Inpatient Management of Atrial Fibrillation & Flutter

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Clinical Cardiac Electrophysiology,
Mercy Clinic Heart and Vascular

Missouri Chapter of the ACP
St. Louis Union Station
September 15, 2002

Mercy

Your life is our life's work.

Disclosures

- No relevant disclosures

Outline/Goals

- **Introduction/Diagnosis**
- **Management**
  - Unstable and stable rhythms
  - Methods for stroke risk reduction
  - Rate vs. rhythm control
  - Inpatient/outpatient management
- **Multidisciplinary team approach**

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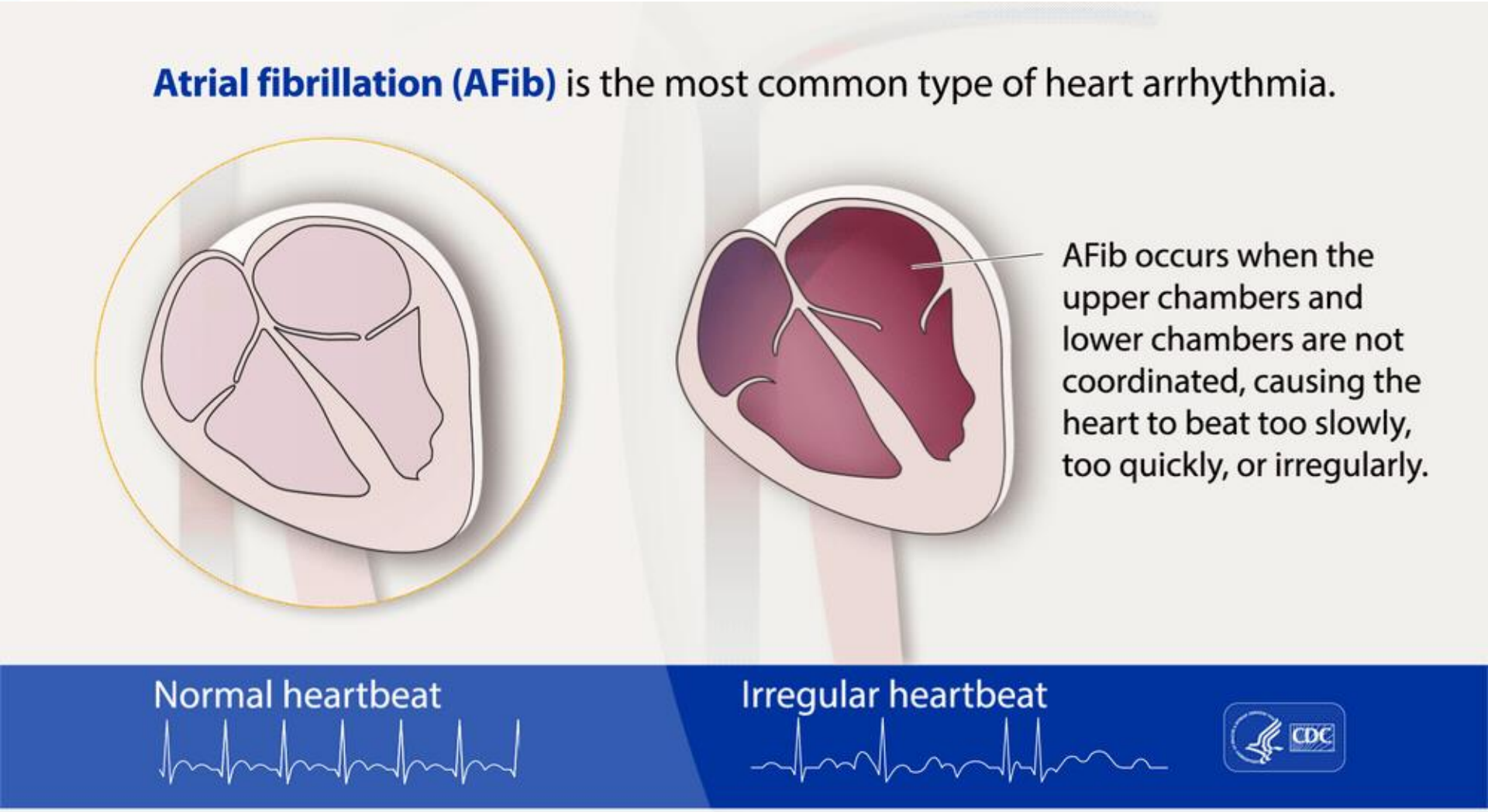
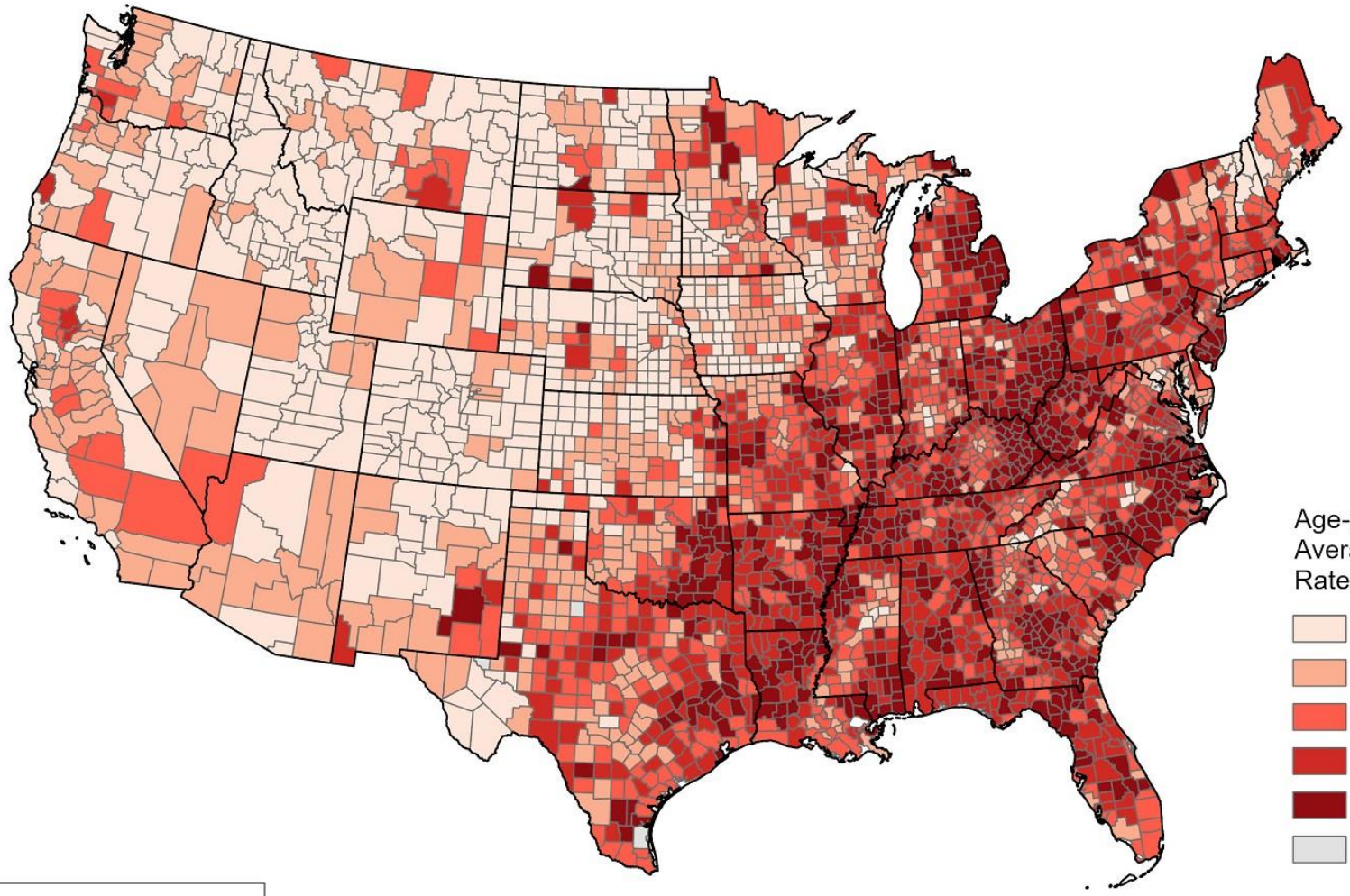
What is atrial fibrillation?



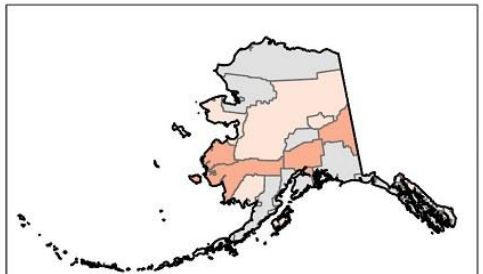
https://www.cdc.gov/heartdisease/images/AFib-Animation.gif

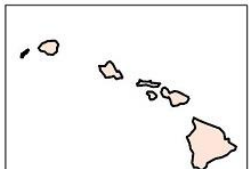
Heart Disease Hospitalization Rates, 2017 - 2019
All Medicare Beneficiaries, Ages 65+, by County



Age-Adjusted Average Annual Rates per 1,000

- 7.9 - 32.0
- 32.1 - 41.0
- 41.1 - 47.7
- 47.8 - 54.6
- 54.7 - 102.5
- Insufficient Data

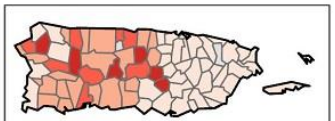




Guam

Northern Mariana

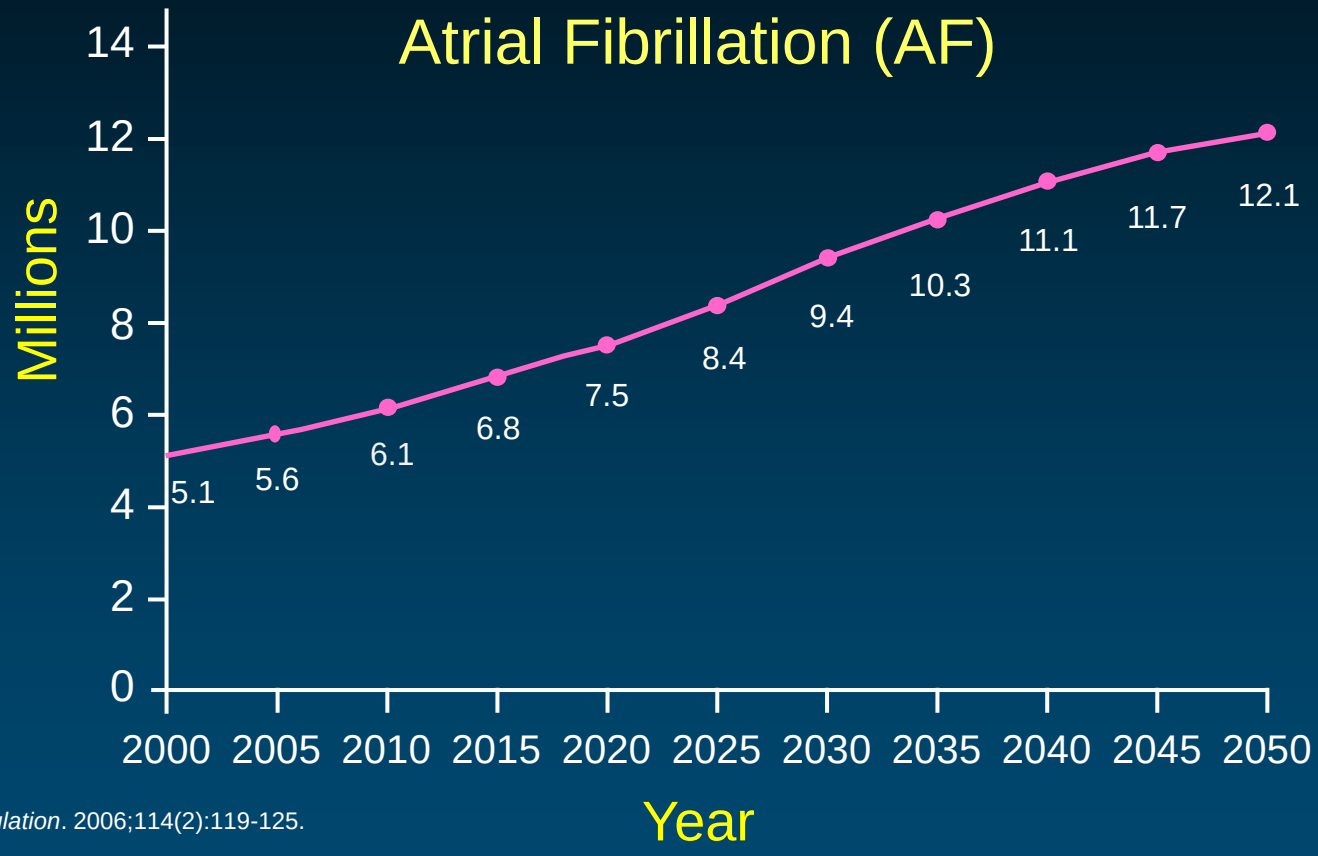
American Samoa



US Virgin Islands

Data source and methodology found at: www.cdc.gov/dhdsp/maps/atlas/statistical-methods

Projected Number of Patients with Atrial Fibrillation (AF)

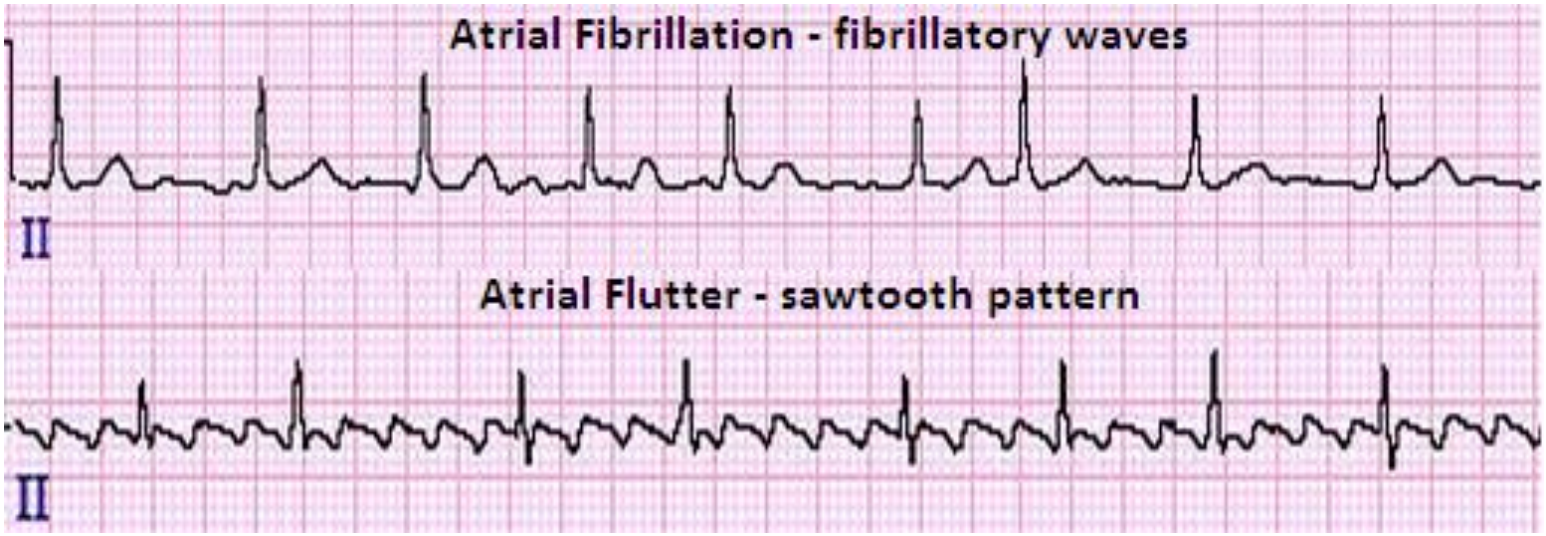


Miyasaka Y, et al. *Circulation*. 2006;114(2):119-125.

Diagnosis

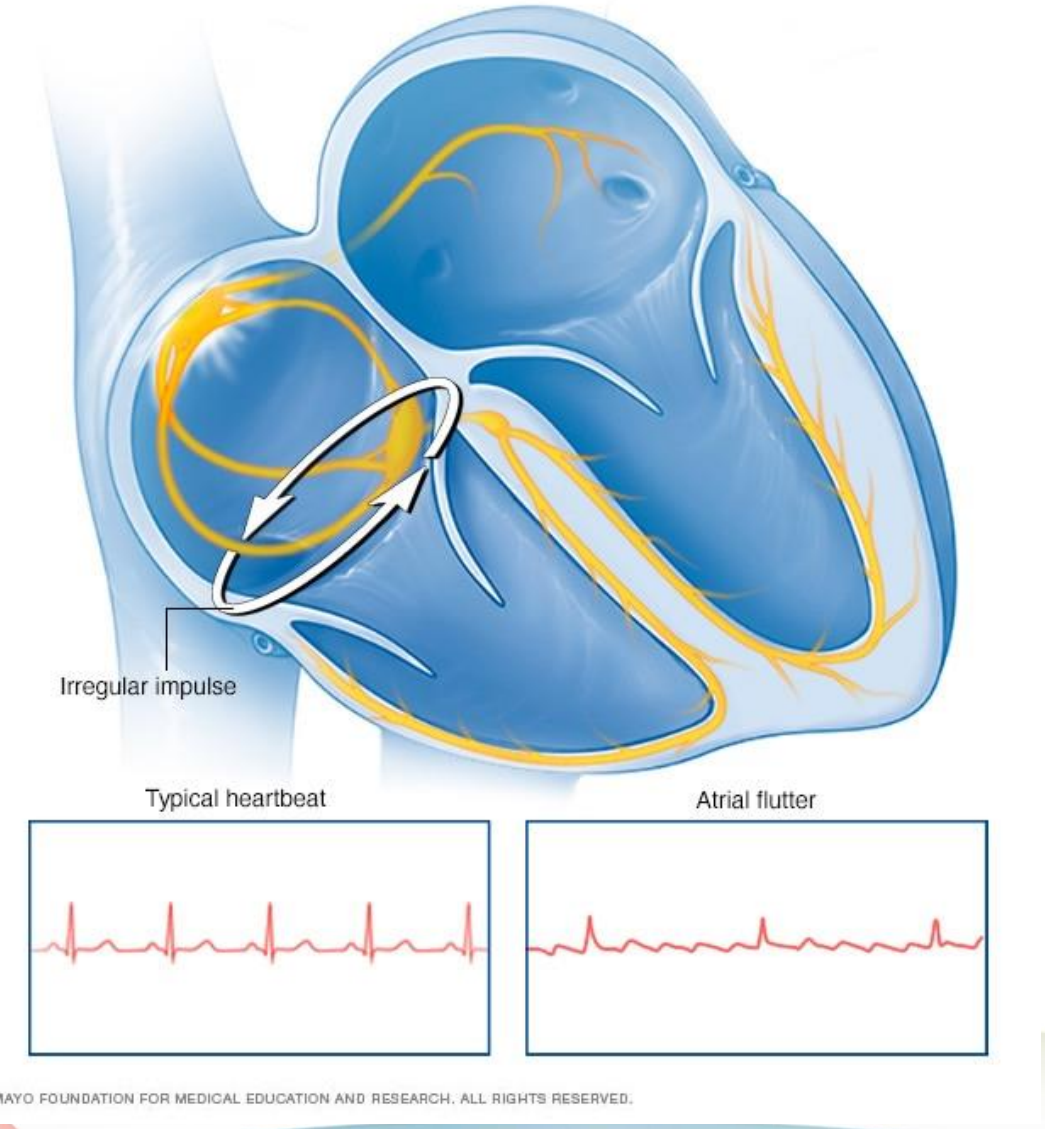
- Physical Exam
- Electrocardiogram
- Labs: CBC, BMP, TSH, cardiac markers
- Imaging: CXR, TTE
- Continuous telemetry monitoring

Diagnosis



www.Healio.com

Diagnosis


Irregular impulse
Typical heartbeat
Atrial flutter
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Diagnosis

- Types of atrial fibrillation:
  - **Paroxysmal** – self-terminating, episodes generally last 7 days or less
  - **Persistent** – not self-terminating, episodes lasting longer than 7 days (requiring DCCV)
  - **Long-standing persistent** – continuous Afib lasting > 1 year
  - **Permanent** – rhythm control interventions are not pursed

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UNSTABLE AND STABLE RHYTHMS

Unstable and Stable Rhythms

- **Unstable atrial fibrillation or atrial flutter:**
  - Begin resuscitation and consider other conditions contributing to instability
  - If instability is due to AF/AFL, direct current cardioversion (DCCV)

Unstable and Stable Rhythms

- **Decompensated HFrEF**
  - *Without signs of systemic hypoperfusion*
    - Continue their home beta-blocker
  - *With signs of systemic hypoperfusion*
    - Should not be treated with negative inotropes
  - *Tolerate tachycardia while treating the underlying heart failure*
    - Most appropriate for patients without severe tachycardia
    - Digoxin
    - If already taking antiarrhythmic drugs, early EP consult

Unstable and Stable Rhythms

- **Stable arial fibrillation/flutter (immediate inpatient concerns)**
  - Paroxysmal atrial fibrillation/flutter is associated with increased cardioembolic stroke
  - DCCV
    - Candidates for DCCV, treated with immediate anticoagulation
    - NOT candidates for DCCV usually do not require immediate anticoagulation

STABLE AFIB/FLUTTER

- Treatment of underlying conditions
- Consideration of an accessory pathway
- Control of heart rate
- Consideration of rhythm control
- Anticoagulation
- Subspecialty consultation as needed
- Discharge planning and follow-up

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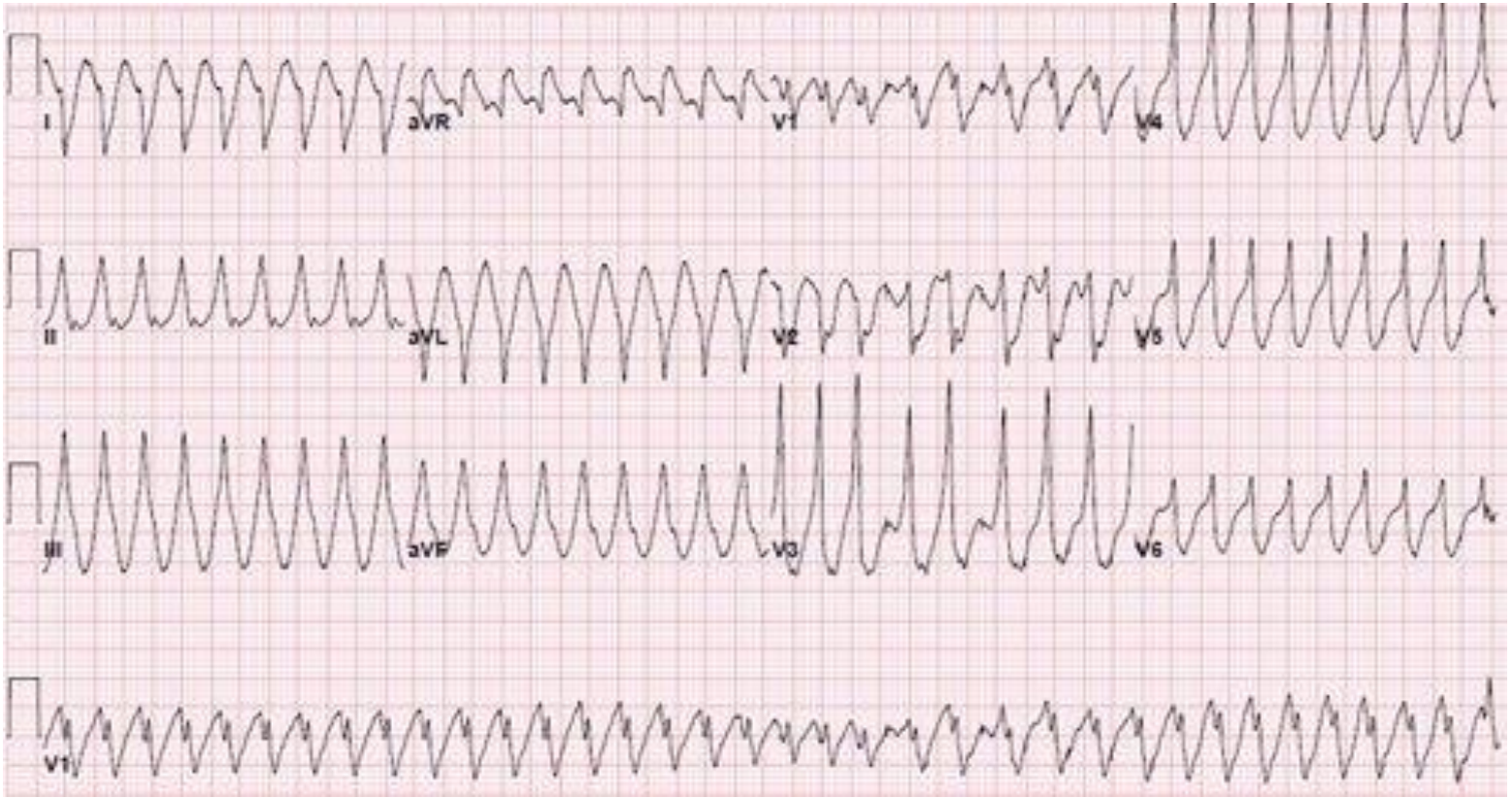
Will you make a fatal mistake?



https://www.healio.com

AFIB WITH PRE-EXCITATION

Urgent electrophysiology consultation!

AFIB WITH PRE-EXCITATION

- Drugs contraindicated:
  - Digoxin, non-dihydropyridine calcium channel antagonists
  - Beta-blockers
- DCCV/procainamide

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RATE CONTROL

- Control symptoms
- Rate control via oral medications:
  - **Asymptomatic/mildly symptomatic** - Doses of metoprolol tartrate and short-acting diltiazem can be increased every 4-6 hours
  - **Highly symptomatic** – intermittent IV injections
  - **Continuous IV medications** reserved for situations where oral and intermittent IV fail to control heart rate/symptoms

RATE CONTROL IN HEART FAILURE

- Beta-blockers and non-dihydropyridine calcium channel-blockers are **contraindicated** in decompensated HFrEF
- Beta-blockers can be initiated in compensated patients
- Digoxin can be considered
- Cardiology consultation recommended

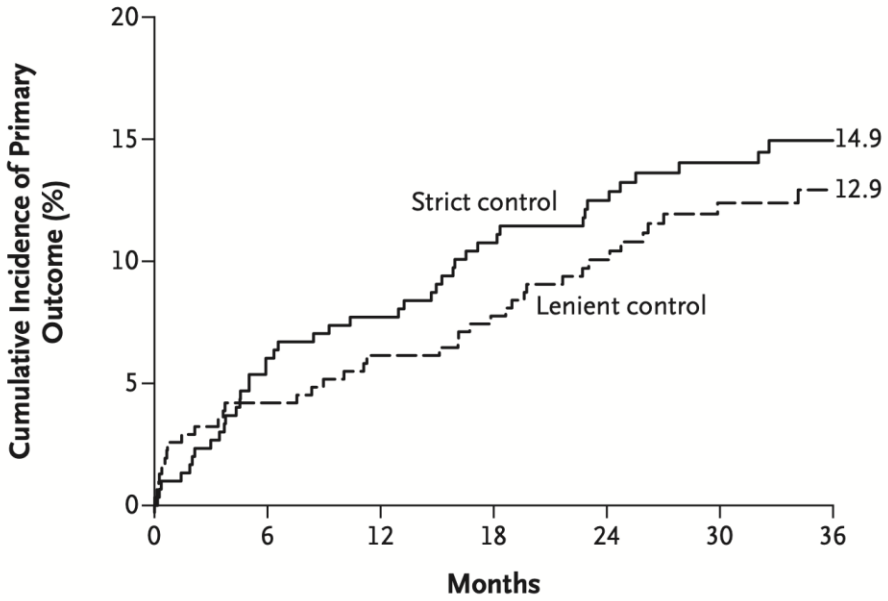
ADEQUATE RATE CONTROL ON DISCHARGE?

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 APRIL 15, 2010 VOL. 362 NO. 15

Lenient versus Strict Rate Control in Patients with Atrial Fibrillation

Isabelle C. Van Gelder, M.D., Hessel F. Groenveld, M.D., Harry J.G.M. Crijns, M.D., Ype S. Tuininga, M.D., Jan G.P. Tijssen, Ph.D., A. Marco Alings, M.D., Hans L. Hillege, M.D., Johanna A. Bergsma-Kadijk, M.Sc., Jan H. Cornel, M.D., Otto Kamp, M.D., Raymond Tukkie, M.D., Hans A. Bosker, M.D., Dirk J. Van Veldhuisen, M.D., and Maarten P. Van den Berg, M.D., for the RACE II Investigators*



No. at Risk

Strict control	303	282	273	262	246	212	131
Lenient control	311	298	290	285	255	218	138

Figure 2. Kaplan–Meier Estimates of the Cumulative Incidence of the Primary Outcome, According to Treatment Group.

The numbers at the end of the Kaplan–Meier curves are the estimated cumulative incidence of the primary outcome at 3 years.

ADEQUATE RATE CONTROL

- Resting heart rate:
  - **Asymptomatic**: <110 bpm
  - **Symptomatic**: <80 bpm
- Based on RACE II Trial, treatments to achieve strict rate control <80 bpm at rest or 110 during 6-minute walk is not beneficial in those with normal LVEF (Van Gelder et al, 2010).

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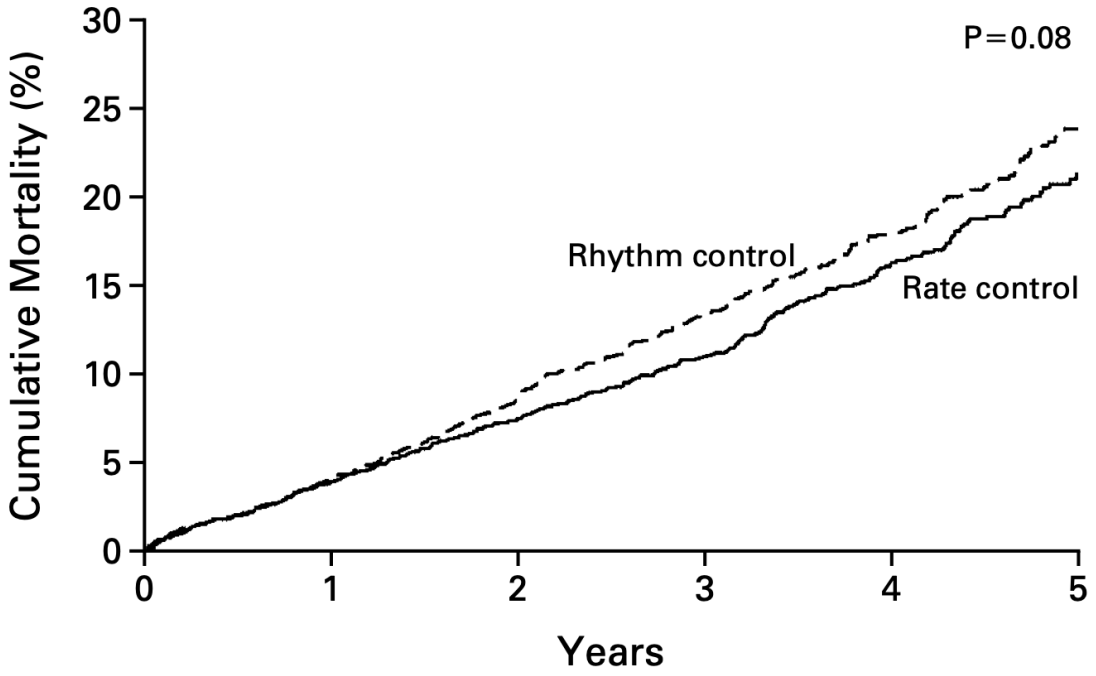
RHYTHM CONTROL

- Goal is to return patient to normal sinus rhythm
- Typically done via DCCV (includes antiarrhythmic drugs and ablation)
- Rhythm-control is most strongly indicated in hospital patients who are unstable because of atrial fibrillation/flutter

No convincing evidence that a rhythm-control strategy is associated with a morbidity/mortality benefit compared to a rate-control strategy

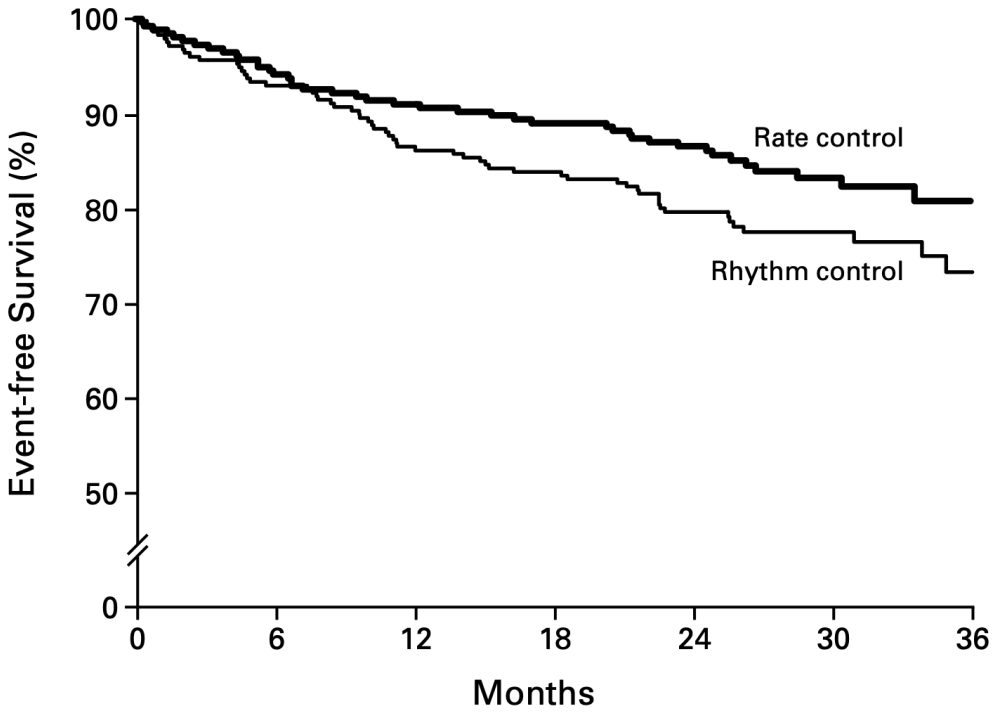


No. of Deaths		number (percent)				
Rhythm control	0	80 (4)	175 (9)	257 (13)	314 (18)	352 (24)
Rate control	0	78 (4)	148 (7)	210 (11)	275 (16)	306 (21)

Figure 1. Cumulative Mortality from Any Cause in the Rhythm-Control Group and the Rate-Control Group.

Time zero is the day of randomization. Data have been truncated at five years.

AFFIRM Trial (Alshansky, 2004)

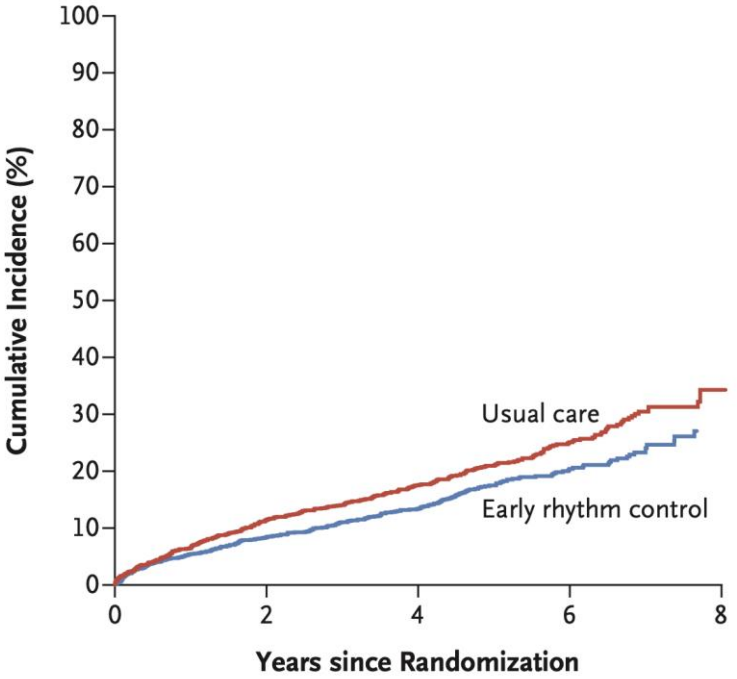


No. at Risk							
Rate control	256	239	232	222	212	99	25
Rhythm control	266	243	224	218	207	85	24

Figure 2. Kaplan–Meier Curves for Event-free Survival in the Rate-Control and Rhythm-Control Groups.

RACE Trial (Gelder, 2002)

- **EAST-AFNET 4 Trial** (Kirchhof, 2020)
  - Compared rhythm vs. rate control in patients with recently diagnosed first-onset atrial fibrillation (within 12 months)
  - Demonstrated a lower risk for cardiovascular death and stroke in rhythm control group



No. at Risk					
Usual care	1394	1169	888	405	34
Early rhythm control	1395	1193	913	404	26

Figure 2. Aalen–Johansen Cumulative-Incidence Curves for the First Primary Outcome.

The first primary outcome was a composite of death from cardiovascular causes, stroke, or hospitalization with worsening of heart failure or acute coronary syndrome.

EAST-AFNET 4 Trial (Kirchhof, 2020)

RHYTHM CONTROL

- For inpatients, the main indications for an immediate rhythm control strategy remain:
  - The inability to achieve adequate HR control with medications
  - The inability to medically control the patient's symptoms

RHYTHM CONTROL

- Antiarrhythmic drugs:
  - Amiodarone, dronedarone
  - Dofetilide, sotalol
  - Flecainide, propafenone
- Cardiology/EP consultation

PRE DCCV MANAGEMENT

- Evaluation of other comorbids
  - Acute ischemic (acute coronary syndrome)
  - Congestive heart failure
  - Other complex cardiac diseases (severe aortic stenosis, other significant valvular disease, moderate to severe pulmonary HTN, etc). Call cardiology.

PRE DCCV MANAGEMENT

- Rule out left atrial appendage thrombus
  - Typically done with TEE but cardiac CT can also be considered
- DCCV can be done WITHOUT TEE if:
  - The patient has been therapeutically anticoagulated for at least 4 weeks
  - Afib/flutter was new in onset and the episode started within 48 hours of time that the DCCV will be done

DCCV AND ANTICOAGULATION

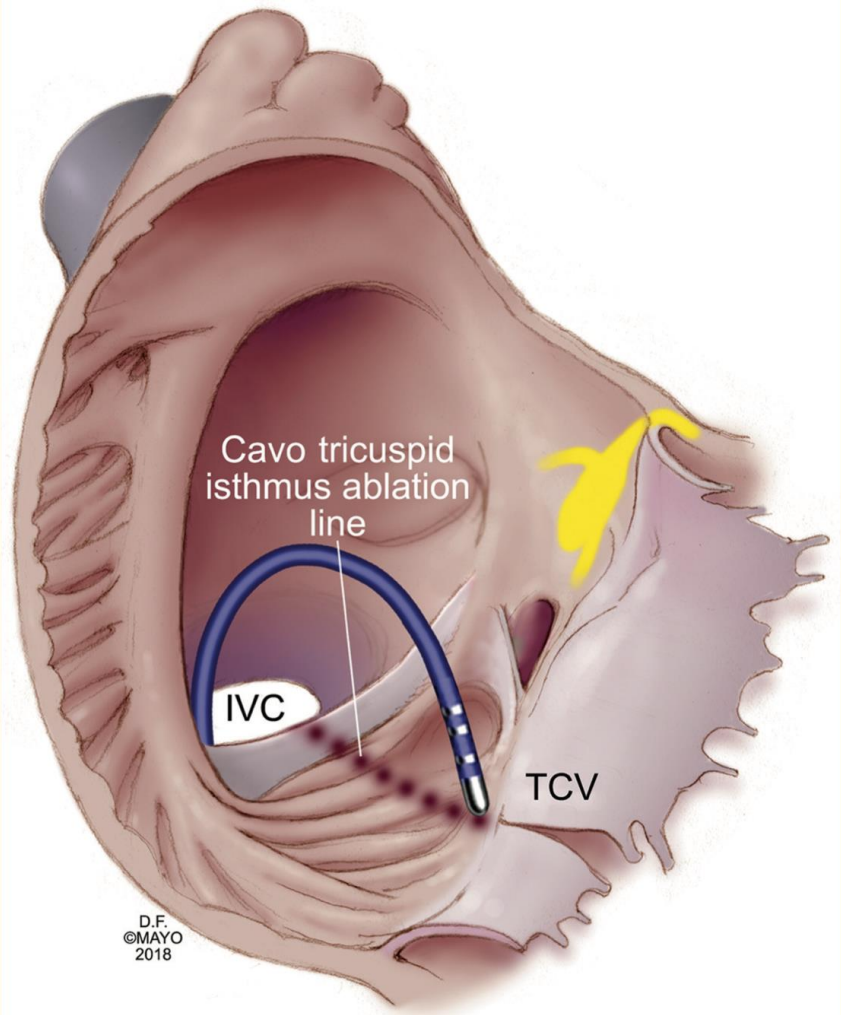
- 4 weeks of uninterrupted anticoagulation post-DCCV
  - Patients who are cardioverted within 48 hours of onset of afib/flutter with CHAD2S2-VASc score of 0 in men or 1 in women may not require post-DCCV anticoagulation
  - DOACs are preferred

SPONTANEOUS CONVERSION

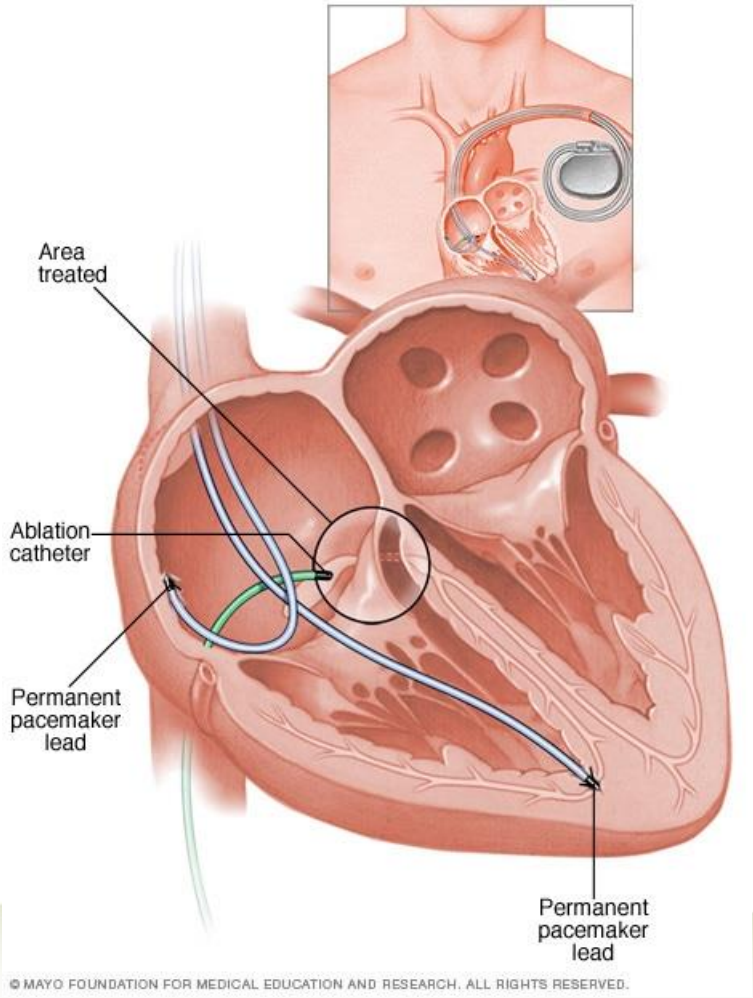
- Consider
  - Anticoagulation
  - Oral rate control agent
  - Event monitor on discharge
  - Should have EP followup on discharge

CARDIAC ABLATIONS

ABLATION – ATRIAL FLUTTER



ABLATION – AV NODE



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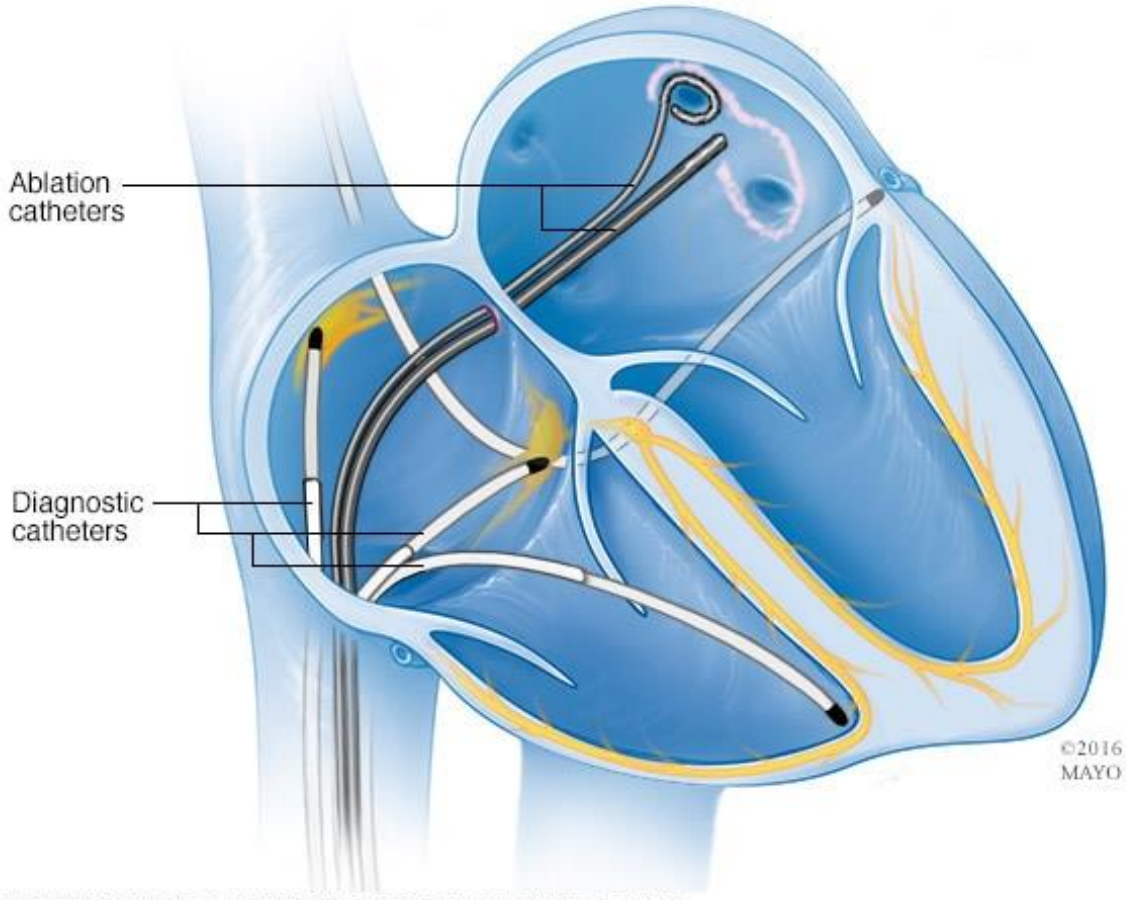
ABLATION – PULMONARY VEIN ISOLATION



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STABLE AFIB/FLUTTER

- Treatment of underlying conditions
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ANTICOAGULATION

- Acute anticoagulation with cardioversion
- Acute anticoagulation of new-onset atrial fibrillation/atrial flutter without cardioversion
- Long-term anticoagulation

ANTICOAGULATION

- DOAC's (Direct Oral AntiCoagulant) are preferred agents
  - Unless moderate/severe mitral stenosis, mechanical heart valve, or inadequate renal function.
  - In these cases, warfarin-based regimen is usually preferred.
- When prescribing anticoagulants, always consider the patient's bleeding risk
- If the patient has a contraindication to anticoagulation, or opts out of this therapy, this should be documented in detail in the medical record.

SPECIAL CONSIDERATIONS

- Consider neurology consultation prior to initiation of anticoagulation for patients with recent ischemic stroke within the prior two weeks
- When starting anticoagulants, consider discontinuing antiplatelet medications if they are prescribed for primary prophylaxis, or secondary prophylaxis of stable disease (e.g., no ACS or stent placement within the last year).
- *Moderate or severe mitral stenosis in a native valve, DOAC use is off-label*

BRIDGING

- DOAC – initiation of DOAC results in almost immediate anticoagulation (over the course of hours) so bridging is not necessary
- If anticoagulated with warfarin, then bridging may be appropriate:
  - Expected to be treated with DCCV during index hospitalization
  - Moderate or severe mitral stenosis
  - Mechanical heart failures
  - History of ischemic stroke within the last 3 months

SPECIAL CONSIDERATIONS

- Bileaflet prosthetic valves in aortic position, bridging is considered optional
- Bridging considered in history of ischemic stroke > 3 months, CHA2DS2-Vasc > 6

ANTICOAGULATION

- Acute anticoagulation with cardioversion
- Acute anticoagulation of new-onset atrial fibrillation/atrial flutter without cardioversion
- Long-term anticoagulation

ANTICOAGULATION WITH DCCV

- If duration < 48 hours, then proceed with cardioversion
- If duration > 48 hours or duration is unknown, then TEE or CT guided DCCV
  - Alternatively, these patients may be maintained on therapeutic anticoagulation for minimum of three weeks prior to cardioversion

ANTICOAGULATION

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- Long-term anticoagulation

ANTICOAGULATION

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BLEEDING RISK

- Active or recent bleeding/known bleeding diathesis
- Recent trauma or surgery (<14 days for most surgeries or <1 month for neurosurgery)
- Thrombocytopenia (platelet count <50k)
- History of intracranial hemorrhage
- Known high-risk bleeding lesion (i.e. intracranial or spinal malignancy)

HAS-BLED score

Condition	Points
H - Hypertension	1
A - Abnormal renal or liver function (1 point each)	1 or 2
S - Stroke	1
B - Bleeding	1
L - Labile INRs	1
E - Elderly (> 65 years)	1
D - Drugs or alcohol (1 point each)	1 or 2

HAS-BLED score	Bleeds per 100 patient-years
0	1.13
1	1.02
2	1.88
3	3.74
4	8.70
5	12.5

Note: HAS-BLED has been validated for warfarin, but not for the new anticoagulants.

Pisters R et al. Chest 2010;138(5):1093-1100.

CHA2DS2-VASC SCORE & ANTICOAGULATION

C	Congestive heart failure (or Left ventricular systolic dysfunction)	1
H	Hypertension: blood pressure consistently above 140/90 mmHg (or treated hypertension on medication)	1
A_2	Age ≥75 years	2
D	Diabetes Mellitus	1
S_2	Prior Stroke or TIA or thromboembolism	2
V	Vascular disease (e.g. peripheral artery disease, myocardial infarction, aortic plaque)	1
A	Age 65–74 years	1
Sc	Sex category (female gender)	1

CHA_2DS_2-VASc Score	Stroke Risk (%/year)
0	0
1	1.3
2	2.2
3	3.2
4	4.0
5	6.7
6	9.8
7	9.6
8	6.7
9	15.2

2012 European Society of Cardiology AF Guidelines (John, 2012)

CHAD2DS2-VASC SCORE

- **No anticoagulation**: score 0 for men or 0-1 for women
- **Anticoagulation**: score >1 for men or > 2 for women

DOACS

- **Dabigatran** – Direct thrombin inhibitor
- **Rivaroxaban, apixaban, edoxaban** - Direct factor Xa inhibitors

DOAC

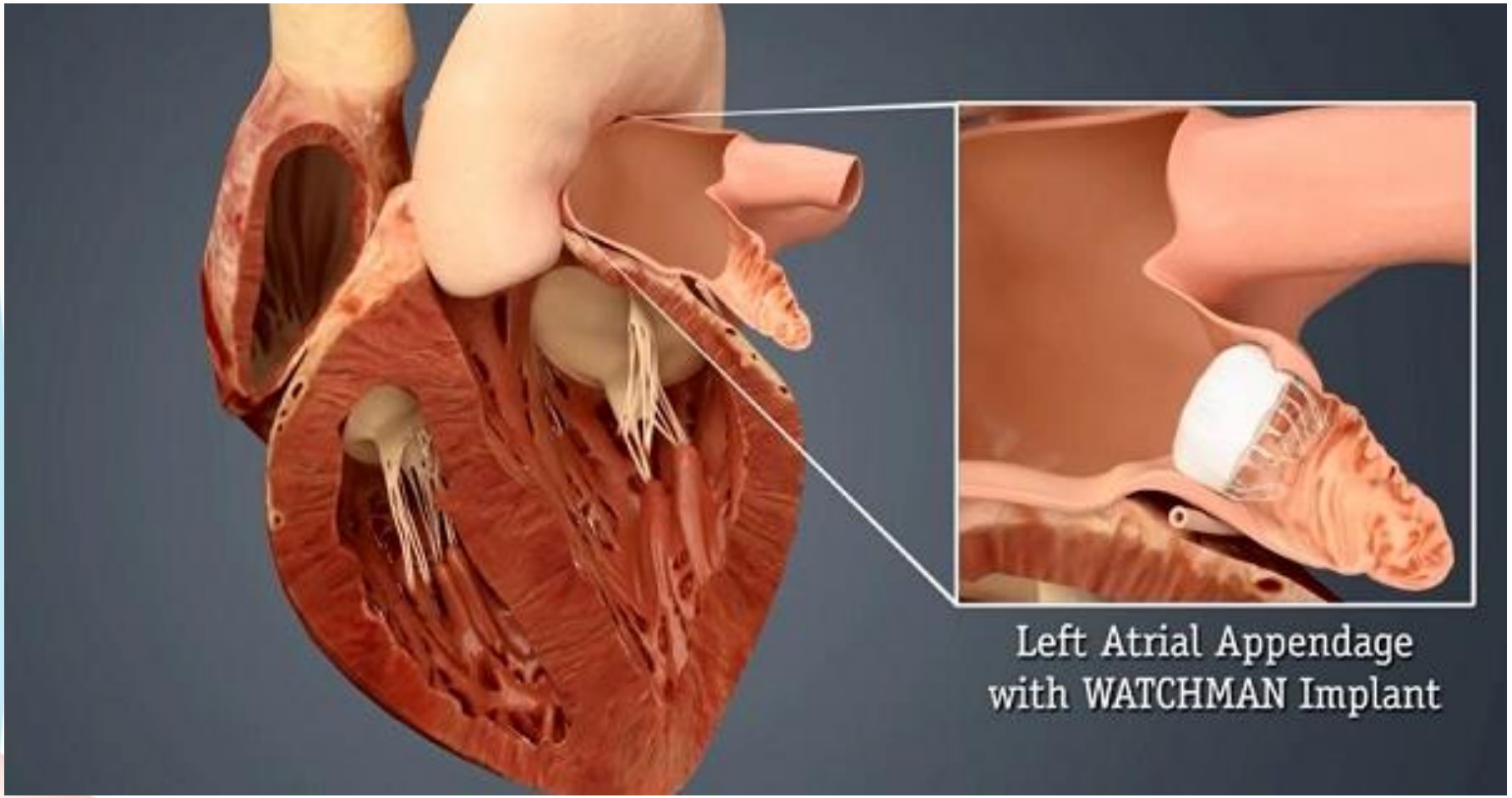
- Pharmacokinetics
  - P-glycoprotein interaction, CYP3A4 interactions with Rivaroxaban and Apixaban
- Aware of cost
  - They are not covered uniformly by all insurance companies
  - Determination of copayment should be done in conjunction with pharmacy and prior to discharge

ANTIPLATELET THERAPY

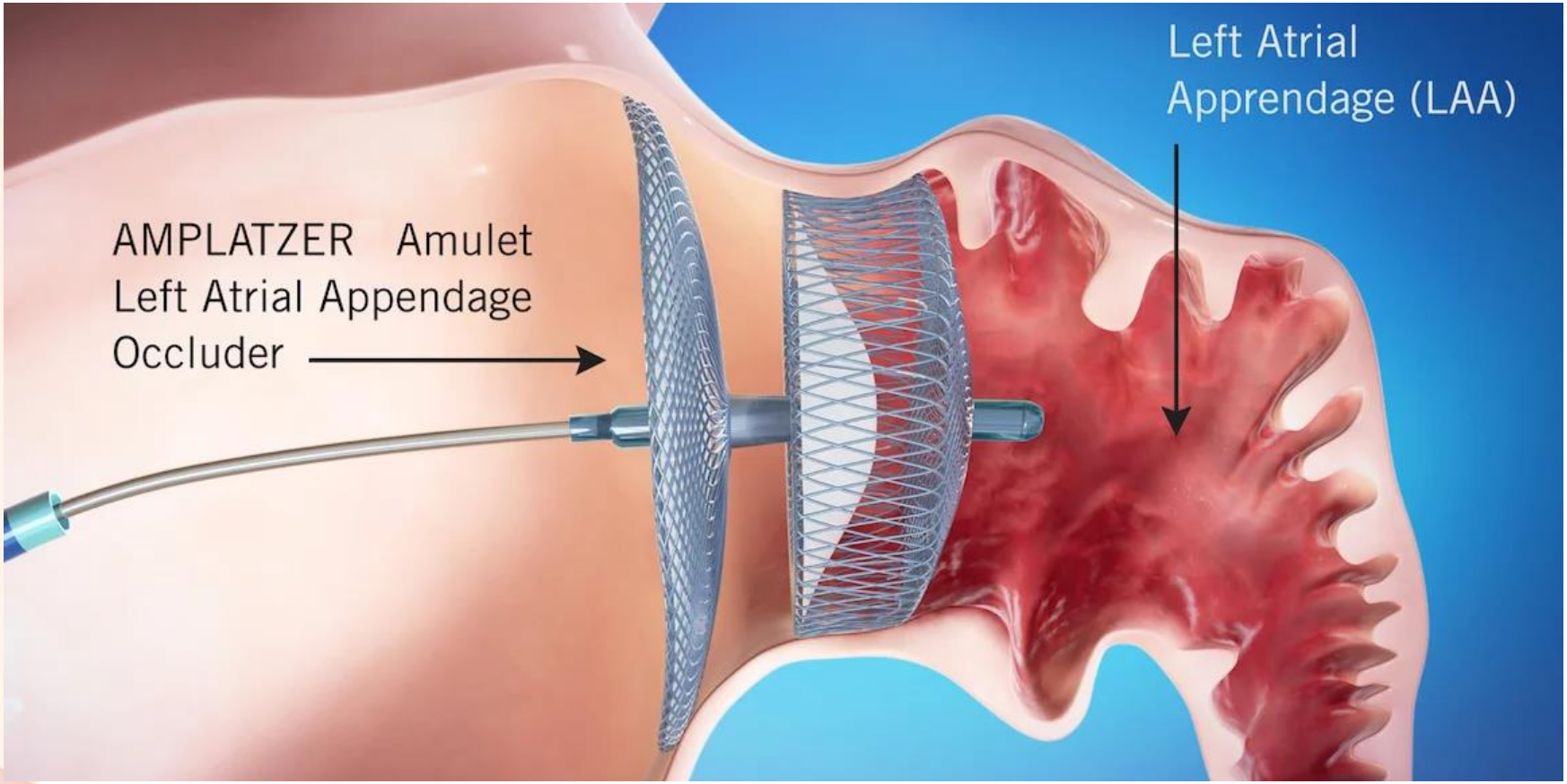
- If ACS in prior year without stent placement, then oral AC plus antiplatelet therapy (usually P2Y12 inhibitor)
- If ACS with stent placement, usually triple therapy with AC and dual-antiplatelets
  - Consult cardiology
- Aspirin is usually recommended with mechanical heart vales or bioprosthetic heart valves with additional risk factors
- If concurrent AC and antiplatelet therapy, consider proton pump inhibitor therapy

LEFT ATRIAL APPENDAGE OCCLUSION

- **Watchman device**
  - Oral anticoagulant and aspirin for 6 weeks (TEE) then transitioned to daily aspirin/plavix for 45 days then daily aspirin after (TEE)
- **Amplatzer Amulet**
  - No need for oral anticoagulation post implant



https://www.stamfordhealth.org/care-treatment/heart/watchman



https://www.dicardiology.com/content/fda-clears-abbott-amplatzer-amulet-laa-occluder-reduce-stroke-people-atrial-fibrillation

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- Treatment of underlying conditions
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SUBSPECIALTY CONSULTATION

- General cardiology – when atrial fibrillation is accompanied by other heart disease (i.e. acute ischemic, heart failure)
- Electrophysiology – questions about rhythm control

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DISCHARGE PLANNING

- Discharge followup:
  - Ensure appropriate heart rate control
  - Medication and symptom tolerance
  - Anticoagulation management
  - Insurance issues regarding DOAC, antiarrhythmics
  - Event monitor

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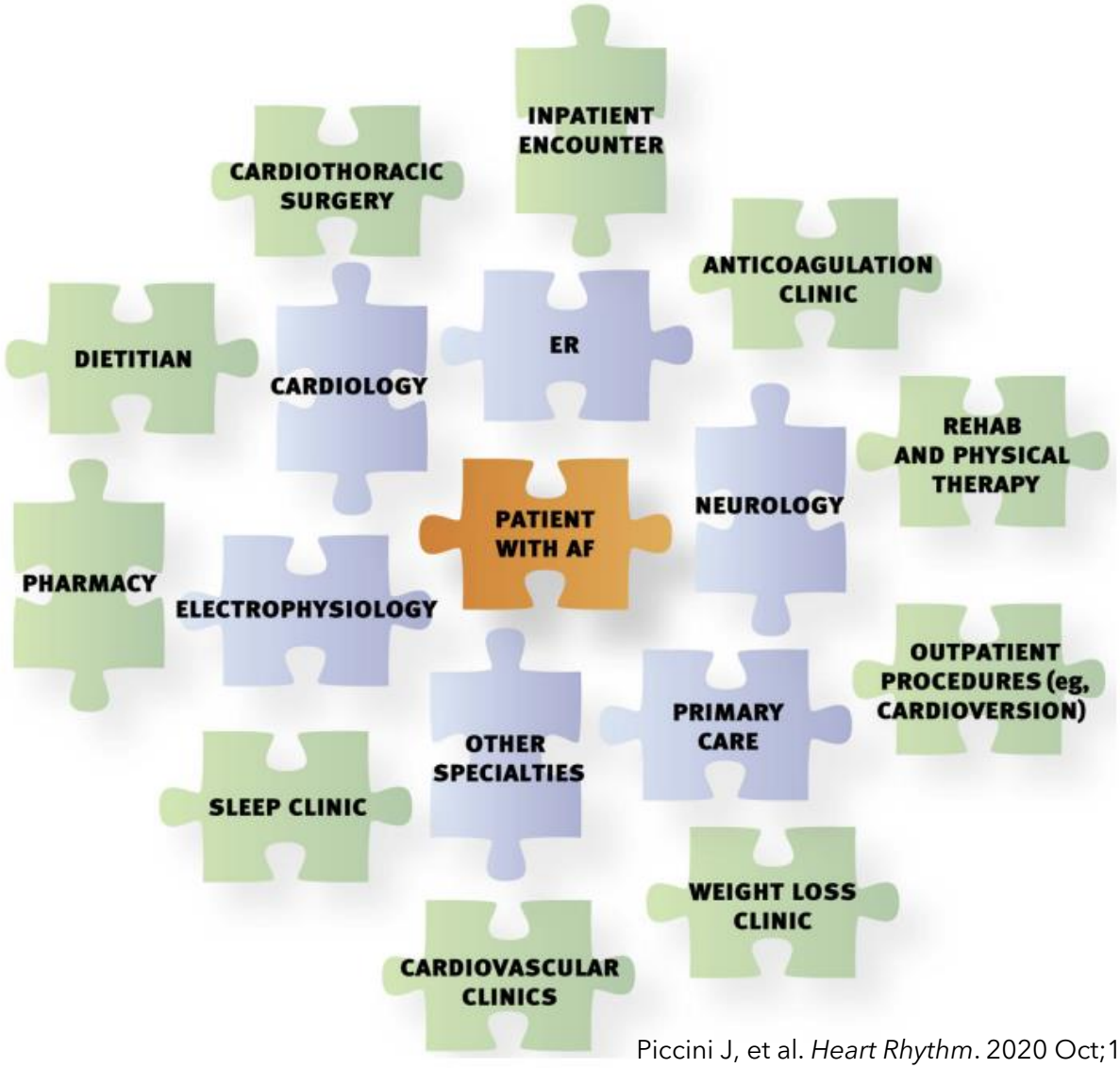

Piccini J, et al. *Heart Rhythm*. 2020 Oct;17(10):1804-1832

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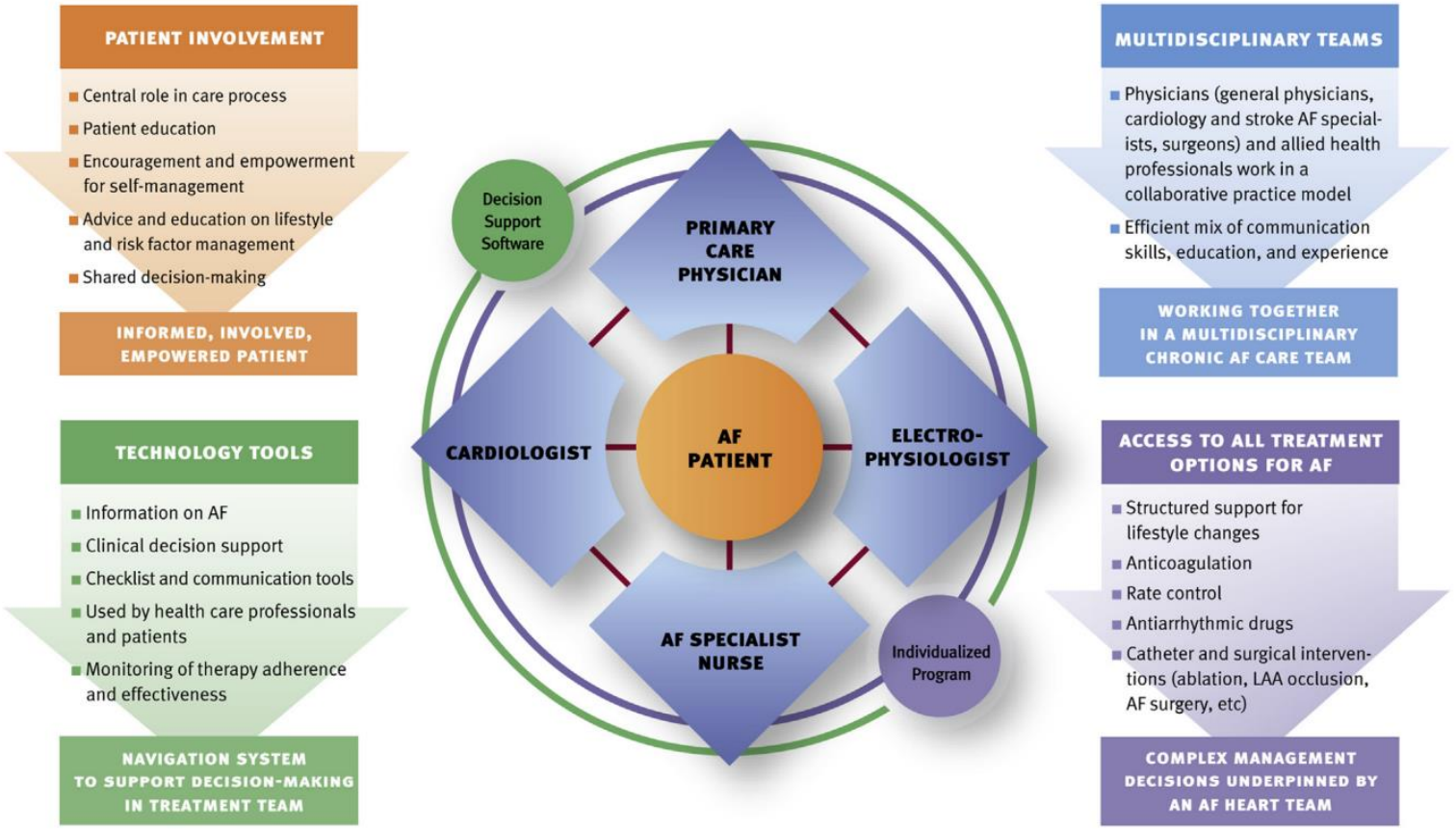

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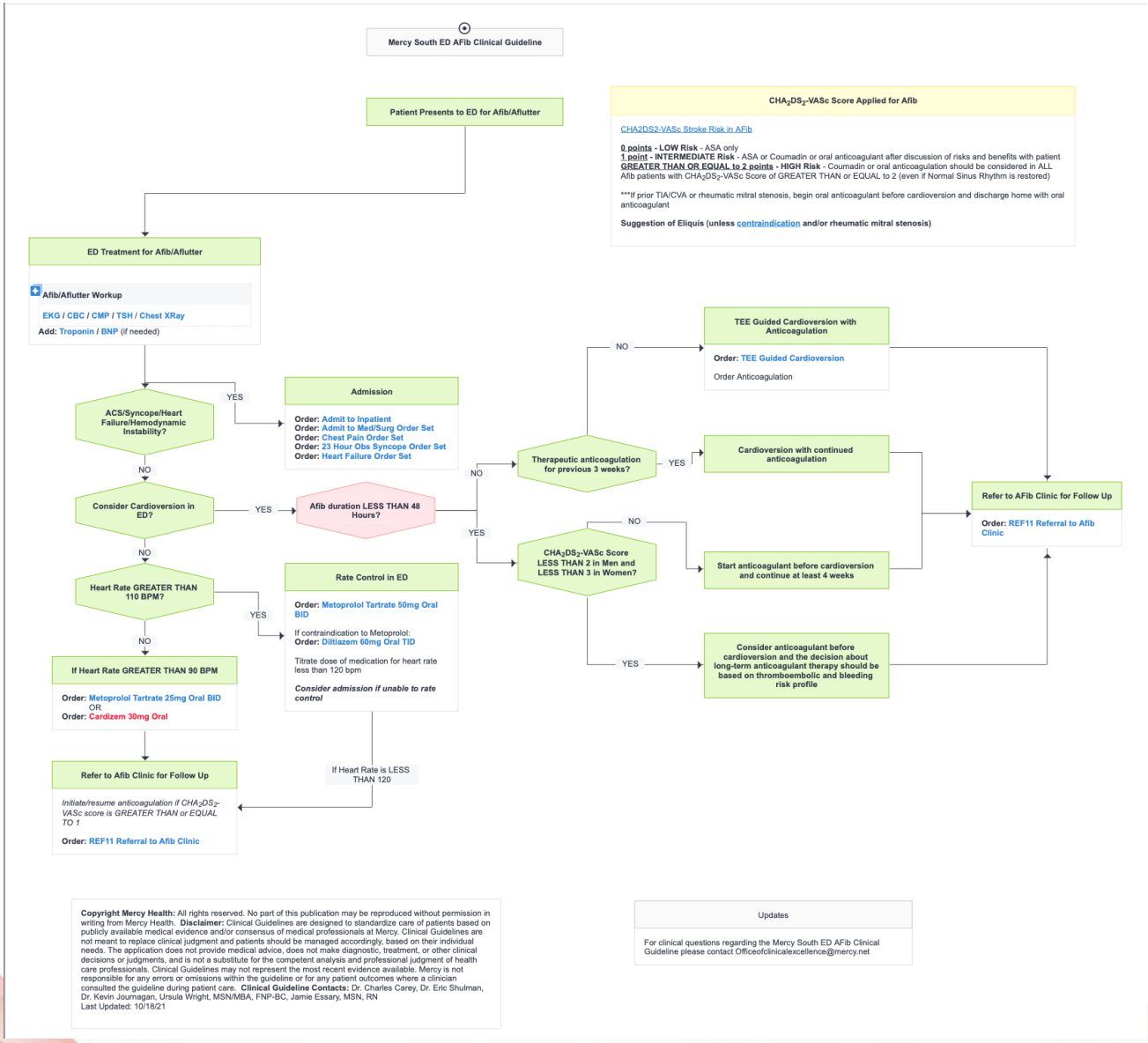

Mercy

Afib Clinic | Heart and Vascular

Provider Line Below or Epic Order -
REF11 Referral to Afib Clinic

Mercy Hospital South
referral line 314-880-6108

Thank you

Mercy

Your life is our life's work.

MercyIT

DABIGATRAN

- RE-LY trial compared dabigatran to warfarin (Connolly, 2009)
  - Dabigatran was superior to coumadin for reduction in stroke or systemic embolism with similar rate of bleeding
  - Life-threatening and intracranial bleeding was lower with dabigatran

RIVAROXABAN

- ROCKET-AF Trial (Patel, 2011)
  - Rivaroxaban was noninferior to warfarin for prevention of stroke or systemic embolism
  - Composite of major and non-major relevant bleeding events was similar
  - Intracranial and fatal bleeding was significantly lower in rivaroxaban group while gastrointestinal bleeding was higher
  - Within 30 days of stopping trial, increase in stroke and systemic embolism

APIXABAN

- ARISTOTLE Trial (Granger, 2011)
  - Apixaban was compared to coumadin
  - Stroke risk was similar in RE-LY trial (reduction in stroke or systemic embolism in apixaban group compared to warfarin and a reduction in all bleeding indices)
  - Rates of gastrointestinal bleeding an myocardial infarction were not increased

EDOXABAN

- ENGAGE AF-TIMI 48 Trial (Giugliano, 2013)
  - Shown to be non-inferior to coumadin, with a lower risk of stroke or system embolism
  - Risk of major bleeding was also lower