CARDIAC CONCERNS FOR THE DENTAL PATIENT

Christopher Kelly, MD, MS, FACC
North Carolina Heart and Vascular
UNC Rex Hospital

THE AGENDA

01 **ANTIBIOTICS**
Who needs them, and who doesn't

02 **BLOOD THINNERS**
When they can be stopped; for how long

03 **BLOOD PRESSURE**
What's acceptable for invasive procedures

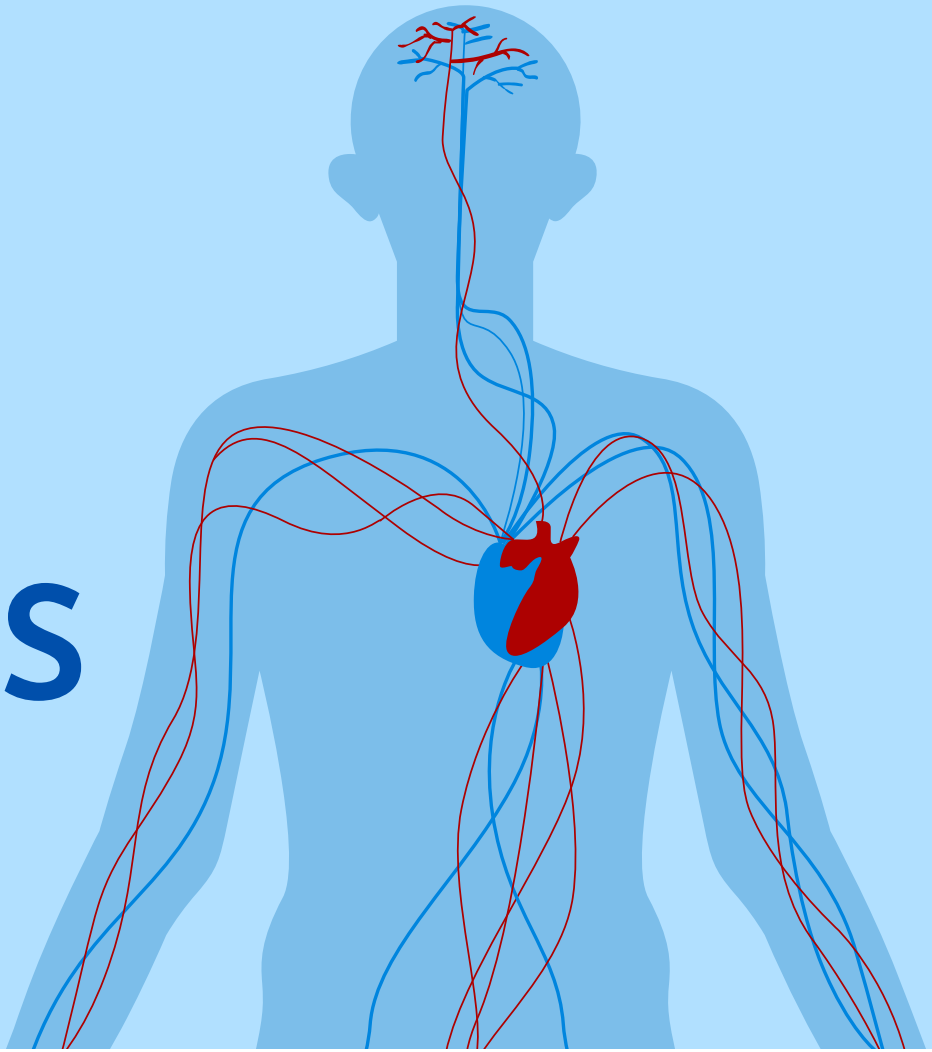
04 **PACEMAKERS/ICDs**
Are they an issue during oral surgeries?

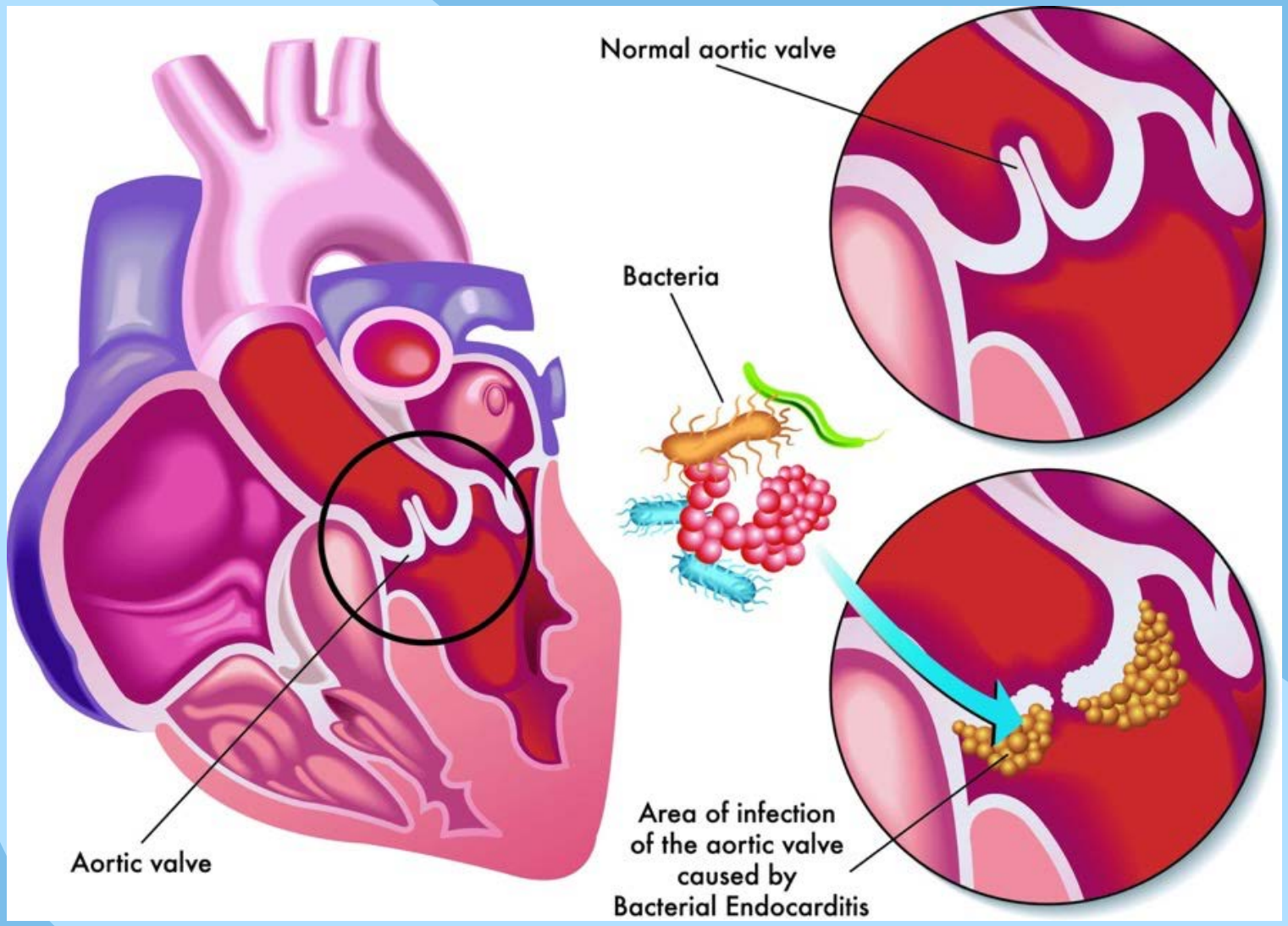
05 **CARDIAC EMERGENCIES**
Don't panic!

06 **WHAT'S NEW**
Some of the latest and greatest in cardiology

01

ANTIBIOTIC PROPHYLAXIS




Normal aortic valve
Bacteria
Aortic valve
Area of infection
of the aortic valve
caused by
Bacterial Endocarditis

THE QUARTERLY JOURNAL OF MEDICINE

VOLUME II

1908–9

INFECTIVE ENDOCARDITIS

WITH AN ANALYSIS OF 150 CASES AND WITH SPECIAL REFERENCE TO THE CHRONIC FORM OF THE DISEASE

By THOMAS J. HORDER

xvii. *Treatment.* (i) *Preventive.* I do not know that it has ever been suggested that measures should be taken to prevent this most serious disease. In cases of the primary form, where no previous valvular lesion has been present, no such prophylactic measures would be possible. But in the secondary form of the disease, where the infection is grafted upon a previously sclerosed endocardium, and which, as already said, includes by far the majority of the cases, it is possible to do something to prevent the development of the mischief. Reference has been made to the undoubted fact that the source of the infecting agent in most of the cases is the mouth or intestine. This suggests that

Prevention of Rheumatic Fever and Bacterial Endocarditis Through Control of Streptococcal Infections *

Since patients with rheumatic or congenital heart disease are especially vulnerable to bacterial endocarditis, it is advisable to protect such patients with antimicrobial agents when they are to be subjected to any of the above procedures. Some cardiologists are of the opinion that these patients should also receive prophylaxis against bacterial endocarditis when subjected to any surgery involving general anesthesia, or to diagnostic procedures such as cardiac catheterization.

Circulation, Volume XXI, January 1960

Previous (1997) Recommendations

Table 1. Cardiac Conditions Associated With Endocarditis[2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22] (Table view)

Endocarditis prophylaxis recommended
High-risk category
Prosthetic cardiac valves, including bioprosthetic and homograft valves
Previous bacterial endocarditis
Complex cyanotic congenital heart disease (eg, single ventricle states, transposition of the great arteries, tetralogy of Fallot)
Surgically constructed systemic pulmonary shunts or conduits
Moderate-risk category
Most other congenital cardiac malformations (other than above and below)
Acquired valvar dysfunction (eg, rheumatic heart disease)
Hypertrophic cardiomyopathy
Mitral valve prolapse with valvar regurgitation and/or thickened leaflets[1]

Physicians' Recommendations to Patients for Use of Antibiotic Prophylaxis to Prevent Endocarditis

Design, Setting, and Participants All patients who underwent outpatient transthoracic echocardiography at a university-based tertiary hospital in Boston, Mass, during December 1997 were contacted 6 to 9 months later to respond to a survey, completed by 218 (80%) eligible subjects.

Main Outcome Measure Patients' report of their physicians' instructions on actual use of IE prophylaxis in accordance with patient risk category, determined by echocardiographic data.

Results One hundred eight patients (49.5%) had clinical or echocardiographic findings for which prophylaxis was indicated. Of these 108 patients, 71 (65.7%) reported that they were instructed to take IE prophylaxis. Sixteen high-risk patients (88.9%) but only 55 moderate-risk patients (61.1%) reported that they were instructed to take prophylaxis. Among the 110 negligible-risk patients, 29 (26.4%) reported that they had been instructed to take IE prophylaxis. Overall, 100 patients (45.9%) reported that they received physician instructions to take IE prophylaxis. Of those who subsequently underwent a procedure for which IE prophylaxis was indicated (n=68), 9 (13.2%) elected not to follow their physician's advice to take prophylaxis.

Conclusions We found that although most patients reported receiving instructions for IE prophylaxis use consistent with American Heart Association guidelines, IE prophylaxis overuse among negligible-risk patients and underuse among moderate-risk patients was common. Continued physician and patient education may lead to improved adherence to the current American Heart Association recommendations.

JAMA. 2000;284:68-71 www.jama.com

AHA Guideline

Prevention of Infective Endocarditis

Guidelines From the American Heart Association

A Guideline From the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group

Originally published 19 Apr 2007 | https://doi.org/10.1161/CIRCULATIONAHA.106.183095 | Circulation. 2007;116:1736–1754

Table 2. Primary Reasons for Revision of the IE Prophylaxis Guidelines

IE is much more likely to result from frequent exposure to random bacteremias associated with daily activities than from bacteremia caused by a dental, GI tract, or GU tract procedure.
Prophylaxis may prevent an exceedingly small number of cases of IE, if any, in individuals who undergo a dental, GI tract, or GU tract procedure.
The risk of antibiotic-associated adverse events exceeds the benefit, if any, from prophylactic antibiotic therapy.
Maintenance of optimal oral health and hygiene may reduce the incidence of bacteremia from daily activities and is more important than prophylactic antibiotics for a dental procedure to reduce the risk of IE.

Activity	Rate of Bacteremia
Tooth Extraction	10-100%
Periodontal surgery	36-88%
Teeth cleaning	40%
Tooth brushing + flossing	20-68%
Chewing food	7-51%

Guntheroth[81] estimated a cumulative exposure of 5370 minutes of bacteremia over a 1-month period in dentulous patients resulting from random bacteremia from chewing food and from oral hygiene measures, such as tooth brushing and flossing, and compared that with a duration of bacteremia lasting 6 to 30 minutes associated with a single tooth extraction. Roberts[62] estimated that tooth brushing 2 times daily for 1 year had a 154 000 times greater risk of exposure to bacteremia than that resulting from a single tooth extraction. The cumulative exposure during 1 year to bacteremia from routine daily activities may be as high as 5.6 million times greater than that resulting from a single tooth extraction, the dental procedure reported to be most likely to cause a bacteremia.[62]

Condition	Risk of IE From Dental Procedure
Mitral valve prolapse	1 in 1.1 million
Congenital heart disease	1 in 475,000
Rheumatic heart disease	1 in 142,000
Prosthetic heart valve	1 in 114,000
Prior endocarditis	1 in 95,000

Table 3. Cardiac Conditions Associated With the Highest Risk of Adverse Outcome From Endocarditis for Which Prophylaxis With Dental Procedures Is Reasonable

Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
Previous IE
Congenital heart disease (CHD)*
Unrepaired cyanotic CHD, including palliative shunts and conduits
Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure†
Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)
Cardiac transplantation recipients who develop cardiac valvulopathy

*Except for the conditions listed above, antibiotic prophylaxis is no longer recommended for any other form of CHD.

†Prophylaxis is reasonable because endothelialization of prosthetic material occurs within 6 months after the procedure.

Table 4. Dental Procedures for Which Endocarditis Prophylaxis Is Reasonable for Patients in Table 3

All dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa*

*The following procedures and events do not need prophylaxis: routine anesthetic injections through noninfected tissue, taking dental radiographs, placement of removable prosthodontic or orthodontic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, shedding of deciduous teeth, and bleeding from trauma to the lips or oral mucosa.

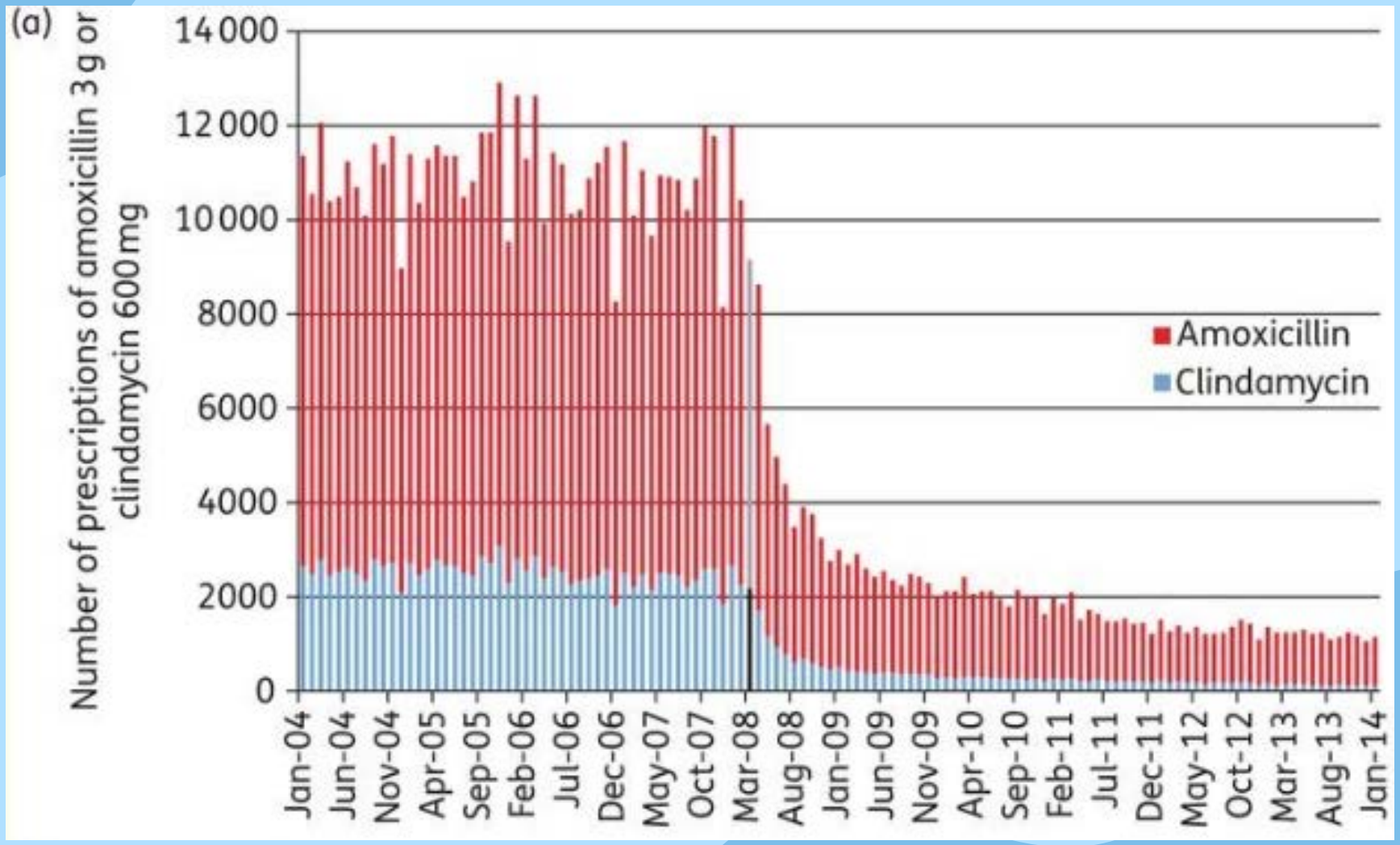
Conditions NOT requiring prophylaxis

- Mitral valve prolapse
- Coronary stents
- Pacemaker or ICD
- IVC filters
- Typical valvular stenosis or regurgitation
- Heart transplant without valvulopathy
- **Murmur in asymptomatic patient with no history of IE or prosthesis**

Table 5. Antibiotic Regimens for a Dental Procedure Regimen: Single Dose 30 to 60 Minutes Before Procedure

Situation	Agent	Adults	Children
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin OR	2 g IM or IV	50 mg/kg IM or IV
	Cefazolin or ceftriaxone	1 g IM or IV	50 mg/kg IM or IV
Allergic to penicillin or ampicillin—oral	Cephalexin* OR	2 g	50 mg/kg
	Azithromycin or clarithromycin OR	500 mg	15 mg/kg
	Doxycycline	100 mg	<45 kg, 2.2 mg/kg >45 kg, 100 mg
Allergic to penicillin or ampicillin and unable to take oral medication	Cefazolin or ceftriaxone†	1 g IM or IV	50 mg/kg IM or IV

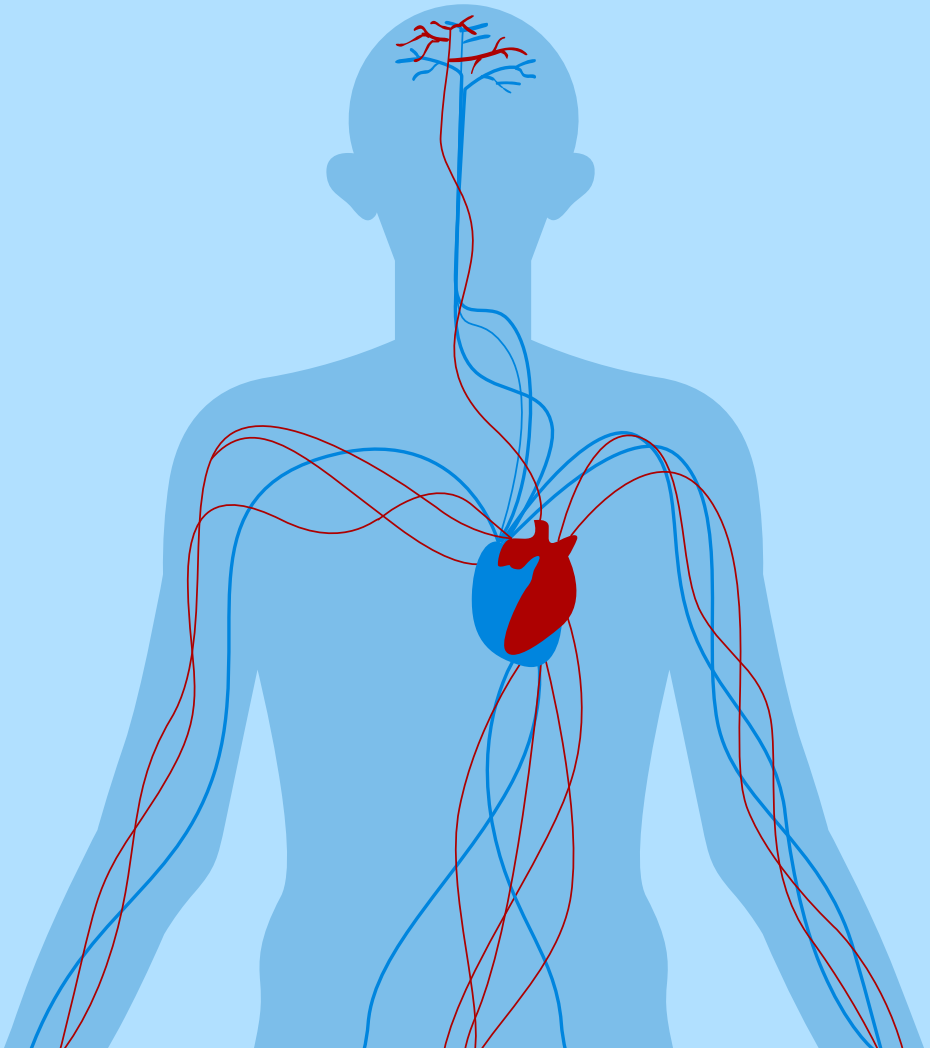
Clindamycin is no longer recommended for antibiotic prophylaxis for a dental procedure.


(a)
Number of prescriptions of amoxicillin 3 g or clindamycin 600 mg
14 000
12 000
10 000
8000
6000
4000
2000
0
Amoxicillin
Clindamycin
Jan-04
Jun-04
Nov-04
Apr-05
Sep-05
Feb-06
Jul-06
Dec-06
May-07
Oct-07
Mar-08
Aug-08
Jan-09
Jun-09
Nov-09
Apr-10
Sep-10
Feb-11
Jul-11
Dec-11
May-12
Oct-12
Mar-13
Aug-13
Jan-14

If AP is inadvertently not administered before a dental procedure, then it may be administered up to 2 hours after the procedure. In patients who are receiving a short course (7–10 days) of oral antibiotic therapy before a dental procedure, it is preferable to select a different class of antibiotic listed in Table 5. If possible, it is preferable to delay an elective dental procedure for at least 10 days after completion of a short course of antibiotic therapy. In patients undergoing multiple sequential dental appointments, if possible, it is preferable to delay the next procedure for 10 days after the last dose of antibiotic therapy. In patients who are receiving parenteral antimicrobial therapy for IE or other infections and require a dental procedure, the same parenteral antibiotic may be continued through the dental procedure.

02

BLOOD THINNERS



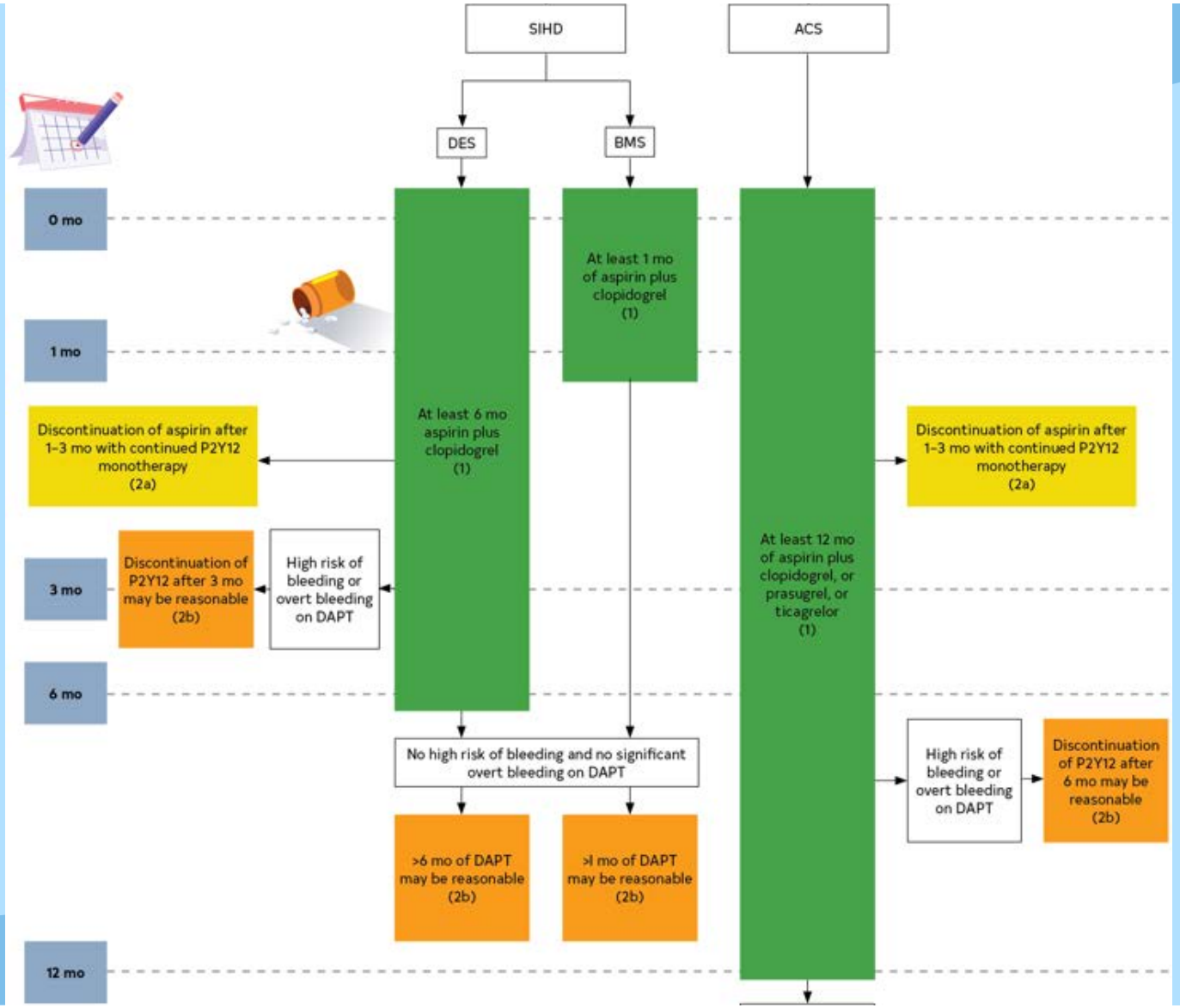
	Anticoagulants	Antiplatelet Agents
Common Indications	Atrial fibrillation DVT or PE Prosthetic heart valve	Prior MI Prior stroke Recent coronary stent

	Anticoagulants	Antiplatelet Agents
Common Indications	Atrial fibrillation DVT or PE Prosthetic heart valve	Prior MI Prior stroke Recent coronary stent
Agents	Warfarin (Coumadin) DOACs - Eliquis (apixaban) - Xarelto (rivaroxaban) - Pradaxa (dabigatran)	Aspirin Plavix (clopidogrel) Effient (prasugrel) Brilinta (ticagrelor)

	Anticoagulants	Antiplatelet Agents
Common Indications	Atrial fibrillation DVT or PE Prosthetic heart valve	Prior MI Prior stroke Recent coronary stent
Agents	Warfarin (Coumadin) DOACs - Eliquis (apixaban) - Xarelto (rivaroxaban) - Pradaxa (dabigatran)	Aspirin Plavix (clopidogrel) Effient (prasugrel) Brilinta (ticagrelor)
How long to hold	2-3 days	5-7 days
When they SHOULD NEVER be stopped	Prosthetic mitral valve Atrial fibrillation with high risk of stroke (recommend bridge)	Coronary stent within last 3-6 months

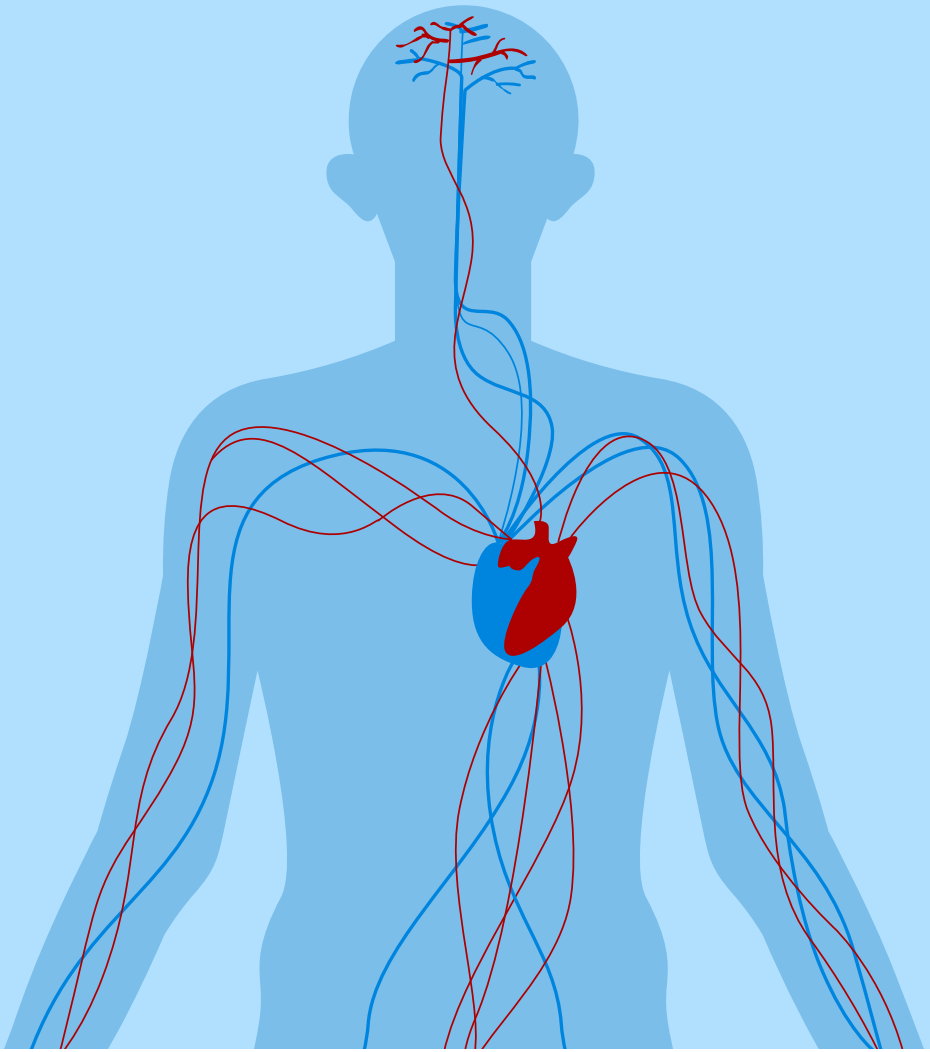
(A) The risk factor-based approach expressed as a point based scoring system, with the acronym CHA_2DS_2-VASc (NOTE: maximum score is 9 since age may contribute 0, 1, or 2 points)	
CHA_2DS_2-VASc risk factor	**Points**
Congestive heart failure Signs/symptoms of heart failure or objective evidence of reduced left ventricular ejection fraction	+1
Hypertension Resting blood pressure >140/90 mmHg on at least 2 occasions or current antihypertensive treatment	+1
Age 75 years or older	+2
Diabetes mellitus Fasting glucose >125 mg/dL (7 mmol/L) or treatment with oral hypoglycemic agent and/or insulin	+1
Previous stroke, transient ischemic attack, or thromboembolism	+2
Vascular disease Previous myocardial infarction, peripheral artery disease, or aortic plaque	+1
Age 65 to 74 years	+1
Sex category (female)	+1

(B) Adjusted stroke rate according to CHA_2DS_2-VASc score		
CHA_2DS_2-VASc score	Patients (n = 73,538)	Stroke and thromboembolism event rate at 1-year follow-up (%)
0	6369	0.78
1	8203	2.01
2	12,771	3.71
3	17,371	5.92
4	13,887	9.27
5	8942	15.26
6	4244	19.74
7	1420	21.50
8	285	22.38
9	46	23.64


SIHD
ACS
DES
BMS
0 mo
1 mo
3 mo
6 mo
12 mo
At least 1 mo of aspirin plus clopidogrel (1)
At least 6 mo aspirin plus clopidogrel (1)
At least 12 mo of aspirin plus clopidogrel, or prasugrel, or ticagrelor (1)
Discontinuation of aspirin after 1-3 mo with continued P2Y12 monotherapy (2a)
Discontinuation of aspirin after 1-3 mo with continued P2Y12 monotherapy (2a)
High risk of bleeding or overt bleeding on DAPT
Discontinuation of P2Y12 after 3 mo may be reasonable (2b)
No high risk of bleeding and no significant overt bleeding on DAPT
>6 mo of DAPT may be reasonable (2b)
>l mo of DAPT may be reasonable (2b)
High risk of bleeding or overt bleeding on DAPT
Discontinuation of P2Y12 after 6 mo may be reasonable (2b)

03

BLOOD PRESSURE



Clinical Practice Guideline

2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

Table 6. Categories of BP in Adults*

BP Category	SBP		DBP
Normal	<120 mm Hg	and	<80 mm Hg
Elevated	120–129 mm Hg	and	<80 mm Hg
Hypertension			
Stage 1	130–139 mm Hg	or	80–89 mm Hg
Stage 2	≥140 mm Hg	or	≥90 mm Hg

*Individuals with SBP and DBP in 2 categories should be designated to the higher BP category.

BP indicates blood pressure (based on an average of ≥2 careful readings obtained on ≥2 occasions, as detailed in Section 4); DBP, diastolic blood pressure; and SBP, systolic blood pressure.

Table 7. Prevalence of Hypertension Based on 2 SBP/DBP Thresholds*†

	SBP/DBP ≥130/80 mm Hg or Self-Reported Antihypertensive Medication†		SBP/DBP ≥140/90 mm Hg or Self-Reported Antihypertensive Medication‡	
Overall, crude	46%		32%	
	Men (n=4717)	Women (n=4906)	Men (n=4717)	Women (n=4906)
Overall, age-sex adjusted	48%	43%	31%	32%
Age group, y				
20–44	30%	19%	11%	10%
45–54	50%	44%	33%	27%
55–64	70%	63%	53%	52%
65–74	77%	75%	64%	63%
75+	79%	85%	71%	78%

Table 8. Checklist for Accurate Measurement of BP[S4.1-3,S4.1-4]

Key Steps for Proper BP Measurements	Specific Instructions
Step 1: Properly prepare the patient	1. Have the patient relax, sitting in a chair (feet on floor, back supported) for >5 min. 2. The patient should avoid caffeine, exercise, and smoking for at least 30 min before measurement. 3. Ensure patient has emptied his/her bladder. 4. Neither the patient nor the observer should talk during the rest period or during the measurement. 5. Remove all clothing covering the location of cuff placement. 6. Measurements made while the patient is sitting or lying on an examining table do not fulfill these criteria.

Step 2: Use proper technique for BP measurements	1. Use a BP measurement device that has been validated, and ensure that the device is calibrated periodically.* 2. Support the patient's arm (eg, resting on a desk). 3. Position the middle of the cuff on the patient's upper arm at the level of the right atrium (the midpoint of the sternum). 4. Use the correct cuff size, such that the bladder encircles 80% of the arm, and note if a larger- or smaller-than-normal cuff size is used (Table 9). 5. Either the stethoscope diaphragm or bell may be used for auscultatory readings.[S4.1-5,S4.1-6]

validatebp.org

US Blood Pressure Validated Device Listing (VDL™)

The ultimate judgment regarding whether a BP measurement device meets the requisite VDL Criteria rests with the Independent Review Committee and is not in any way determined or influenced by the AMA. The AMA does not receive funding from any device manufacturer or other third party in relation to the development of the VDL Criteria or VDL process.*

Print

Brands All Brands

Device Types All Device Types

Brand/Device Type	Name And Model Number	Validation Protocol	Cuff Sizes	Populations Served
ForaCare Home	**Fora TN'G BP** P80 	**ANSI/AAMI/ISO 81060-2: 2013**	Standard (24-43 cm)	General
Smart Meter Home	**iBloodPressure** SMBP802-GS-001 	**ANSI/AAMI/ISO 81060-2:2009**	Standard (22-42 cm)	General
Greater Goods Home	**Greater Goods BP** 0040, 0604, 0664 	**ISO 81060-2:2018**	Standard (22-42 cm)	General

validatebp.org

11.5. Patients Undergoing Surgical Procedures

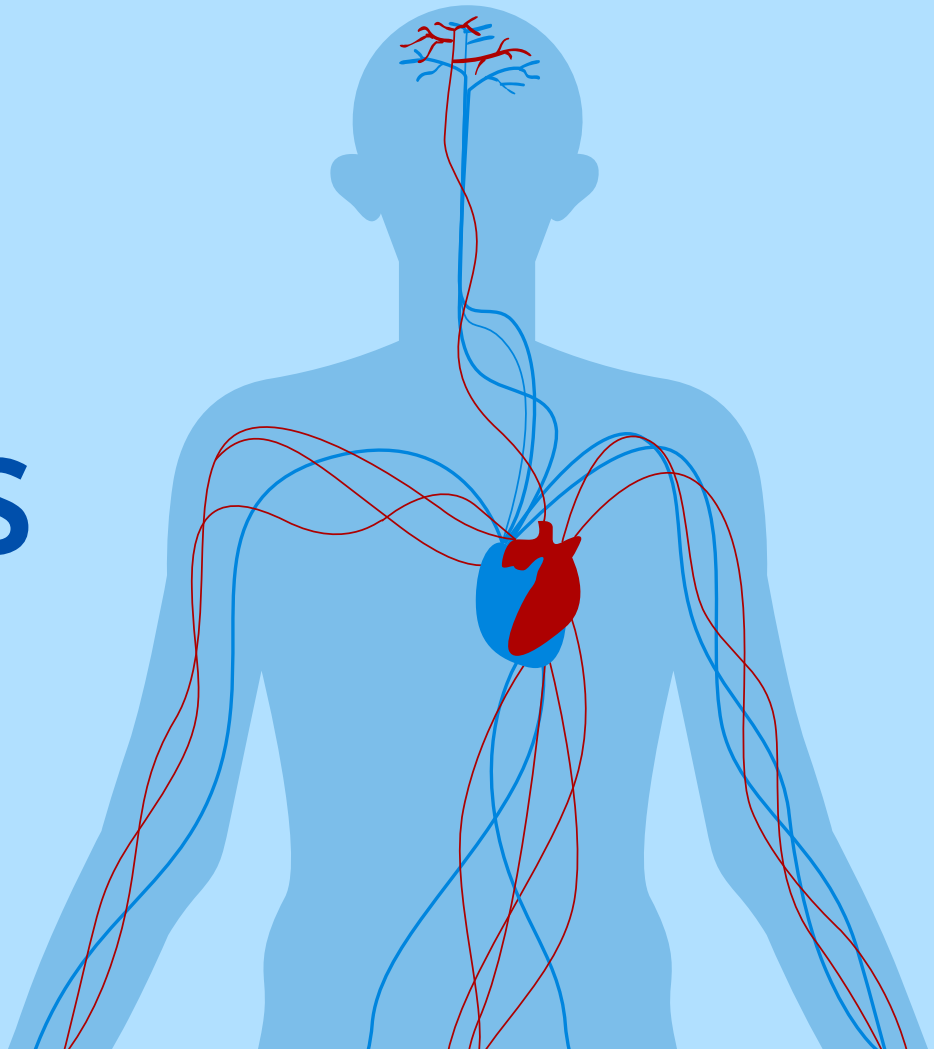
Recommendations for Treatment of Hypertension in Patients Undergoing Surgical Procedures

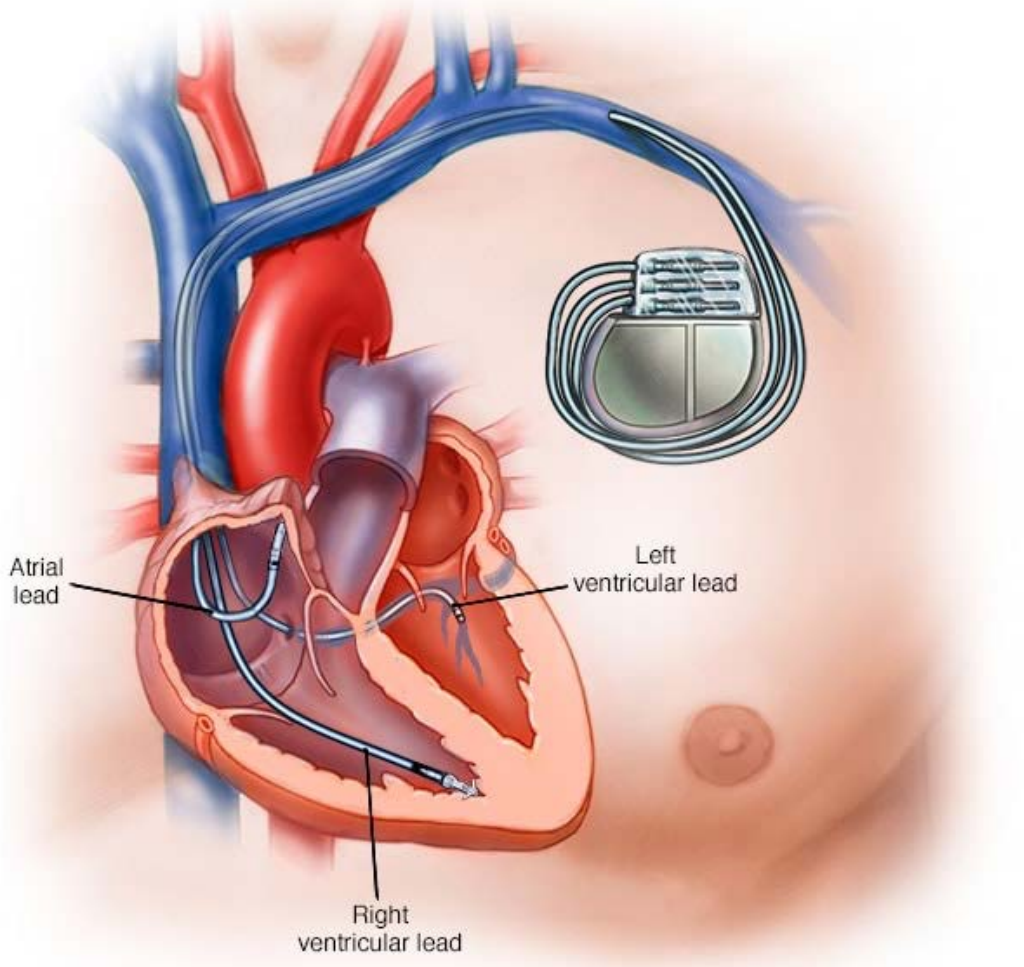
References that support recommendations are summarized in Online Data Supplements 57 and 58.

COR	LOE	Recommendations
Preoperative		
I	B-NR	1. In patients with hypertension undergoing major surgery who have been on beta blockers chronically, beta blockers should be continued.[S11.5-1–S11.5-7]
IIa	C-EO	2. In patients with hypertension undergoing planned elective major surgery, it is reasonable to continue medical therapy for hypertension until surgery.
IIb	B-NR	3. In patients with hypertension undergoing major surgery, discontinuation of ACE inhibitors or ARBs perioperatively may be considered.[S11.5-8–S11.5-10]
IIb	C-LD	4. In patients with planned elective major surgery and SBP of 180 mm Hg or higher or DBP of 110 mm Hg or higher, deferring surgery may be considered.[S11.5-11,S11.5-12]

04

PACEMAKERS and ICDs





Potential Issues

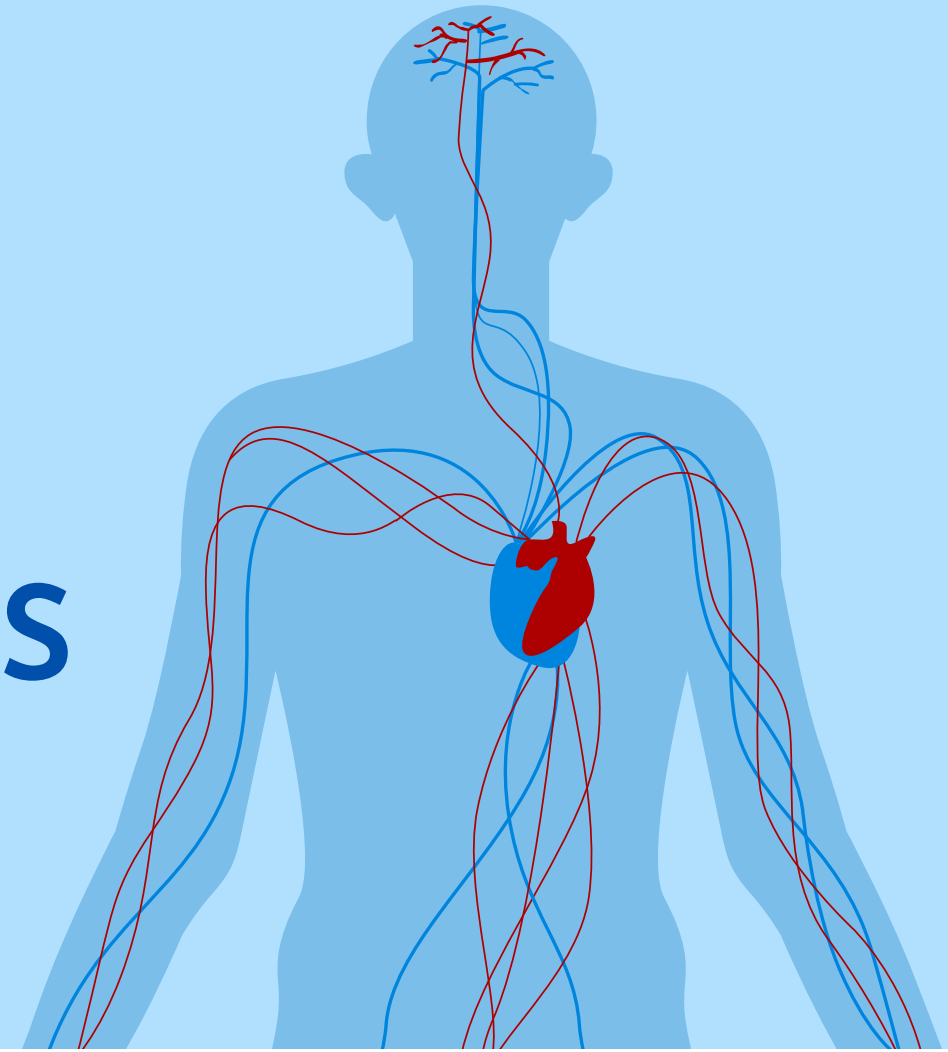
- **Electrocautery**
- *Drills*
- *X-rays*
- *Lasers*

Key Questions

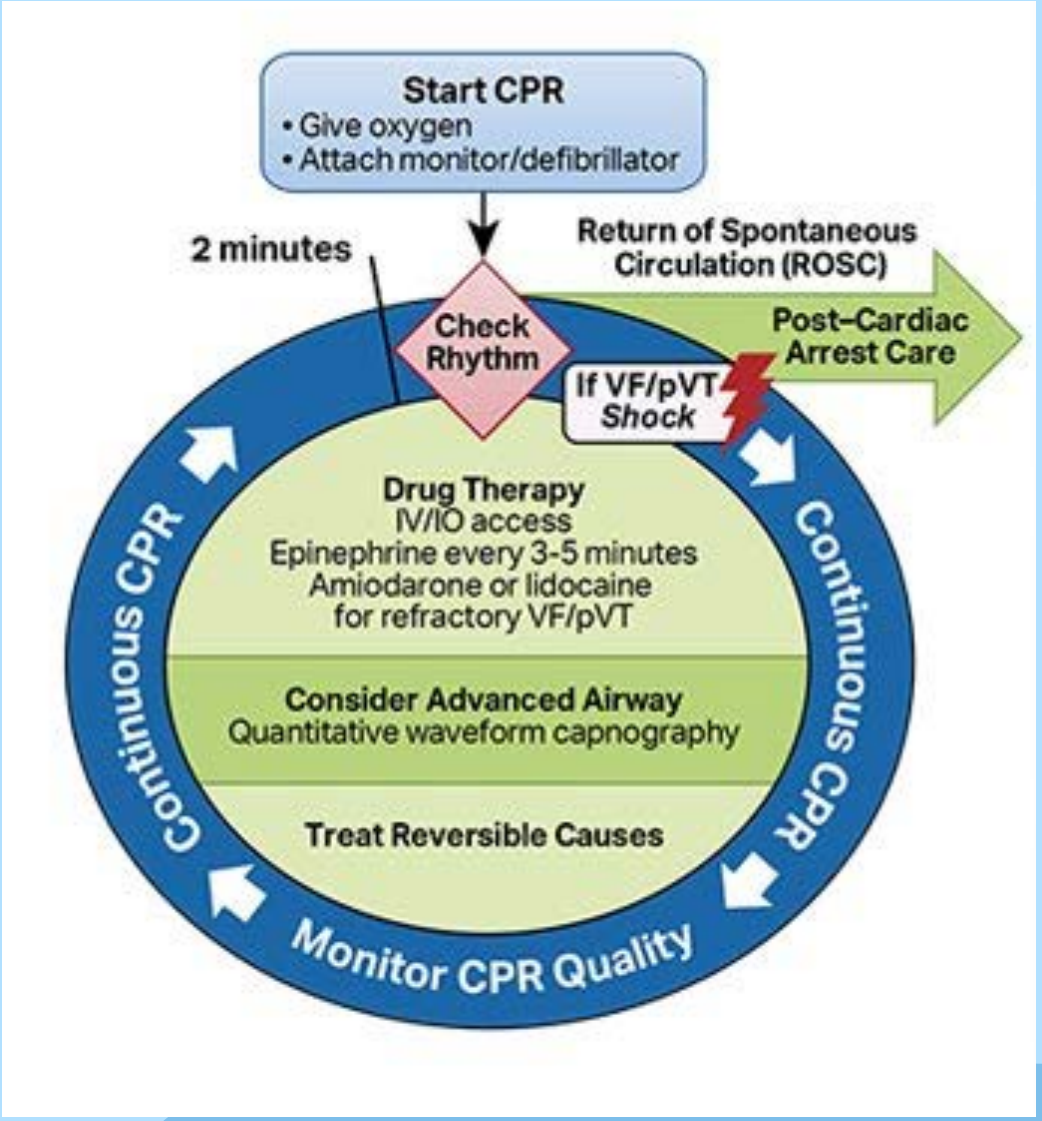
- Does the patient have a pacemaker or a defibrillator?
- Is the patient pacemaker dependent?
- What happens when a magnet is applied?

05

CARDIAC EMERGENCIES



Cardiac Arrest



Severe Hypertension (>200/>110)

- Have the patient relax with their eyes closed for five minutes, then repeat.
- If they normally take antihypertensives but didn't that day, they should return home, take them, and monitor themselves.
- If they are asymptomatic, they should go to an urgent care.
- If they have headache, chest pain, nausea, or other symptoms, call an ambulance.

Chest Pain

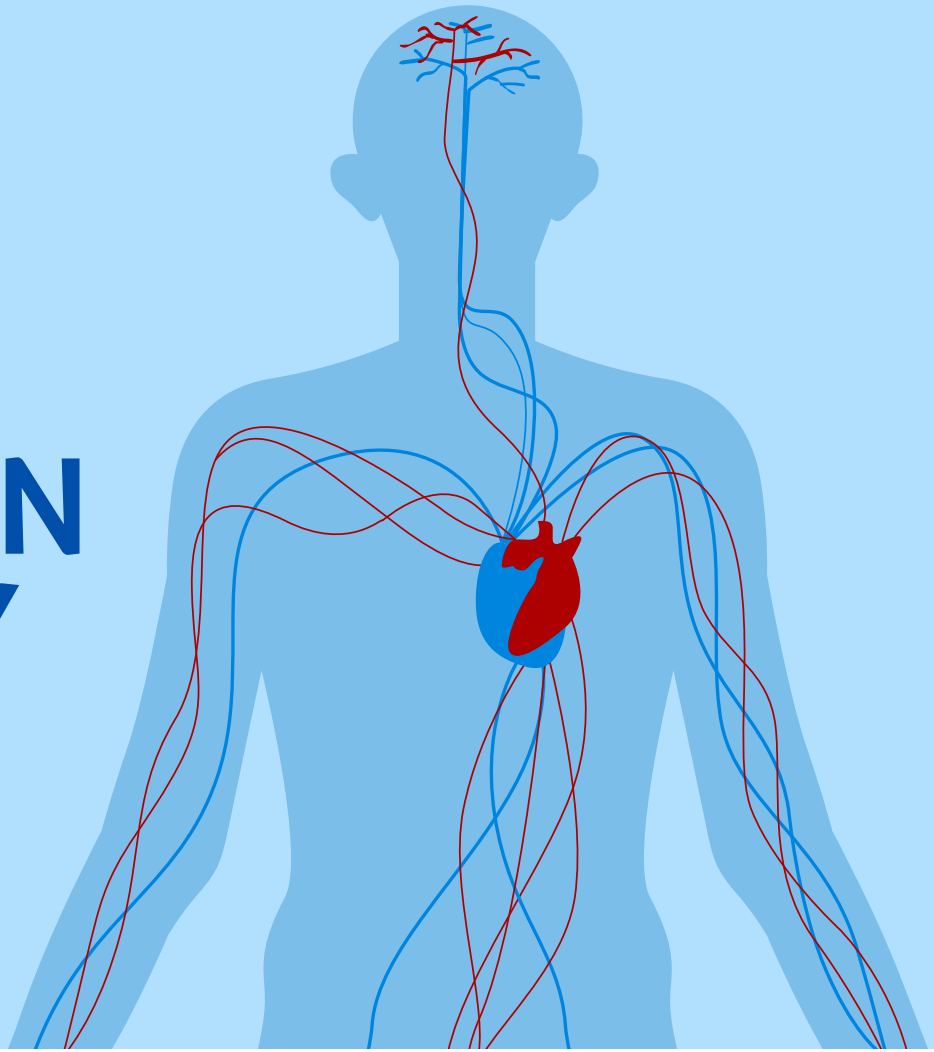
- Call an ambulance if the patient has:
  - Severe, sudden-onset pain
  - A history of ischemic heart disease or multiple risk factors (hypertension, diabetes, dyslipidemia)
  - Associated shortness of breath, dizziness, or weakness
  - Very abnormal blood pressure (high or low)
- The pain is not an urgent concern if it is isolated, non-severe, and reproducible with movement, **especially** in someone with low cardiovascular risk.

When in doubt...

- Cardiologists are always happy to collaborate. We would rather be involved in the decision that deal with the fall-out.
- I am always taking new patients and am happy to provide informal advice.
- You can email **Christopher.Kelly@unchealth.unc.edu**

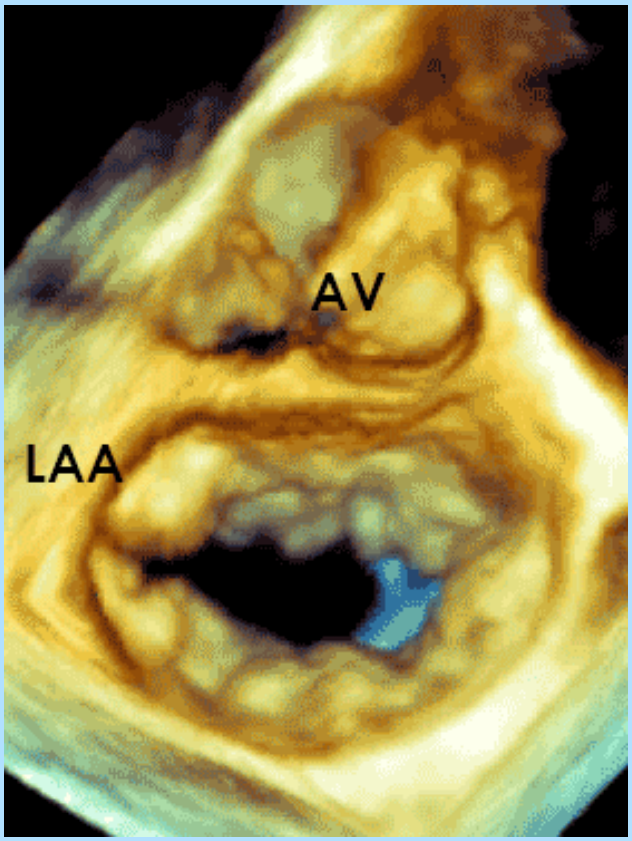
06

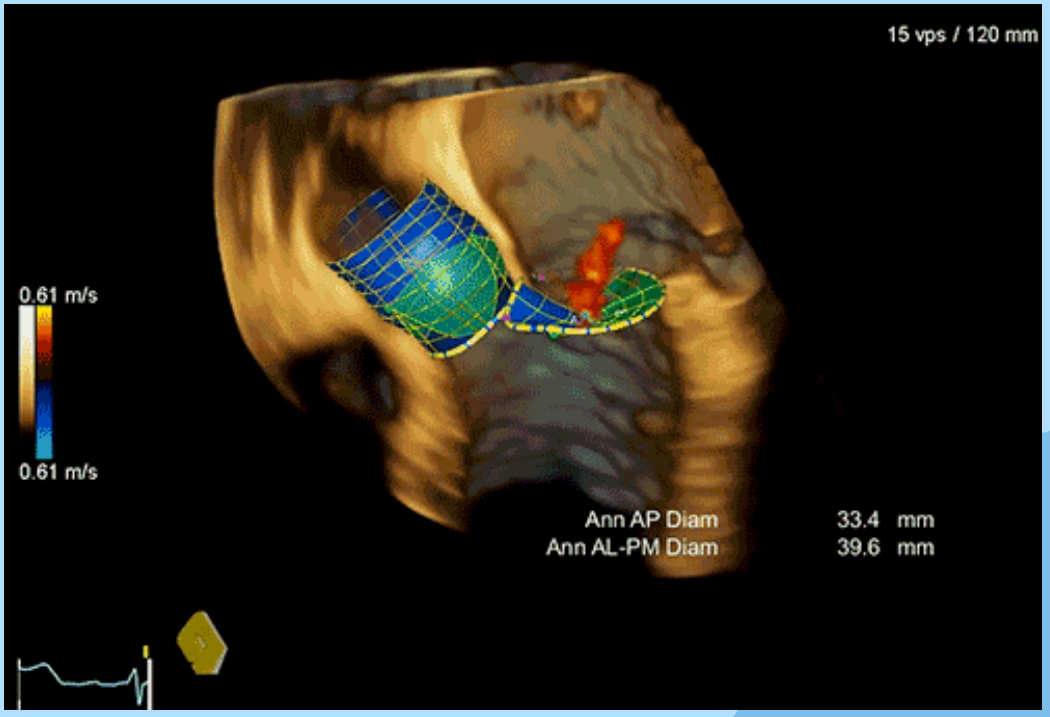
WHAT'S NEW IN CARDIOLOGY



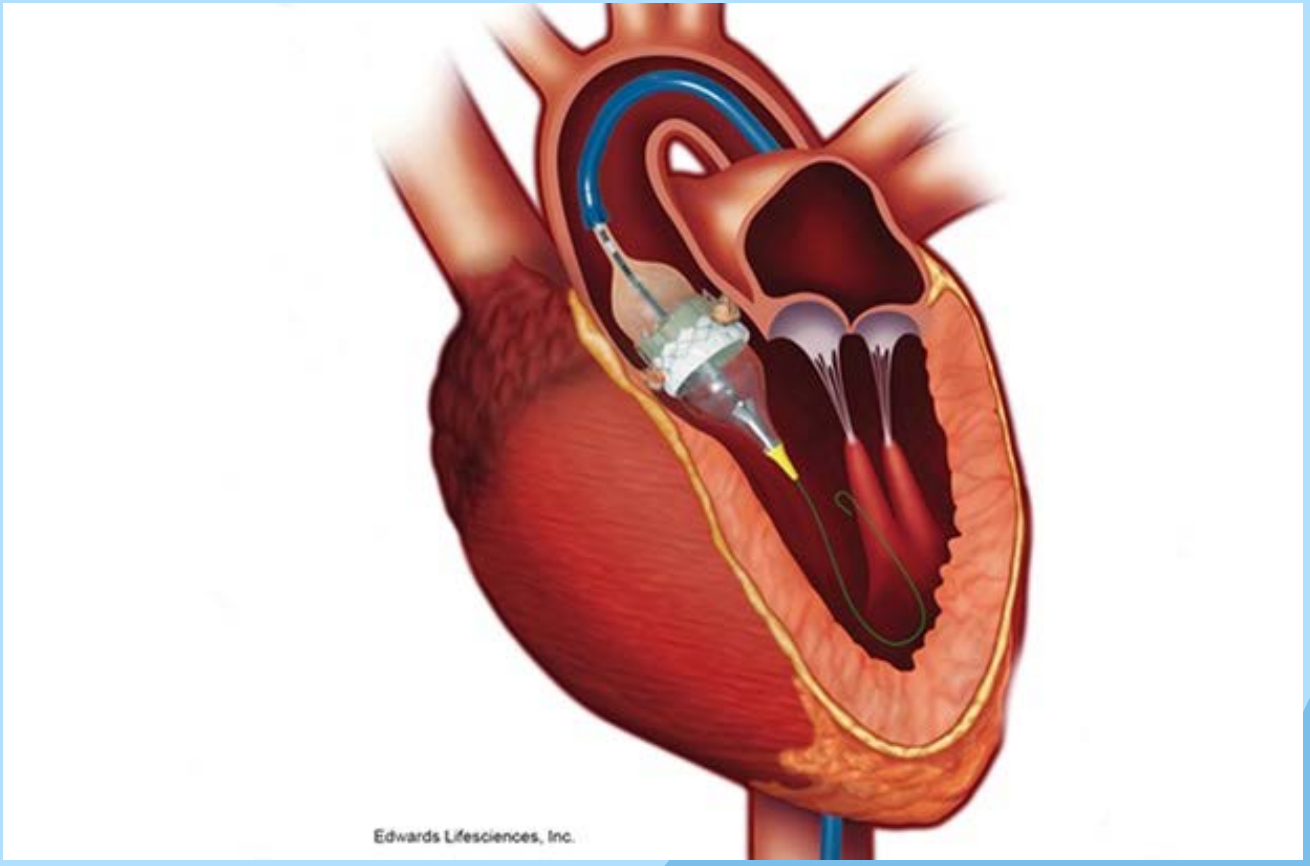
CT Coronary Angiography

3D Echocardiography

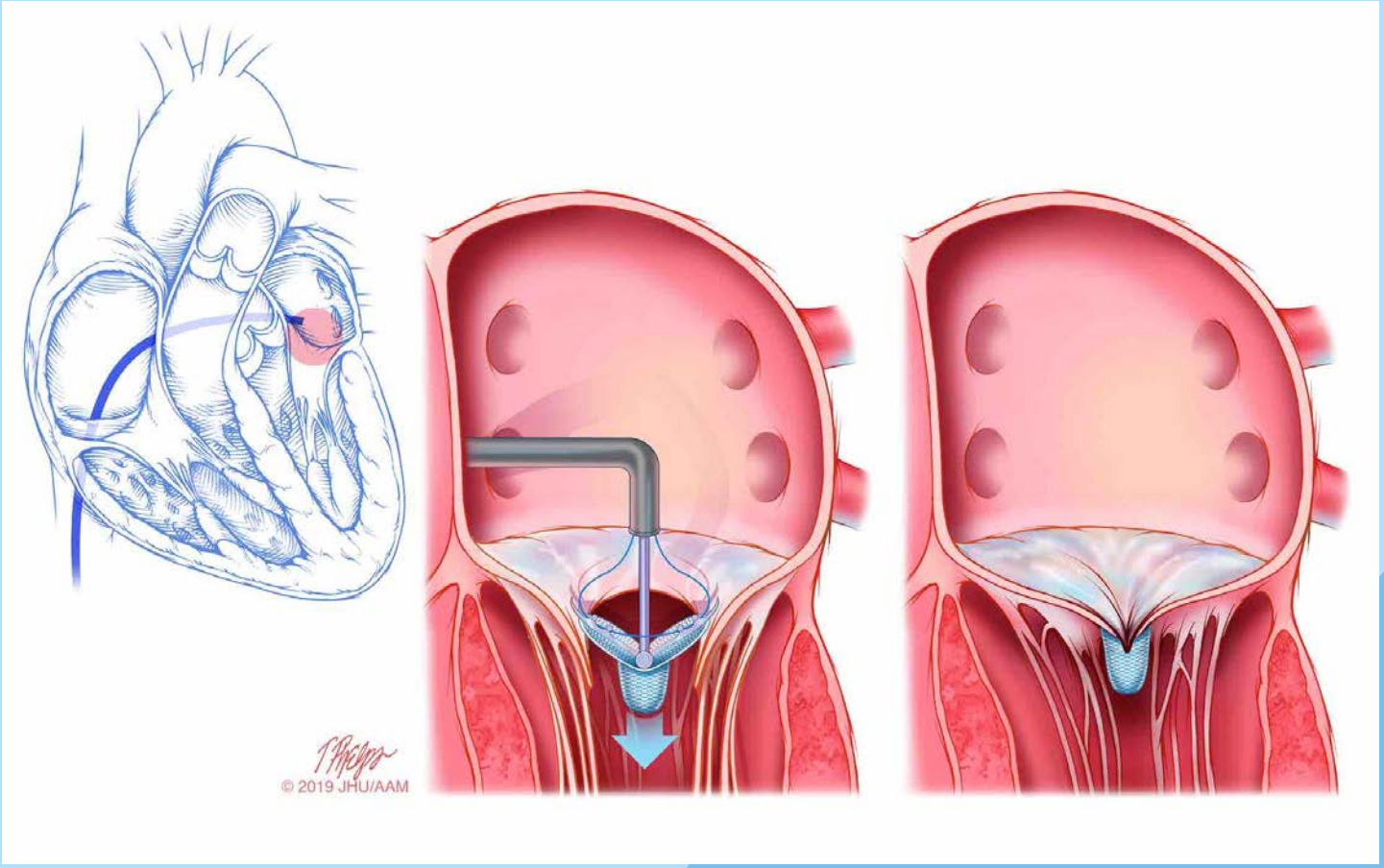




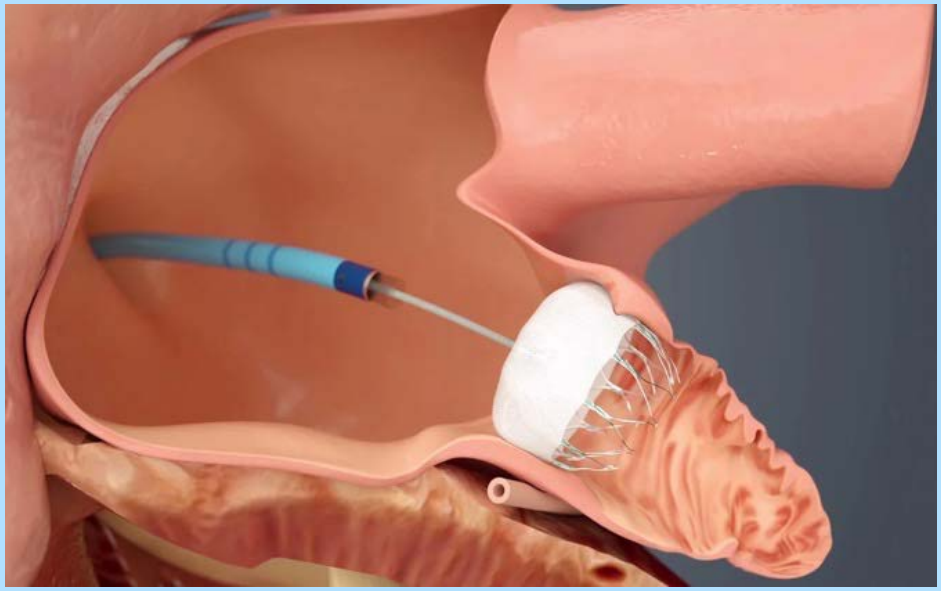
Transcatheter Valve Replacement

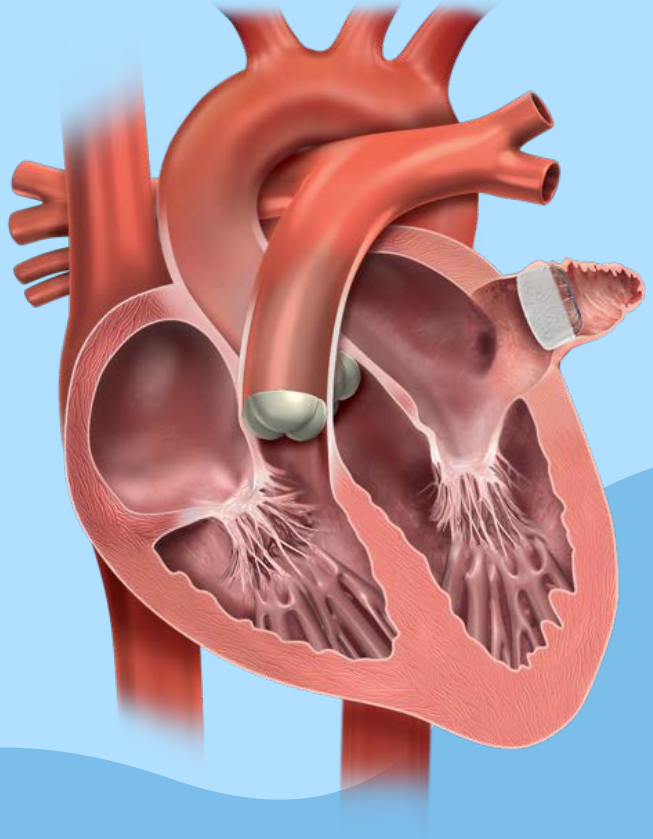


Mitraclip

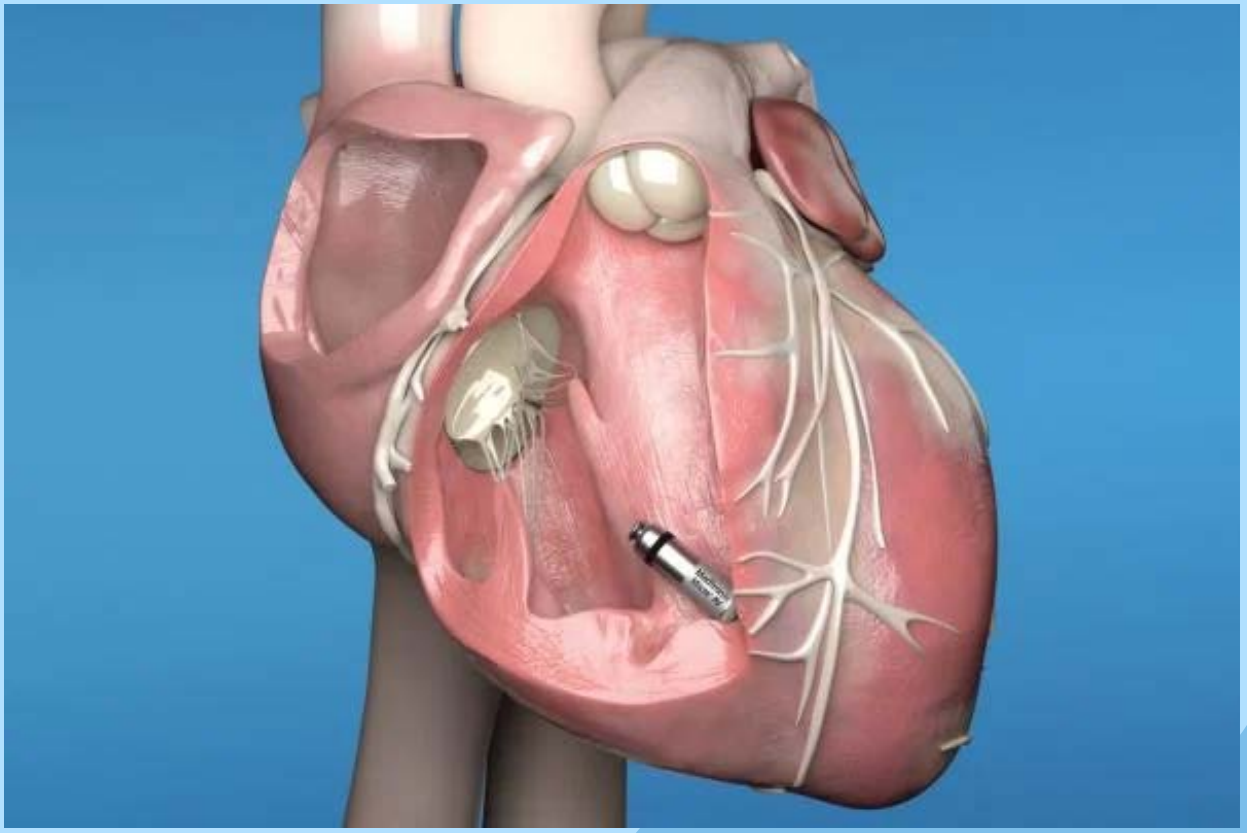


Watchman Device





Leadless Pacemaker




NORTH CAROLINA HEART & VASCULAR HOSPITAL