including:
  - Weight, HR, diastolic BP, ejection fraction, CKD and dementia

- Provides 6month, 1 yr and 2 yr risk

https://reference.medscape.com/calculator/685/garfield-af-risk-calculator

HAS-BLED

Letter	Clinical Characteristic	Points
H	Hypertension	1
A	Abnormal Liver or Renal Function	1 or 2
S	Stroke	1
B	Bleeding	1
L	Labile INR	1
E	Elderly (age > 65)	1
D	Drugs or Alcohol	1 or 2
Maximum Score		9

Ruff, C. Which Risk Score Best Predicts Bleeding With Warfarin in Atrial Fibrillation? 2011. https://www.acc.org/latest-in-cardiology/articles/2014/07/18/11/38/which-risk-score-best-predicts-bleeding-with-warfarin-in-atrial-fibrillation

Warfarin in atrial fibrillation

MOA- Vitamin K antagonist

Dosing- variable based on INR which should be monitored weekly until target achieved, then monthly.

- Target INR is 2.0-3.0.

Onset- 3-5 days after starting to reach its full blood thinning effect.

Half-Life- up to 40 hrs

Reversibility- Vitamin K

Direct Oral Anticoagulants for atrial fibrillation

Medication	MOA	Dosing	Onset	Half-Life	Reversibility
Apixaban	Direct factor Xa inhibitor	Oral Twice a day	3 hr	8-15 hr	Andexanet Alfa Subcutaneous
Dabigatran	Direct thrombin inhibitor	Oral Twice a day	2 hr	12-17 hrs	Idarucizumab IV
Edoxaban	Direct factor Xa inhibitor	Oral Once a day	1-2 hrs	10-14 hrs	Andexanet Alfa Subcutaneous
Rivaroxaban	Direct factor Xa inhibitor	Oral Once a day	2-4 hrs	5-9 hrs	Andexanet Alfa Subcutaneous

Strategies to Enhance Anticoagulation Management

Patient

- Education
  - Diet, drugs, diseases, etc.
- Engagement
  - Consider home monitoring or anticoagulant that does not require monitoring
- Ongoing patient education to reinforce long-term adherence with therapy

Provider

- Online warfarin dosing calculators to assist with warfarin initiation.
- Partnering with patient, family and nursing to increase time in TTR.
- Increase familiarity with newer anticoagulants.

Home Monitoring

The Home INR Study (THINRS) to compare methods among 2,922 warfarin-treated patients at VA centers

Weekly finger-stick INR associated with nonsignificant decrease in bleeding, stroke, or death compared with clinic monitoring (*P*=0.10)

Source: Jacobson AK, et al "A Prospective Randomized Controlled Trial of the Impact of Home INR Testing on Clinical Outcomes: The Home INR Study (THINRS)" *AHA* 2008; Abstract 5217.

Home INR Monitoring

- Home monitoring reduced time outside of therapeutic range by 7%.
- Results supported home testing as alternative to high-quality clinic care.
- Preferable if patients have difficulty getting to the clinic because of disability or distance.
- 2016 analysis of data deemed it cost effective compared to clinic anticoagulation management and preferred by pt in the study.

Source: Jacobson AK, et al "A prospective randomized controlled trial of the impact of home INR testing on clinical outcomes: The Home INR Study (THINRS)" *AHA* 2008; Abstract 5217. Phibbs CS, et al. At-Home Versus In-Clinic INR Monitoring: A Cost-Utility Analysis from The Home INR Study (THINRS). J Gen Intern Med. 2016 Sep;31(9):1061-7.

Selecting an Anticoagulant

For patients with AF and an elevated CHA_2DS_2-VASc score of 2 or greater in men or 3 or greater in women, oral anticoagulants are recommended.

- Warfarin (LOE: A)
- Dabigatran (LOE: B)
- Rivaroxaban (LOE: B)
- Apixaban (LOE: B)
- Edoxaban (LOE: B-R)

Initiation of DOAC

- In eligible patients with afib DOACs are recommended over warfarin

Exception- Mechanical heart valve or moderate to severe mitral stenosis

- Baseline evaluation of renal and hepatic function then on annual basis.

- Engage in shared decision making with the patient and/or caregiver regarding treatment options.

Using CHA_2DS_2-VASc for treatment decision

CHA_2DS_2-VASc Score	Gender	Anticoagulate
0	Men	Can Omit
1	Women	Can Omit
1	Men	Consider anticoagulant
2	Women	Consider anticoagulant
2 or greater with CKD or dialysis	Men	Warfarin or apixaban
3 or greater with CKD or dialysis	Women	Warfarin or apixaban
4, 5, 6		Anticoagulate

Special Considerations

Consider reduced doses of medications in patients with moderate to severe CKD

- Serum creatinine ≥ 1.5 mg/dL
  Apixaban
- CrCl 15 to 30 mL/min
  Dabigatran
- CrCl ≤50 mL/min
  Rivaroxaban
- CrCl 15 to 50 mL/min
  Edoxaban

Bridging and Interrupting Anticoagulation

Mechanical valve

- Balance risk of stroke and bleeding
- Bridge with low molecular weight heparin or unfractionated heparin

No mechanical valve

- Balance risk of stroke and bleeding and the duration of time a patient will not be anticoagulated.
- Bridge with low molecular weight heparin or unfractionated heparin

Electrical Cardioversion

When Afib duration of 48 hrs or longer or duration unknown:

- Anticoagulation with warfarin, a factor Xa inhibitor, or direct thrombin inhibitor for at least **3 weeks before** and at least **4 weeks after** cardioversion, regardless of the CHA_2DS_2-VASc score or the method (electrical or pharmacological) used to restore sinus rhythm.

- When immediate cardioversion is required for hemodynamic instability, anticoagulation should be **initiated as soon as possible** and continued for at least **4 weeks after** cardioversion unless contraindicated

Anticoagulation and Cardioversion

For patients with AFib of less than 48 hours' duration and CHA_2DS_2-VASc score of 2 or greater in men and 3 or greater in women:

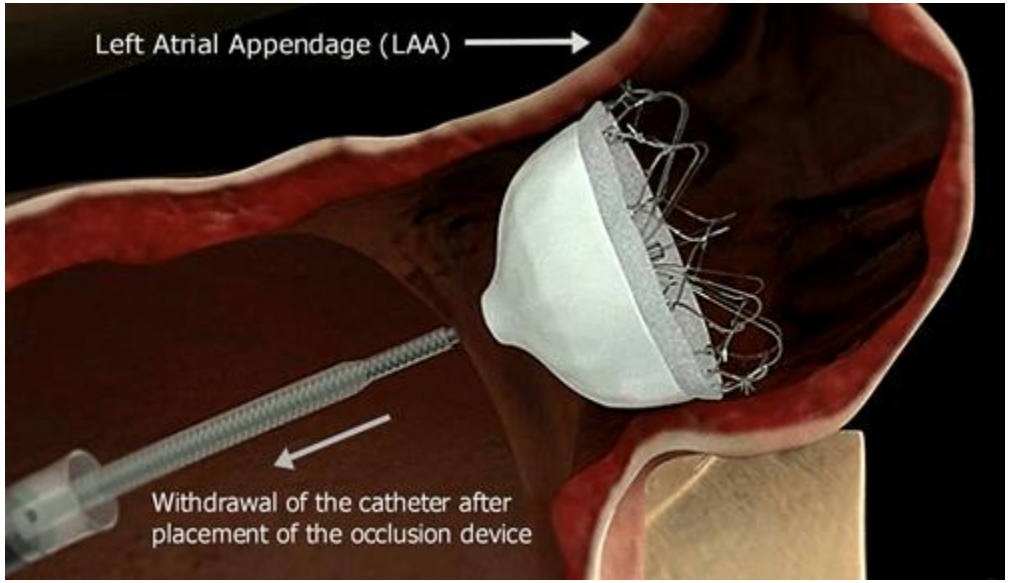
Heparin, a factor Xa inhibitor, or a direct thrombin inhibitor is reasonable as soon as possible before cardioversion and subsequent long-term anticoagulation therapy.

After cardioversion for AFib of any duration base anticoagulation therapy on thromboembolic risk profile and bleeding risk profile.

Left Atrial Appendage Occluder- 2a recommendation

Percutaneous LAA occlusion may be considered in patients with AF at increased risk of stroke who have contraindications to long-term anticoagulation.

- Lariat™
- Watchman™
- Amplatzer cardiac plug™



Effectiveness in Stroke reduction

- PROTECT AF (5 yr analysis) and PREVAIL trial data used for a pooled analysis.
- PREVAIL showed an increase in ischemic stroke.
- Compared LAA closure device to warfarin or DOAC.
- Cost effective and cost saving in reducing stroke in patients with nonvalvular atrial fib
- For pts requiring lifelong anticoagulation LAA device is an option

Reddy, V. et al. Cost-Effectiveness of Lef tAtrial Appendage Closure for Stroke Reduction in Atrial Fibrillation: Analysis of Pooled,5-Year, Long-Term Data. JAmHeartAssoc.2019;8:e011577.DOI:10.1161/JAHA. 118.011577.

Consideration for Left Atrial Appendage Occluder

People that have had some major bleeding issues on coumadin or other NOACs

- GI bleeds
- Hemorrhagic strokes

Patients who are non-compliant on anticoagulant therapy or those with issues regulating their INR.

People with active lifestyles.

Elderly or those who are prone to falls.

Contraindications for Left Atrial Appendage Occluder

- Mechanical heart valve
- Current thrombus in the left atrial appendage
- Left atrial appendage opening larger than current device available

Medications beyond anticoagulation

Rate control

- Beta blocker
- Calcium channel blocker (Diltiazem and Verapamil)
- Digoxin

Rhythm control (most common)

- Calcium channel blocker (Diltiazem and Verapamil)
- Amiodarone
- Sotalol
- Dofetilide

Anticoagulation and cardioversion

Perform transesophageal echocardiography (TEE) for patients with AFib of 48 hours' duration or longer or of unknown duration who have not been anticoagulated for the preceding 3 weeks.

If no left atrial thrombus is identified, perform cardioversion, provided that anticoagulation is achieved before transesophageal echocardiography and maintained after cardioversion for at least 4 weeks.

Anticoagulation and cardioversion

For patients with AF or atrial flutter of less than 48 hours' duration with a CHA_2DS_2-VASc score of 0 in men or 1 in women

Administration of heparin, a factor Xa inhibitor, or a direct thrombin inhibitor, OR no anticoagulant therapy, may be considered before cardioversion.

Post cardioversion oral anticoagulation may not be needed long term

Catheter ablation

A procedure which focuses on disrupting electrical signals in the heart by destroying or scarring tissue in the atria.

In patient with symptomatic atrial fib and heart failure with reduced EF (HFrEF) catheter ablation may reduce hospitalizations and lower mortality.

Catheter Ablation

- **Class I Indication**
  - Symptomatic patients with paroxysmal atrial fib not intolerant to antiarrhythmic meds or medications are ineffective.
  - Patients with HFrEF

- **Additional indications for which catheter ablation can be considered**
  - Asymptomatic patients
  - Patients with AF and psychological distress

Parameswaran R, et al. Catheter ablation for atrial fibrillation: current indications and evolving technologies. Nat Rev Cardiol. 2021 Mar;18(3):210-225. doi: 10.1038/s41569-020-00451-x. Epub 2020 Oct 13. PMID: 33051613.

Catheter Ablation

Class IIa indications

- Symptomatic persistent Afib and paroxysmal AF as first-line therapy
- HFrEF
- Tachycardia–bradycardia syndrome
- Selected elderly patients
- Athletes

Parameswaran R, et al. Catheter ablation for atrial fibrillation: current indications and evolving technologies. Nat Rev Cardiol. 2021 Mar;18(3):210-225. doi: 10.1038/s41569-020-00451-x. Epub 2020 Oct 13. PMID: 33051613.

What about post op atrial fib?

- If precipitant in surgery or an acute medical illness then evaluate the risk of recurrence of atrial fib.

Case 1

HPI- 60 yo male with 3 days of increased fatigue and dyspnea at rest and with exertion. Denies palpitations, chest discomfort or dizziness.

PMH- Htn, OA, CAD, DM

Meds:

HCTZ 25mg daily

Losartan 50mg daily,

Atorvastatin 40 mg daily

ASA 81 mg daily

Naprosyn 500mg bid

Glimepiride 2mg daily

Refuses to take “rat poison”

Recent EKG- atrial fib with rapid ventricular response at 110

Case 1

PE: 124/56 HR 102 RR 18 O2 sat 98%

General : well appearing White male in NAD

HEENT: head normocephalic. Conjunctiva pink, sclera anicteric. Mucous membranes moist. Neck veins flat, 2+carotids without bruits.

Chest: Lungs with bibasilar crackles

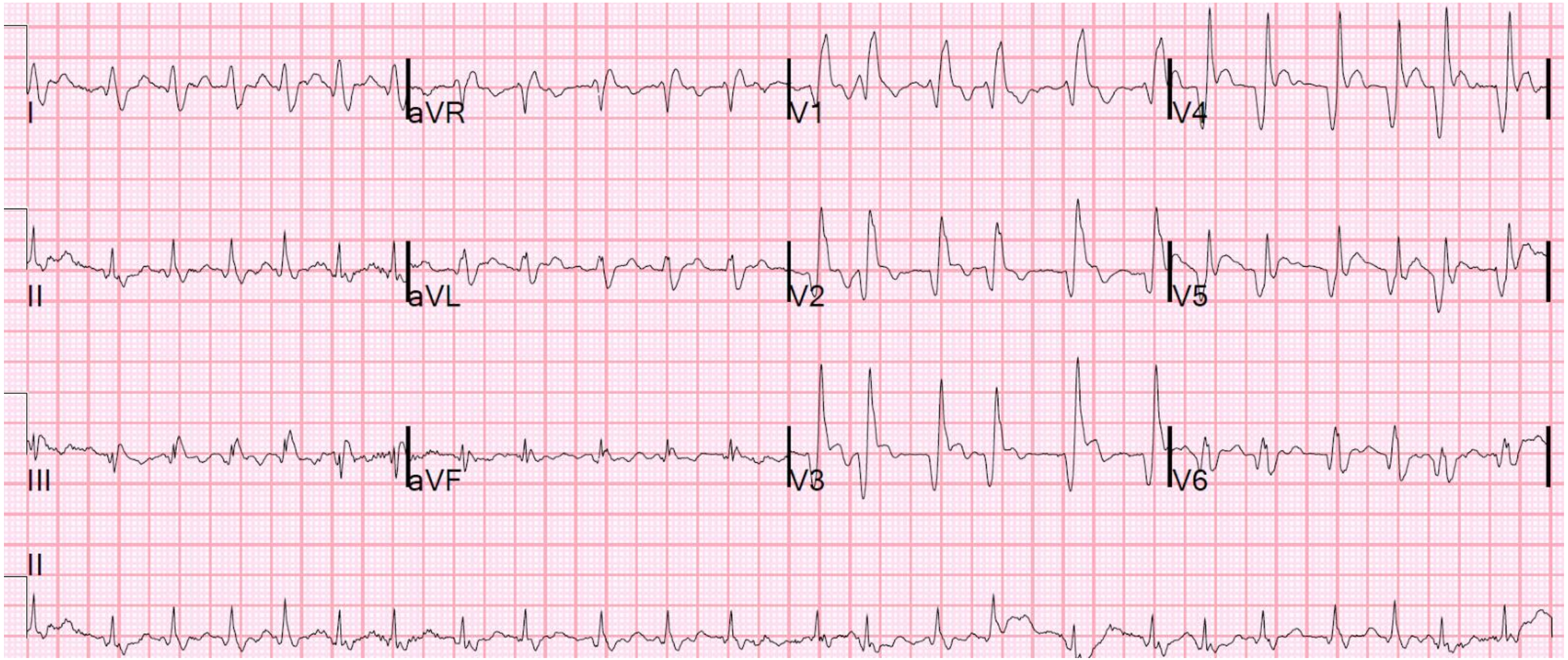
Cardiac: Rapid irregular rate and rhythm. Normal S1 S2 no murmurs

Abdomen: soft, NT, + bowel sounds, without hepatomegaly

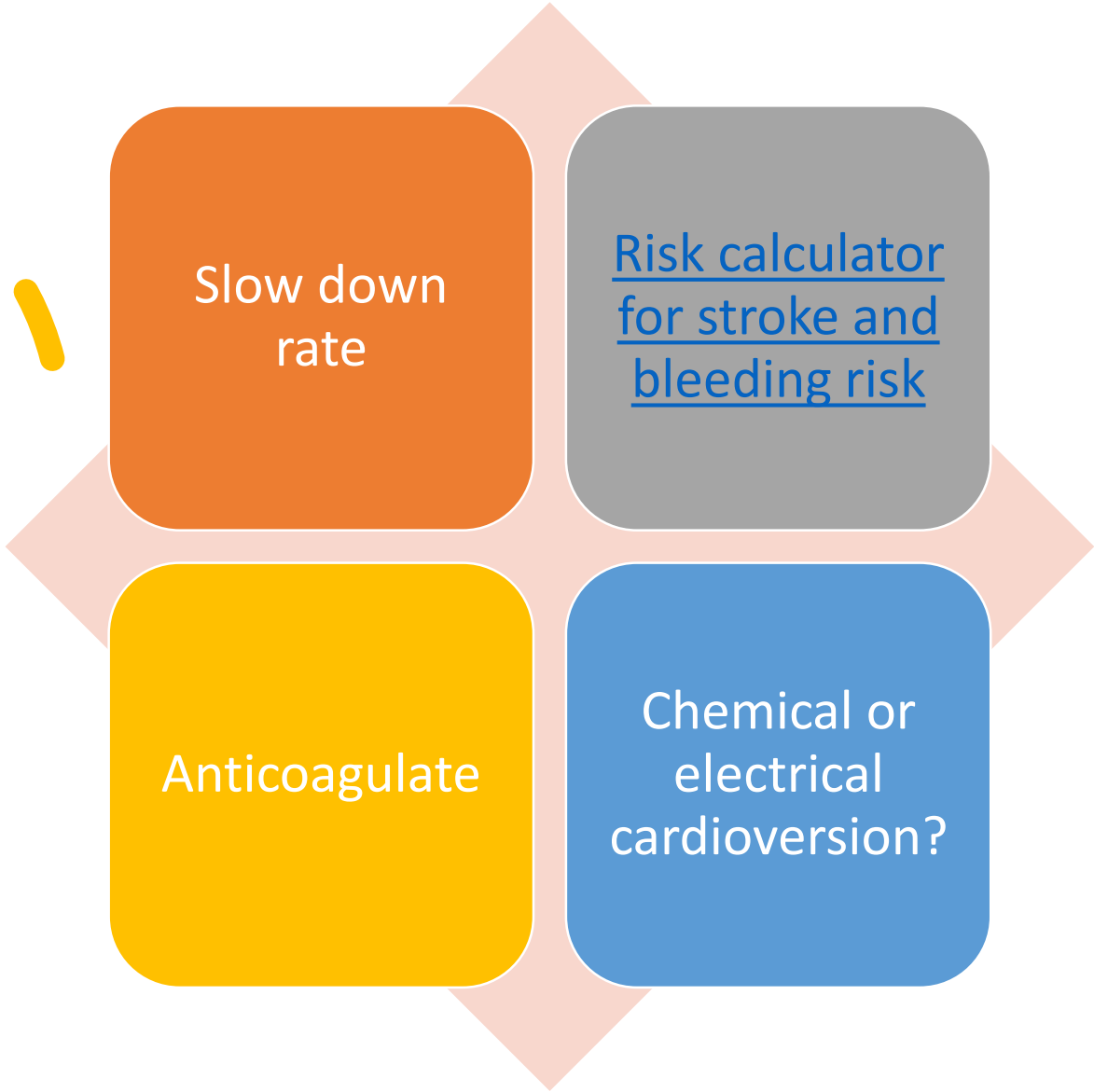
Ext: 2+ distal pulses without edema

Skin: warm and dry, no cyanosis , rashes or lesions.

Case 1



Approach to treatment



Should I recommend ablation?

Focus of Treatment

- Early rhythm control
- Maintain sinus rhythm
- Minimizing burden of atrial fib

Case 2

HPI: 71 yo female discharged to long term care after recent hospitalization. She has a h/o Parkinsonism, OSA, Htn and heart failure with EF 30% and new onset paroxysmal atrial fibrillation. S/P recent hospitalization fluid overload in the setting of paroxysmal atrial fib. She spontaneously converted to sinus rhythm 48 hrs prior to discharge.

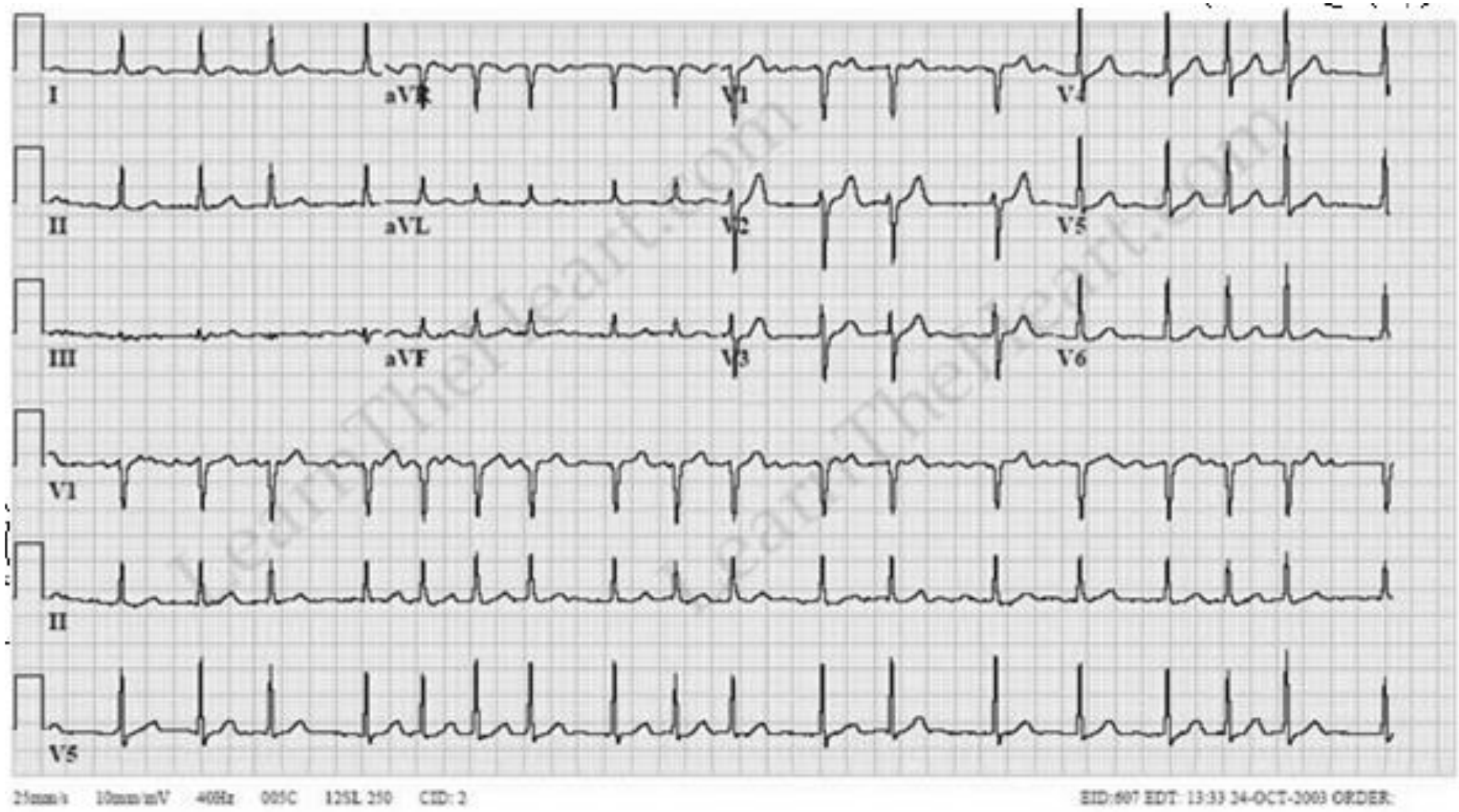
Meds:

- Metoprolol Succinate, Furosemide, Sinemet, Lisinopril, Warfarin, Spironolactone, Peri-colace

Case 2

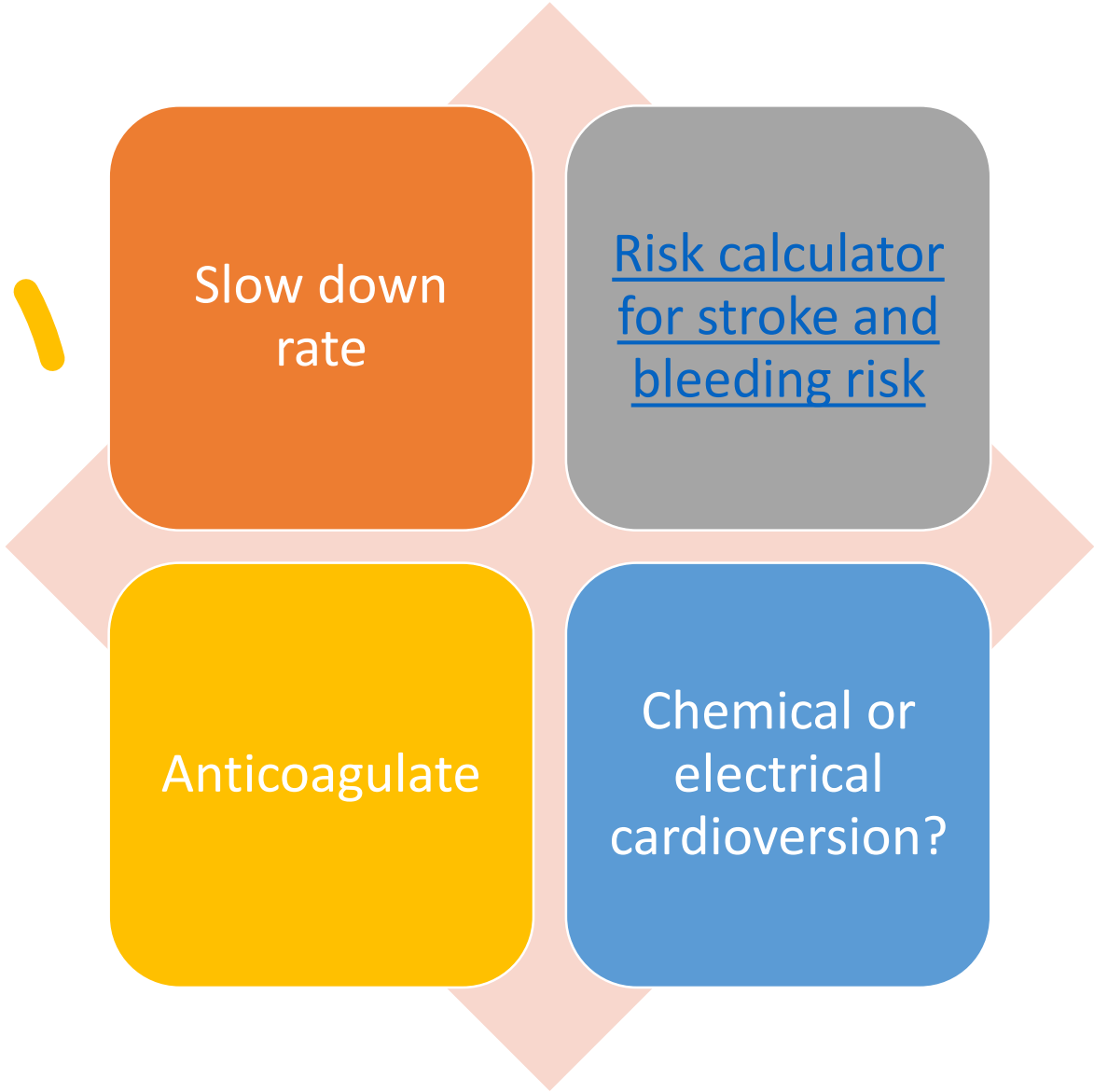
- PE: 104/86 HR 96 RR 14 O2 sat 99%
- General : frail appearing older African American female in NAD.
- HEENT: head normocephalic. Conjunctiva pink, sclera anicteric. Mucous membranes moist. Neck veins slightly elevated 2cm above the clavicle. 2+carotids without bruits.
- Chest: Lungs without crackles or wheezes.
- Cardiac: Rapid irregular rate and rhythm. Normal S1 S2, 3/6 holosystolic murmur.
- Abdomen: soft, NT, + bowel sounds, without hepatomegaly
- Ext: 2+ distal pulses with trace pitting edema
- Skin: warm and dry, no cyanosis , rashes or lesions.

EKG



http://www.learntheheart.com/AtrialFibrillation.html

Respond (treatment)



Mobile Health

Wearable sensors

Applications

Useful for

Early detection

Paroxysmal episodes

Challenges

Overdiagnosis

Overtreatment

Mobile Health devices

Mobile phones are ubiquitous

Consider as a cost-effective method of screening high risk individuals

User experience is straightforward

Accuracy compared to gold standard 12 lead EKG is still being studied

Mobile health

Event monitor

Holter monitor

Mobile devices

12 lead ECG

Single lead ECG

Direct or indirect heart rate monitor

Patch

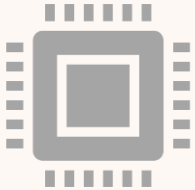
https://mhealth.jmir.org/2019/6/e13641/

Detection using a wearable

Sensor in back of watch and in digital crown

Monitors heart rate

Allows user activation



AliveCor

Two fingers on the electrodes fixed to a small plastic plate transmit to phone or computer

High sensitivity and specificity

Less accurate in children, elite athletes and hospitalized older adults

KardiaBand

Worn on wrist in combination with Apple Watch

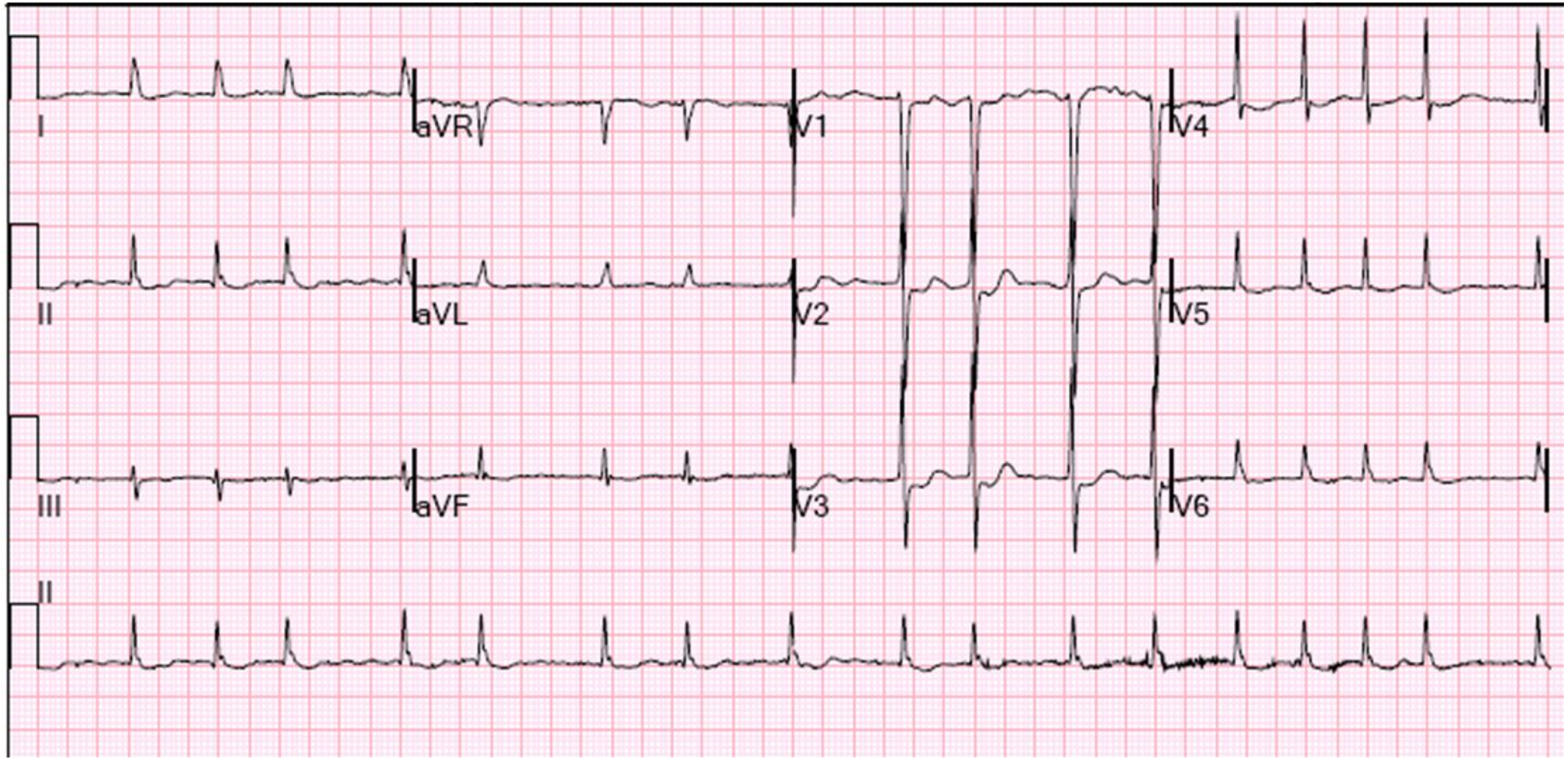
Case 3

Patient advice message:

- 54 yo male with a h/o:
  - Sleep disordered breathing and BMI>40
  - + Family history of atrial fibrillation

- Has had a “few” episodes of palpitations recently
- Purchased a mobile device with an option to transmit 12 lead EKG

Case 3



Next steps for this patient

Office visit vs. phone followup

Diagnostics

- EKG
- Event monitor

Anticoagulate or not?

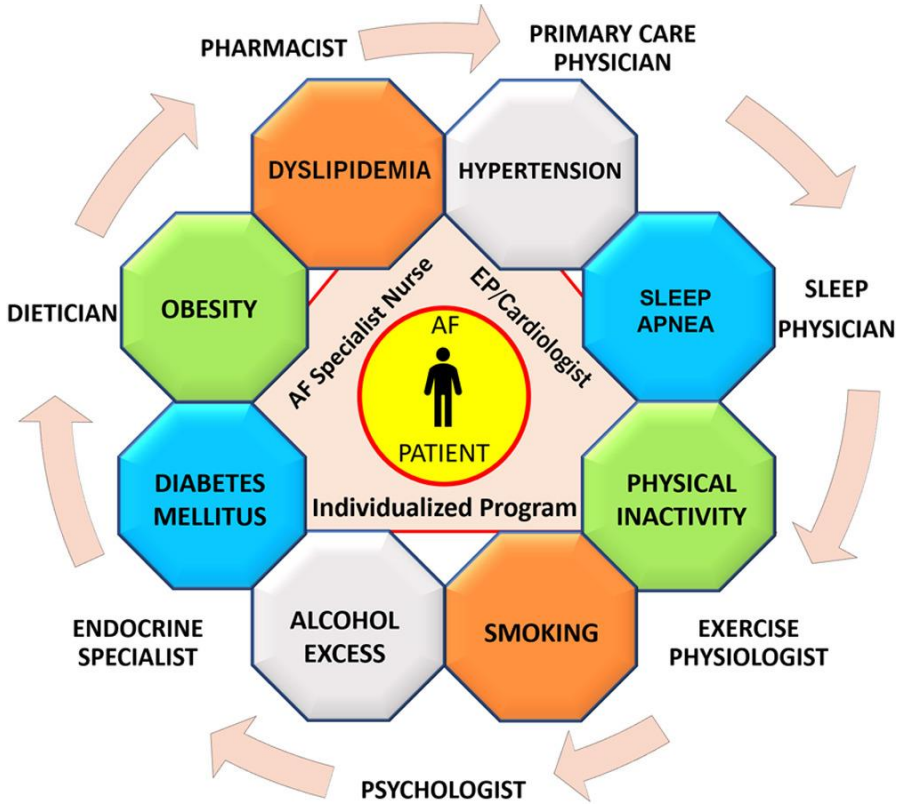
Shared decision-making

- Discussion between patient and clinician to address goals of treatment
- Relevant to anticoagulation discussion
- Clinical trials with heterogenous results on adherence and outcomes
- Shared Decision-Making for Atrial Fibrillation (SDM4AFib) trial
  - No significant effect on clinical safety outcomes or treatment decisions.

Shared decision-making

- Stroke and bleeding risk calculator
- Factors included:
  - Age, gender
  - H/o Heart failure, HTN, DM
  - H/o Stroke, TIA, MI or plaque

  - If Yes, prompted to answer additional questions
    - Dialysis or abnormal kidney function
    - Abnormal liver function or liver disease
    - Elevated INR
    - Major bleeding requiring blood transfusion or hospital
    - Taking NSAID or antiplatelet medications
    - Alcohol use > 8 glasses/week



Mina K. Chung. Circulation. Lifestyle and Risk Factor Modification for Reduction of Atrial Fibrillation: A Scientific Statement From the American Heart Association, Volume: 141, Issue: 16, Pages: e750-e772, DOI: (10.1161/CIR.0000000000000748)

Summary

Atrial fibrillation is highly prevalent in the global population

Risk factor modification should focus on prevention of afib

Effective management of co-morbidities is essential

Use scoring tools to stratify risks vs benefits of anticoagulation

Consider treatment options for both rate and rhythm control

Use shared decision-making approach

Key References

- Fox KAA, Lucas JE, Pieper KS, Bassand J-P, Camm AJ, Fitzmaurice DA, Goldhaber SZ, Goto S, Haas S, Hacke W, Kayani G, Oto A, Mantovani LG, Misselwitz F, Piccini JP, Turpie AGG, Verheugt FWA, Kakkar AK. Improved risk stratification of patients with atrial fibrillation: an integrated GARFIELD-AF tool for the prediction of mortality, stroke and bleed in patients with and without anticoagulation. BMJ Open 2017;7.

- Joglar, J. et al. 2023 ACC/AHA/ACCP/HRS Guideline for the Diagnosis and Management of Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. Circulation. 2024; 149e-e156. https://doi.org/10.1161/CIR.0000000000001193

Questions-Margaret.bowers@duke.edu

Personal Photo M. Bowers