2014 ACC/AHA Guidelines for the Management of Patients with Valvular Heart Disease

Core Curriculum for the Cardiovascular Clinician
September 14-17, 2016

R. David Anderson, MD, MS, FACC
Professor of Medicine
Director of Interventional Cardiology
Director of the UF Health Cardiac Cath Lab
Program Director: Interventional Cardiology Fellowship
University of Florida Health
Gainesville, Florida

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Disclosures

Biosense Webster (a J&J Co.) consultant

Disclosures

I am not an echocardiographer!

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Disclosures

Did I mention that I am not an echocardiographer???

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Core Curriculum Audience

Anderson giving valve talk at Core Curriculum

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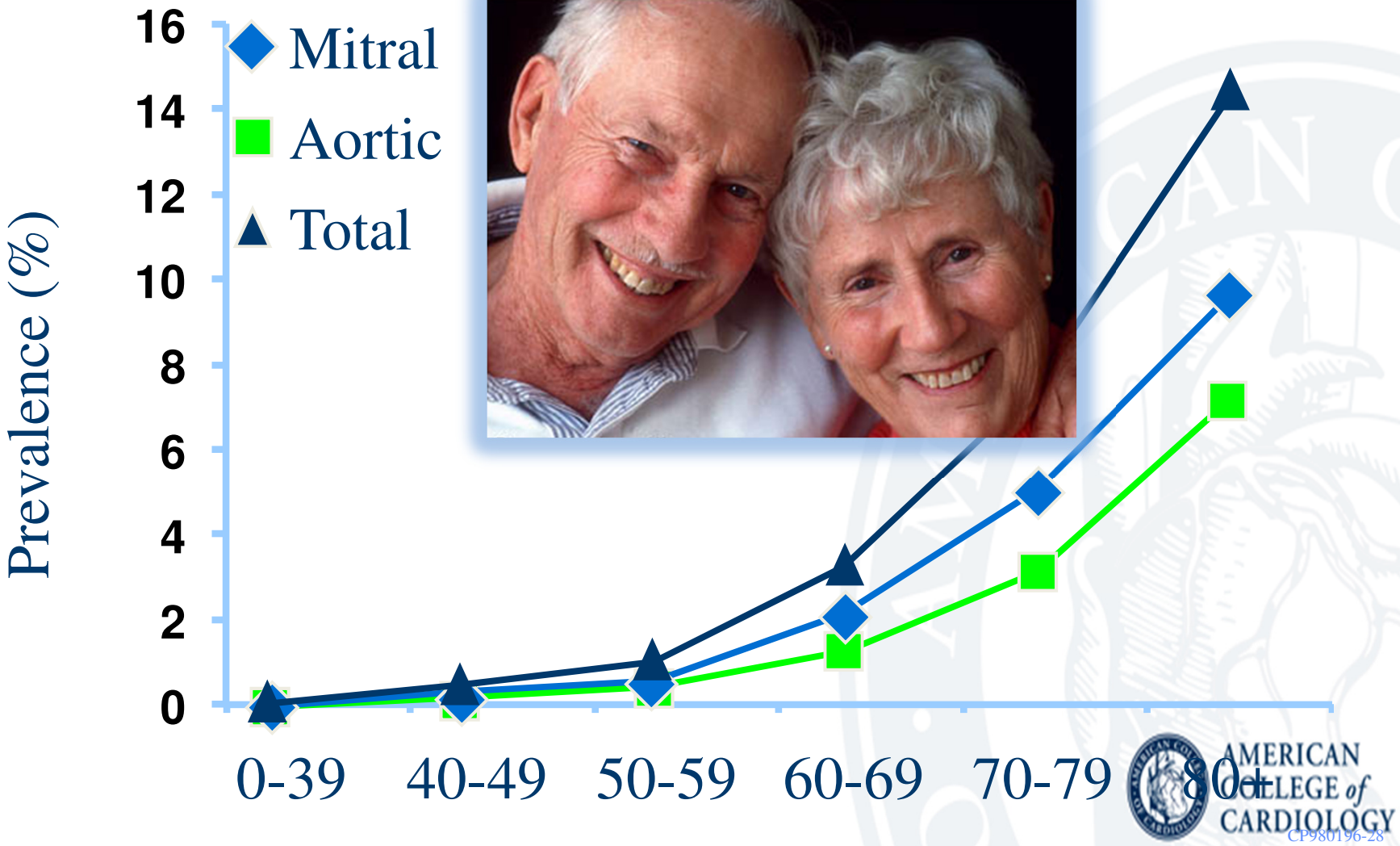
How much valve disease is out there?

Valve Disease prevalence 2.5%
0.7% 18-44y to 13.3% ≥75y

Nkomo et al. Lancet 2006;368:1005

Prevalence of Valve Disease – Olmstead County



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Valve Disease in the Elderly
Historically speaking!

- Two schools of thought:
  - Symptomatic elderly with VHD:
    - "You are too old and frail to undergo surgery!"
  - Asymptomatic elderly with severe VHD:
    - "You are doing too well to consider the risk of surgery!"

1998

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

Guidelines for the Management of Patients With Valvular Heart Disease: Executive Summary A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Patients With Valvular Heart Disease)

Robert O. Bonow, Blase Carabello, Antonio C. de Leon, Jr, L. Henry Edmunds, Jr, Bradley J. Fedderly, Michael D. Freed, William H. Gaasch, Charles R. McKay, Rick A. Nishimura, Patrick T. O'Gara, Robert A. O'Rourke, Shahbudin H. Rahimtoola, James L. Ritchie, Melvin D. Cheitlin, Kim A. Eagle, Timothy J. Gardner, Arthur Garson, Jr, Raymond J. Gibbons, Richard O. Russell, Thomas J. Ryan and Sidney C. Smith, Jr

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doi:10.1016/j.jacc.2006.05.021

ACC/AHA PRACTICE GUIDELINES

ACC/AHA 2006 Guidelines for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 1998 Guidelines for the Management of Patients With Valvular Heart Disease)

Developed in Collaboration With the Society of Cardiovascular Anesthesiologists
Endorsed by the Society for Cardiovascular Angiography and Interventions and the Society of Thoracic Surgeons

WRITING COMMITTEE MEMBERS

Robert O. Bonow, MD, FACC, FAHA, *Chair*

Blase A. Carabello, MD, FACC, FAHA
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Antonio C. de Leon, JR, MD, FACC, FAHA
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Jack S. Shanewise, MD*

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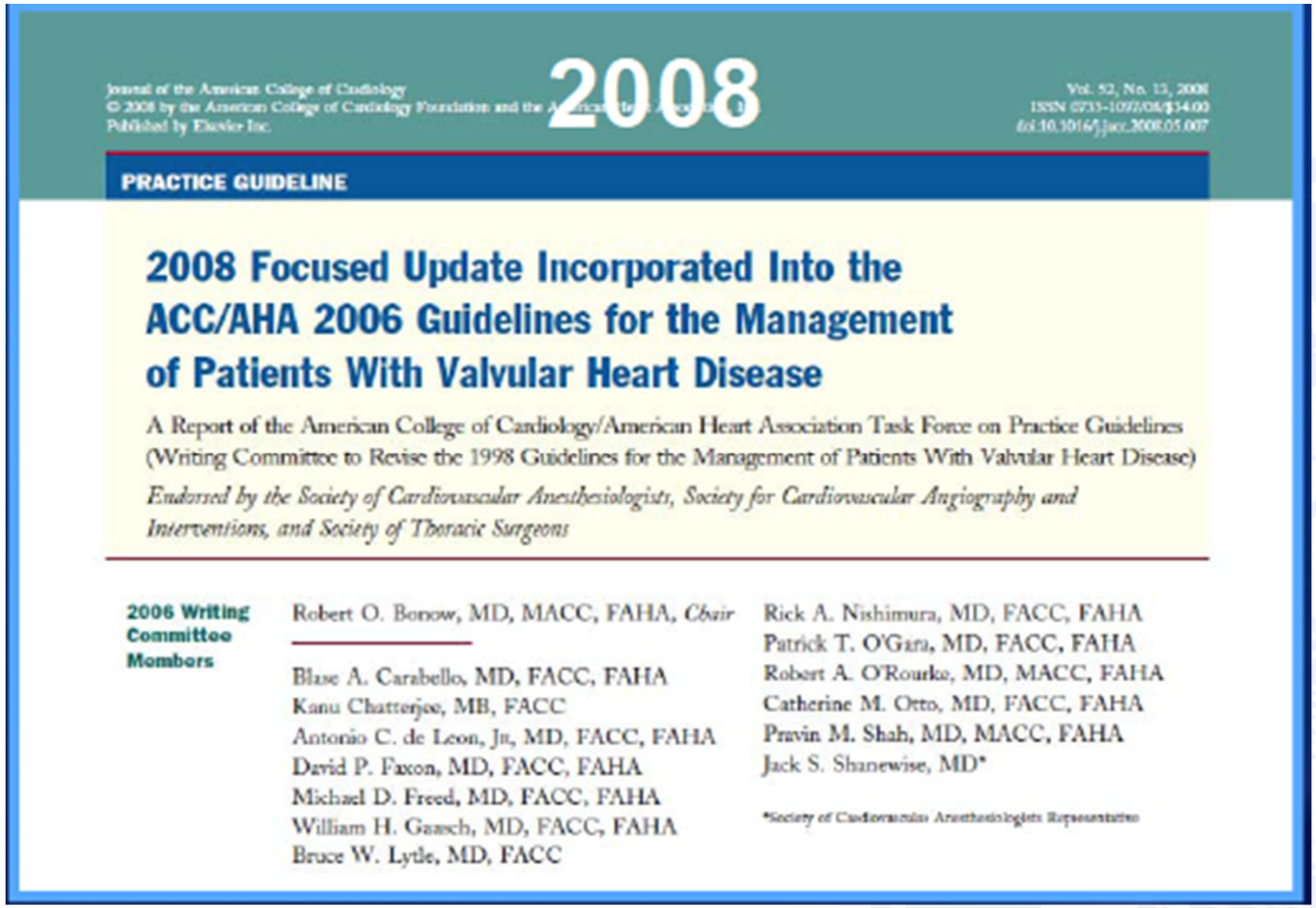

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2008

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PRACTICE GUIDELINE

2008 Focused Update Incorporated Into the ACC/AHA 2006 Guidelines for the Management of Patients With Valvular Heart Disease

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*Society of Cardiovascular Anesthesiologists Representative

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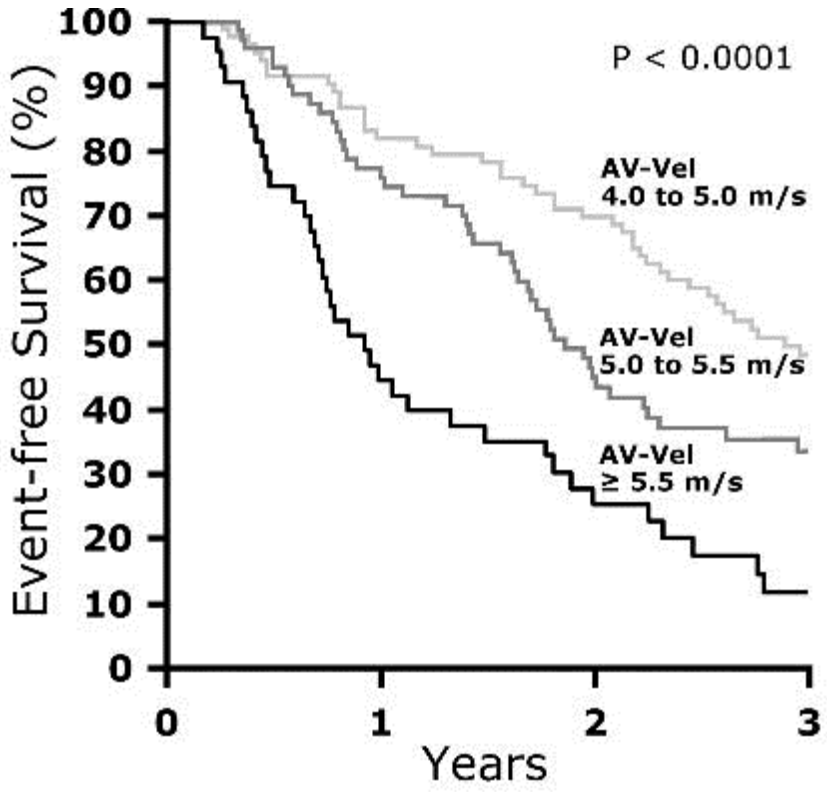
Why did we need new guidelines in 2014?

Survival with asymptomatic aortic stenosis



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Pts. at risk:	72	53	29	18
Patients with AV-Vel ≥ 5.5 m/s				
Pts. at risk:	44	20	11	5

More data on natural history

Raphael Rosenhek et al. Circulation. 2010;121:151-156

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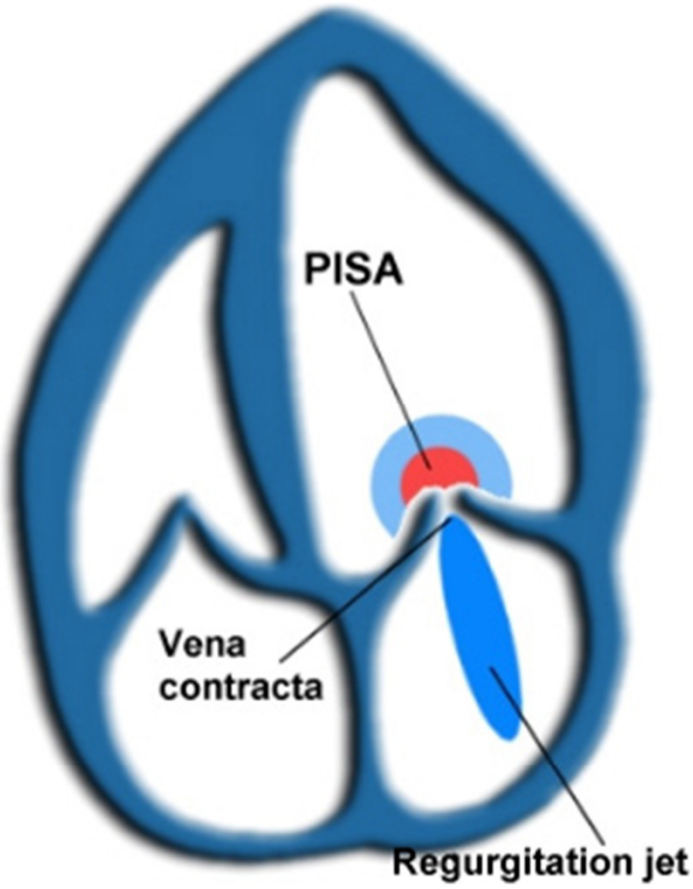
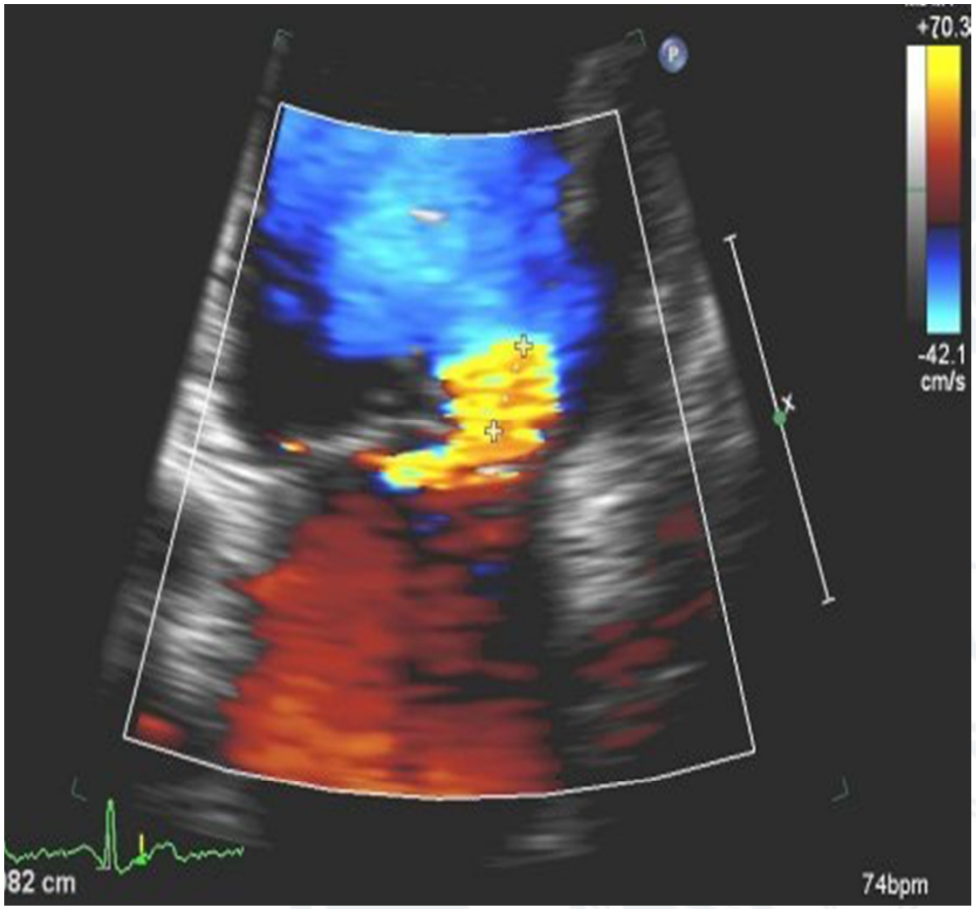
We have better imaging and quantification techniques.

Proximal Isovelocity Surface Area (PISA)





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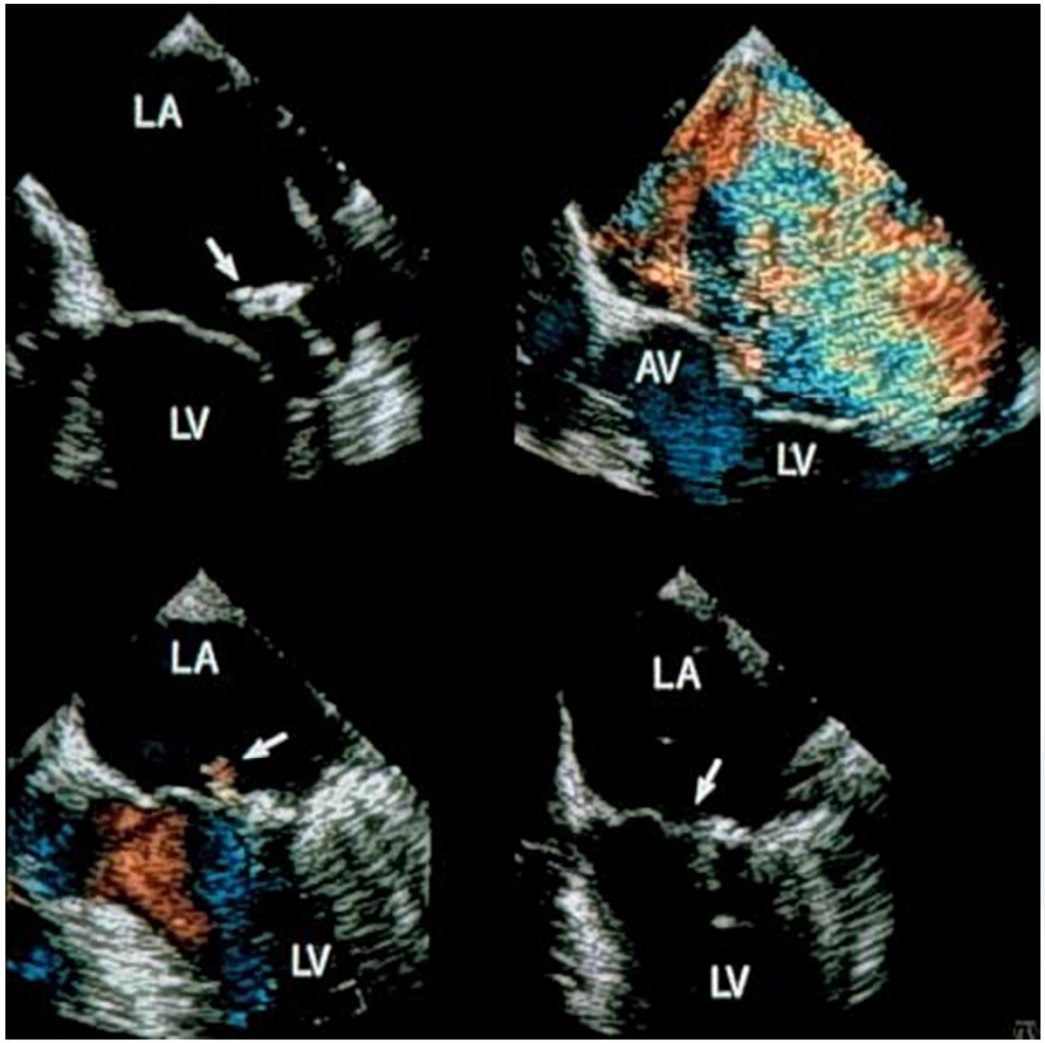
We also now have better outcomes from interventions!



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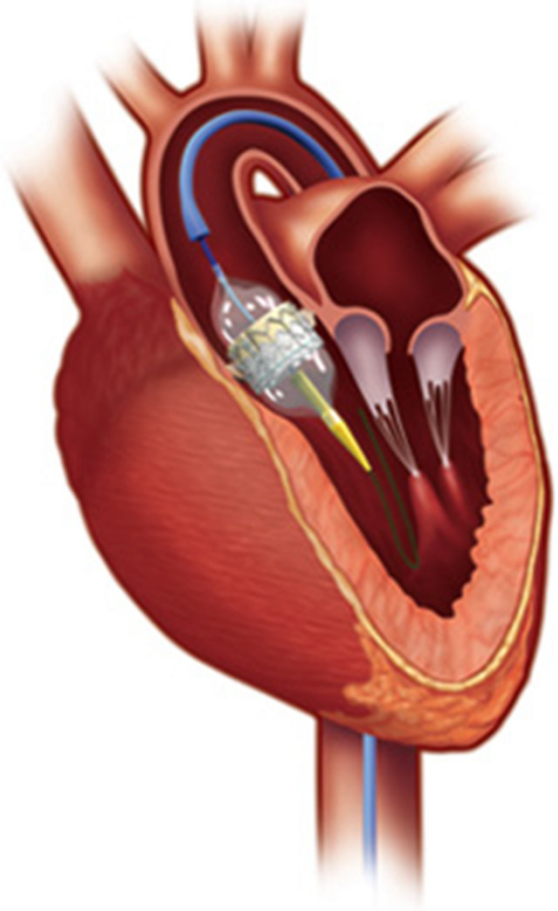
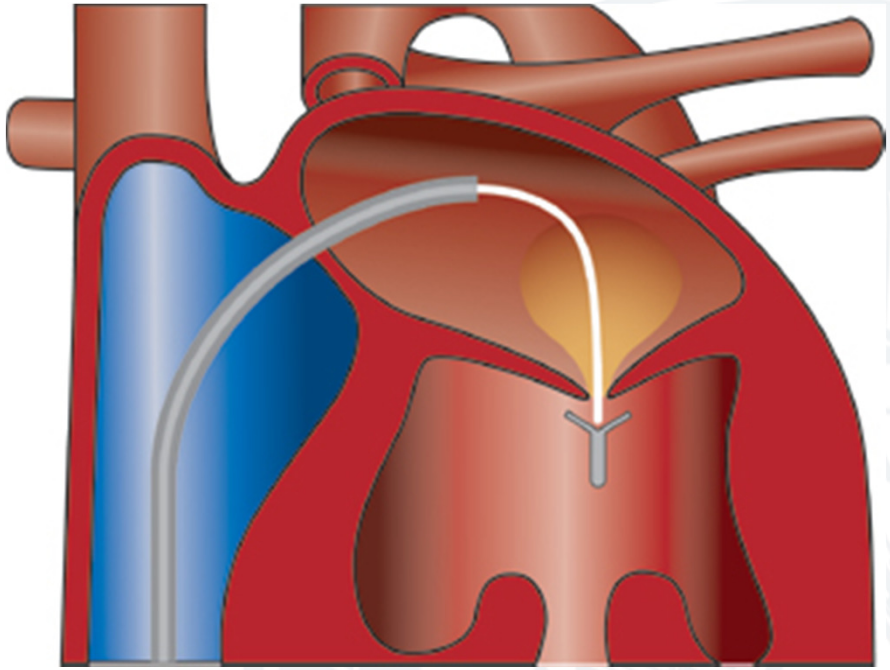
Access to minimally invasive therapies.





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Practice Guideline | June 2014

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary

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

FREE

Rick A. Nishimura, MD, MACC, FAHA; Catherine M. Otto, MD, FACC, FAHA; Robert O. Bonow, MD, MACC, FAHA; Blase A. Carabello, MD, FACC; John P. Erwin, III, MD, FACC, FAHA; Robert A. Guyton, MD, FACC; Patrick T. O'Gara, MD, FACC, FAHA; Carlos E. Ruiz, MD, PhD, FACC; Nikolaos J. Skubas, MD, FASE; Paul Sorajja, MD, FACC, FAHA; Thoralf M. Sundt, III, MD; James D. Thomas, MD, FASE, FACC, FAHA

[+] Author Information

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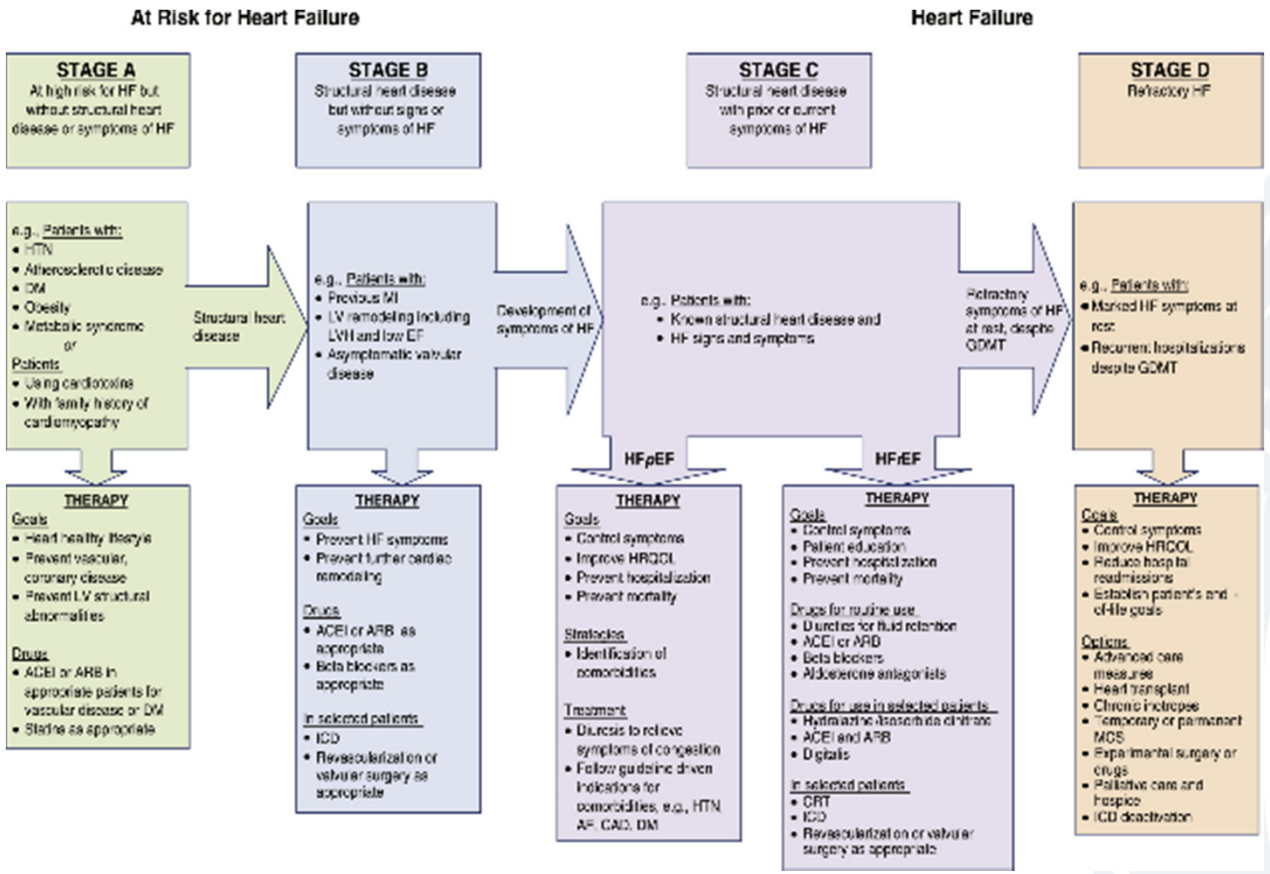
What is new in the 2014 guidelines?

- Stages of disease
- Earlier therapy for asymptomatic patients
- Patient specific therapy (no one size for all)
- Tools to increase the utility of the guidelines

JACC Journals

2013 ACCF/AHA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines



J Am Coll Cardiol. 2013;62(16):e147-e239. doi:10.1016/j.jacc.2013.05.019

2014 ACC/AHA Valve Guidelines
Stage A-D

- Additional definitions of severity
- Guidance on when to intervene
- How often to perform follow up exams

Stages of Progression of VHD

Stage	Definition	Description
A	At risk	Patients with risk factors for the development of VHD
B	Progressive	Patients with progressive VHD (mild-to-moderate severity and asymptomatic)
C	Asymptomatic severe	Asymptomatic patients who have reached the criteria for severe VHD C1: Asymptomatic patients with severe VHD in whom the left or right ventricle remains compensated C2: Asymptomatic patients who have severe VHD, with decompensation of the left or right ventricle
D	Symptomatic severe	Patients who have developed symptoms as a result of VHD

2014 ACC/AHA Valve Guidelines Stage A-D

- What is severe valve disease?
  - Severe when outcomes are poor
  - Severe when symptoms occur
  - When intervention prolongs survival

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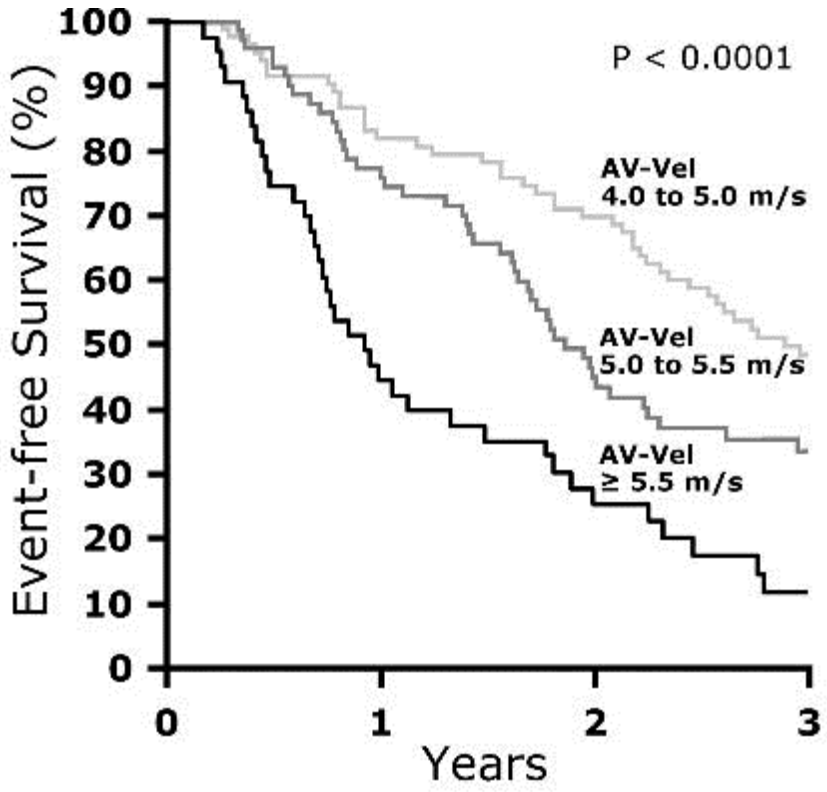
Survival with asymptomatic aortic stenosis



Patients with AV-Vel from 4.0 to 5.0 m/s				
Pts. at risk:	82	69	59	38
Patients with AV-Vel from 5.0 to 5.5 m/s				
Pts. at risk:	72	53	29	18
Patients with AV-Vel ≥ 5.5 m/s				
Pts. at risk:	44	20	11	5

Raphael Rosenhek et al. Circulation. 2010;121:151-156

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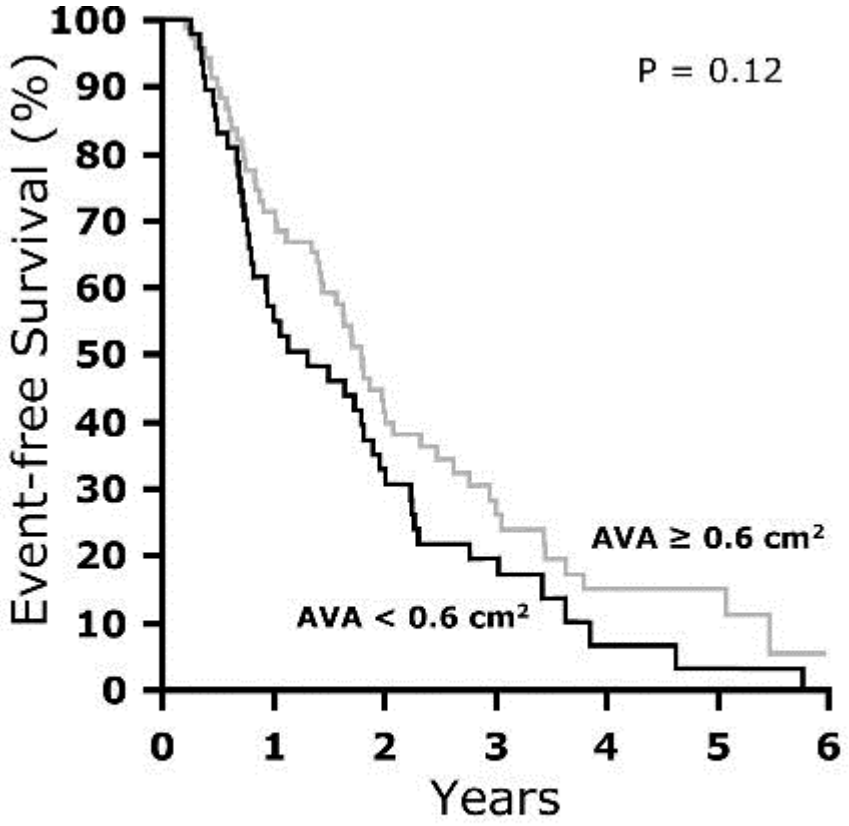
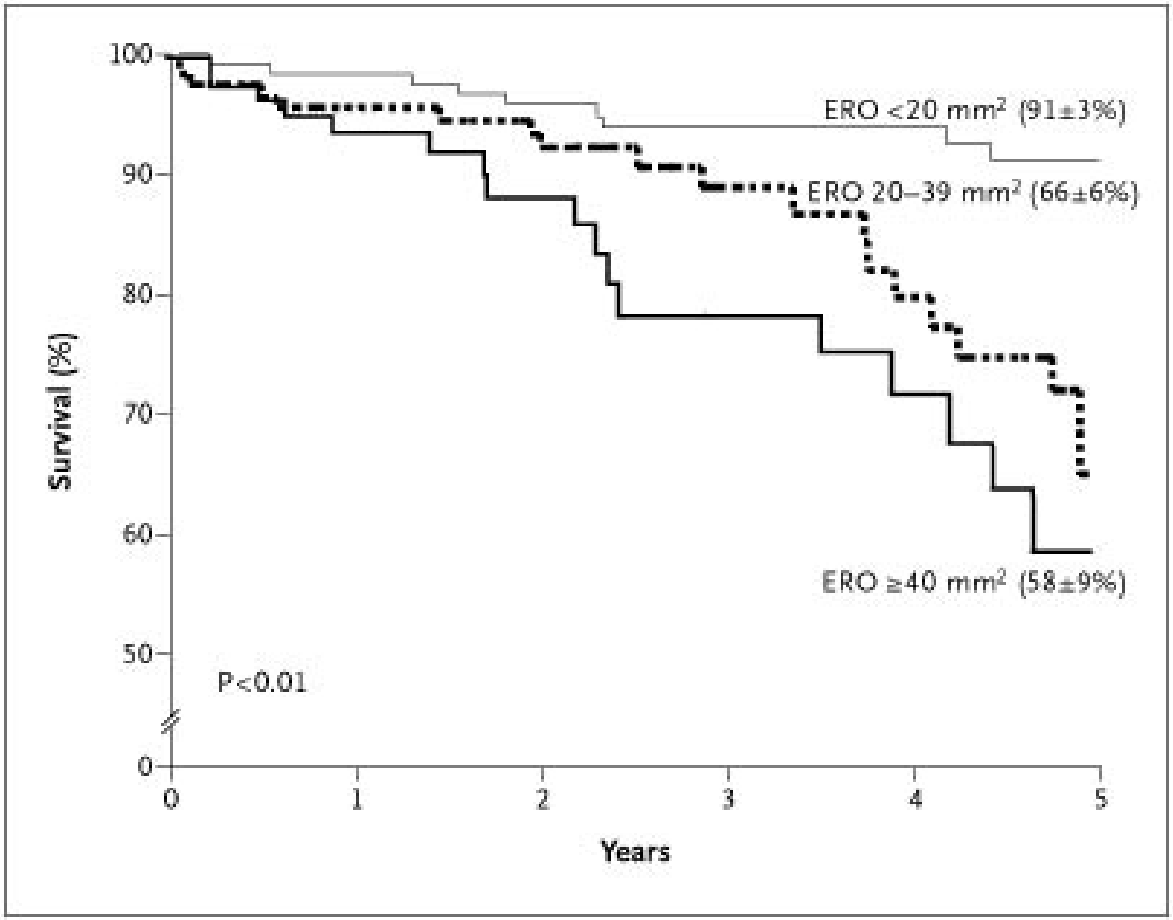
Does area matter as much?



Patients with AVA ≥ 0.6 cm²							
Pts. at risk:	69	47	25	14	7	5	2
Patients with AVA < 0.6 cm²							
Pts. at risk:	47	26	15	9	2	1	0

Raphael Rosenhek et al. Circulation. 2010;121:151-156

Asymptomatic Mitral Regurgitation

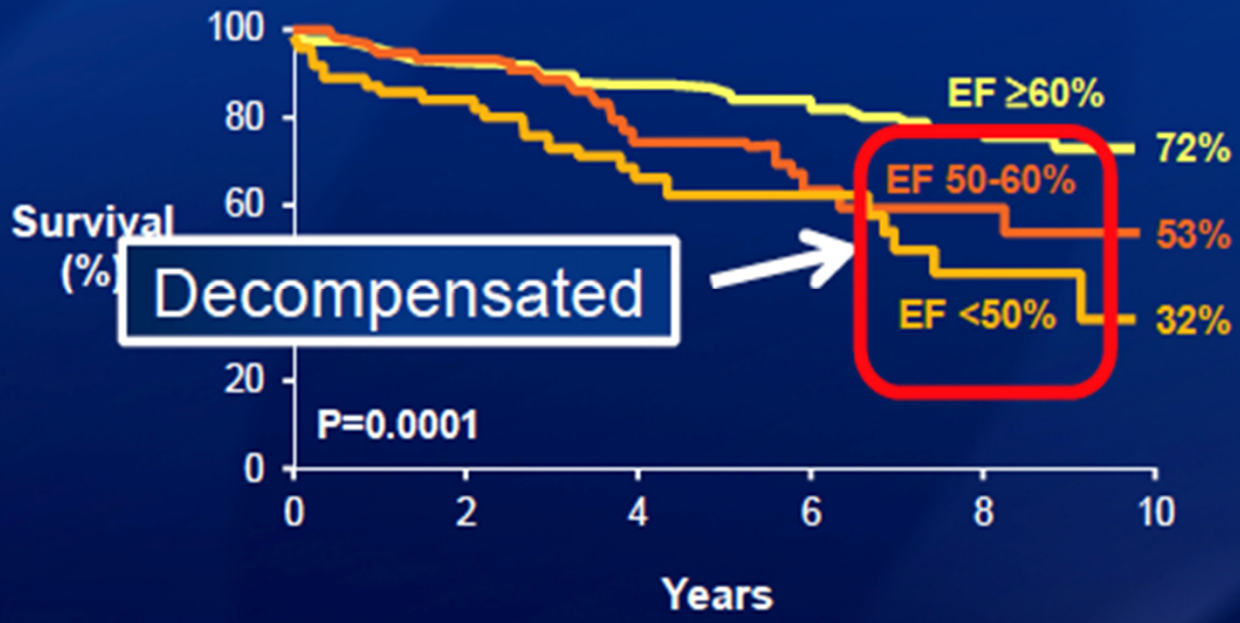


Enriquez-Sarano M et al. N Engl J Med 2005;352:875-883.

2014 ACC/AHA Valve Guidelines Stage A-D

- What is decompensated LV?
  - C1: compensated LV
  - C2: decompensated LV
  - Function when outcomes are poor
  - Function when postop LV function declines
  - When intervention prolongs survival

Mitral Regurgitation
Preop EF vs Postop Survival



Enriquez-Sarano, M. et al.

Aortic Stenosis: Stages of Disease

J Am Coll Cardiol. 2014;63(22):2438-2488

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AS	•Bicuspid aortic valve (or other congenital valve anomaly)•Aortic valve sclerosis	•Aortic Vmax <2 m/s	•None	•None
B	Progressive AS	•Mild-to-moderate leaflet calcification of a bicuspid or trileaflet valve with some reduction in systolic motion or•Rheumatic valve changes with commissural fusion	•Mild AS:Aortic Vmax 2.0–2.9 m/s ormean ΔP <20 mm Hg•Moderate AS:Aortic Vmax 3.0–3.9 m/s ormean ΔP 20–39 mm Hg	•Early LV diastolic dysfunction may be present•Normal LVEF	•None
C: Asymptomatic severe AS					
C1	Asymptomatic severe AS	•Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening	•Aortic Vmax ≥4 m/s ormean ΔP ≥40 mm Hg•AVA typically is ≤1.0 cm2 (or AVAi ≤0.6 cm2/m2)•Very severe AS is an aortic Vmax ≥5 m/s or mean ΔP ≥60 mm Hg	•LV diastolic dysfunction•Mild LV hypertrophy•Normal LVEF	•None: Exercise testing is reasonable to confirm symptom status
C2	Asymptomatic severe AS with LV dysfunction	•Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening	•Aortic Vmax ≥4 m/s ormean ΔP ≥40 mm Hg•AVA typically ≤1.0 cm2 (or AVAi ≤0.6 cm2/m2)	•LVEF <50%	•None
D: Symptomatic severe AS					
D1	Symptomatic severe high-gradient AS	•Severe leaflet calcification or congenital stenosis with severely reduced leaflet opening	•Aortic Vmax ≥4 m/s ormean ΔP ≥40 mm Hg•AVA typically ≤1.0 cm2 (or AVAi ≤0.6 cm2/m2) but may be larger with mixed AS/AR	•LV diastolic dysfunction•LV hypertrophy•Pulmonary hypertension may be present	•Exertional dyspnea or decreased exercise tolerance•Exertional angina•Exertional syncope or presyncope
D2	Symptomatic severe low-flow/low-gradient AS with reduced LVEF	•Severe leaflet calcification with severely reduced leaflet motion	•AVA ≤1.0 cm2 withresting aortic Vmax <4 m/s ormean ΔP <40 mm Hg•Dobutamine stress echocardiography shows AVA ≤1.0 cm2 with Vmax ≥4 m/s at any flow rate	•LV diastolic dysfunction•LV hypertrophy•LVEF <50%	•HF•Angina•Syncope or presyncope
D3	Symptomatic severe low-gradient AS with normal LVEF or paradoxical low-flow severe AS	•Severe leaflet calcification with severely reduced leaflet motion	•AVA ≤1.0 cm2 with aortic Vmax <4 m/s or mean ΔP <40 mm Hg•Indexed AVA ≤0.6 cm2/m2 and•Stroke volume index <35 mL/m2•Measured when patient is normotensive (systolic BP <140 mm Hg)	•Increased LV relative wall thickness•Small LV chamber with low stroke volume•Restrictive diastolic filling•LVEF ≥50%	•HF•Angina•Syncope or presyncope

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2014 ACC/AHA Valve Guidelines
Aortic Stenosis

- Stage C: Severe disease (asymptomatic)
  - AV velocity > 4 m/s
  - C1: EF > 50%
  - C2: EF < 50%

- Stage D: Severe disease (symptomatic)
  - D1: high gradient, normal EF
  - D2: low gradient, low EF
  - D3: low gradient, normal EF

Table 13 Stages of *Primary* MR

J Am Coll Cardiol. 2014;63(22):2438-2488

Grade	Definition	Valve Anatomy	Valve Hemodynamics•	Hemodynamic Consequences	Symptoms
A	At risk of MR	•Mild mitral valve prolapse with normal coaptation•Mild valve thickening and leaflet restriction	•No MR jet or small central jet area <20% LA on Doppler•Small vena contracta <0.3 cm	•None	•None
B	Progressive MR	•Severe mitral valve prolapse with normal coaptation•Rheumatic valve changes with leaflet restriction and loss of central coaptation•Prior IE	•Central jet MR 20%–40% LA or late systolic eccentric jet MR•Vena contracta <0.7 cm•Regurgitant volume <60 mL•Regurgitant fraction <50%•ERO <0.40 cm2•Angiographic grade 1–2+	•Mild LA enlargement•No LV enlargement•Normal pulmonary pressure	•None
C	Asymptomatic severe MR	•Severe mitral valve prolapse with loss of coaptation or flail leaflet•Rheumatic valve changes with leaflet restriction and loss of central coaptation•Prior IE•Thickening of leaflets with radiation heart disease	•Central jet MR >40% LA or holosystolic eccentric jet MR•Vena contracta ≥0.7 cm•Regurgitant volume ≥60 mL•Regurgitant fraction ≥50%•ERO ≥0.40 cm2•Angiographic grade 3–4+	•Moderate or severe LA enlargement•LV enlargement•Pulmonary hypertension may be present at rest or with exercise•C1: LVEF >60% and LVESD <40 mm•C2: LVEF ≤60% and LVESD ≥40 mm	•None
D	Symptomatic severe MR	•Severe mitral valve prolapse with loss of coaptation or flail leaflet•Rheumatic valve changes with leaflet restriction and loss of central coaptation•Prior IE•Thickening of leaflets with radiation heart disease	•Central jet MR >40% LA or holosystolic eccentric jet MR•Vena contracta ≥0.7 cm•Regurgitant volume ≥60 mL•Regurgitant fraction ≥50%•ERO ≥0.40 cm2•Angiographic grade 3–4+	•Moderate or severe LA enlargement•LV enlargement•Pulmonary hypertension present	•Decreased exercise tolerance•Exertional dyspnea

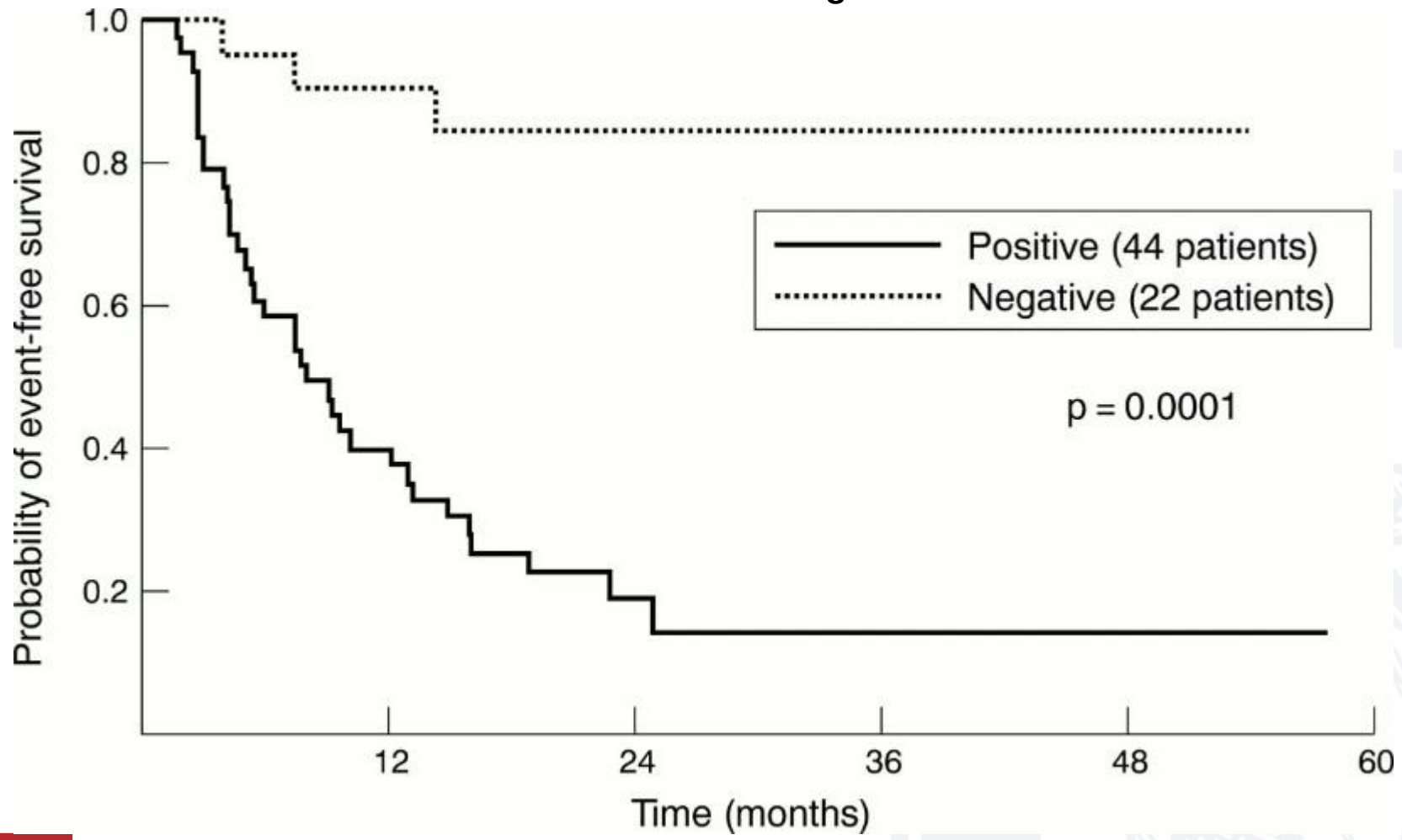
2014 ACC/AHA Valve Guidelines
Mitral Regurgitation

- Stage C: Severe disease (asymptomatic)
  - C1: EF > 60% ESD < 40 mm
  - C2: EF < 60% ESD $\geq$ 40 mm
- Stage D: Severe disease (symptomatic)
  - central jet >40% LA
  - eccentric jet MR-Vena Contracta > 0.7 cm
  - regurgitant volume $\geq$ 60 ml
  - regurgitant fraction $\geq$ 50%
  - ERO $\geq$ 0.40 cm2

2014 ACC/AHA Valve Guidelines

- What about asymptomatic patients?
  - aortic stenosis
  - mitral insufficiency

Kaplan–Meier life table analysis for probability of event-free survival over 60 months for patients with asymptomatic severe aortic stenosis, according to positive or negative results of exercise testing.



Heart

M C M Amato et al. Heart 2001;86:381-386

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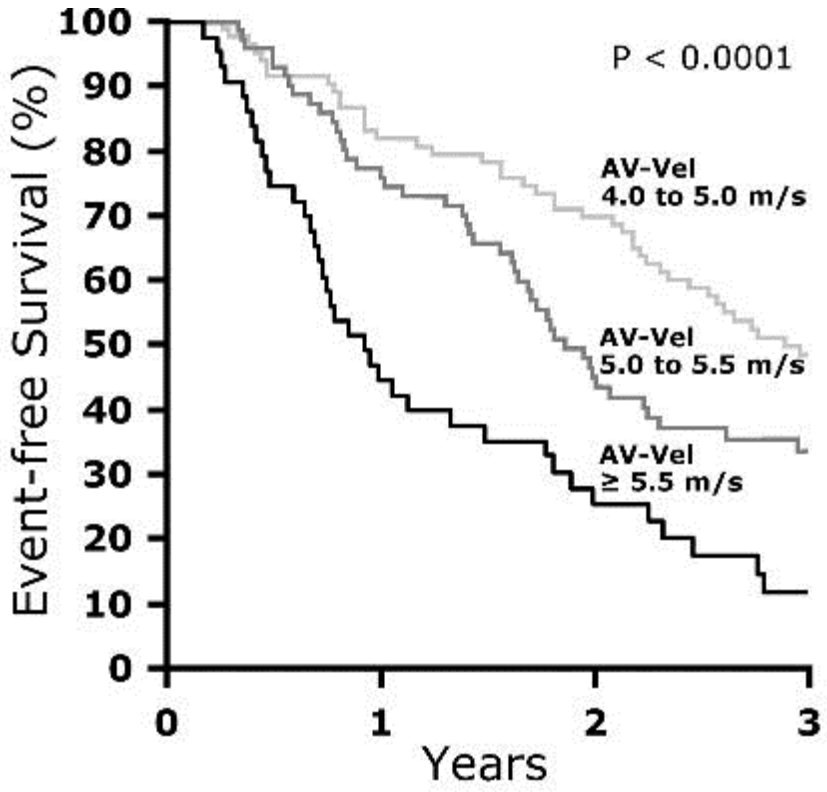
Survival with asymptomatic aortic stenosis



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Raphael Rosenhek et al. Circulation. 2010;121:151-156

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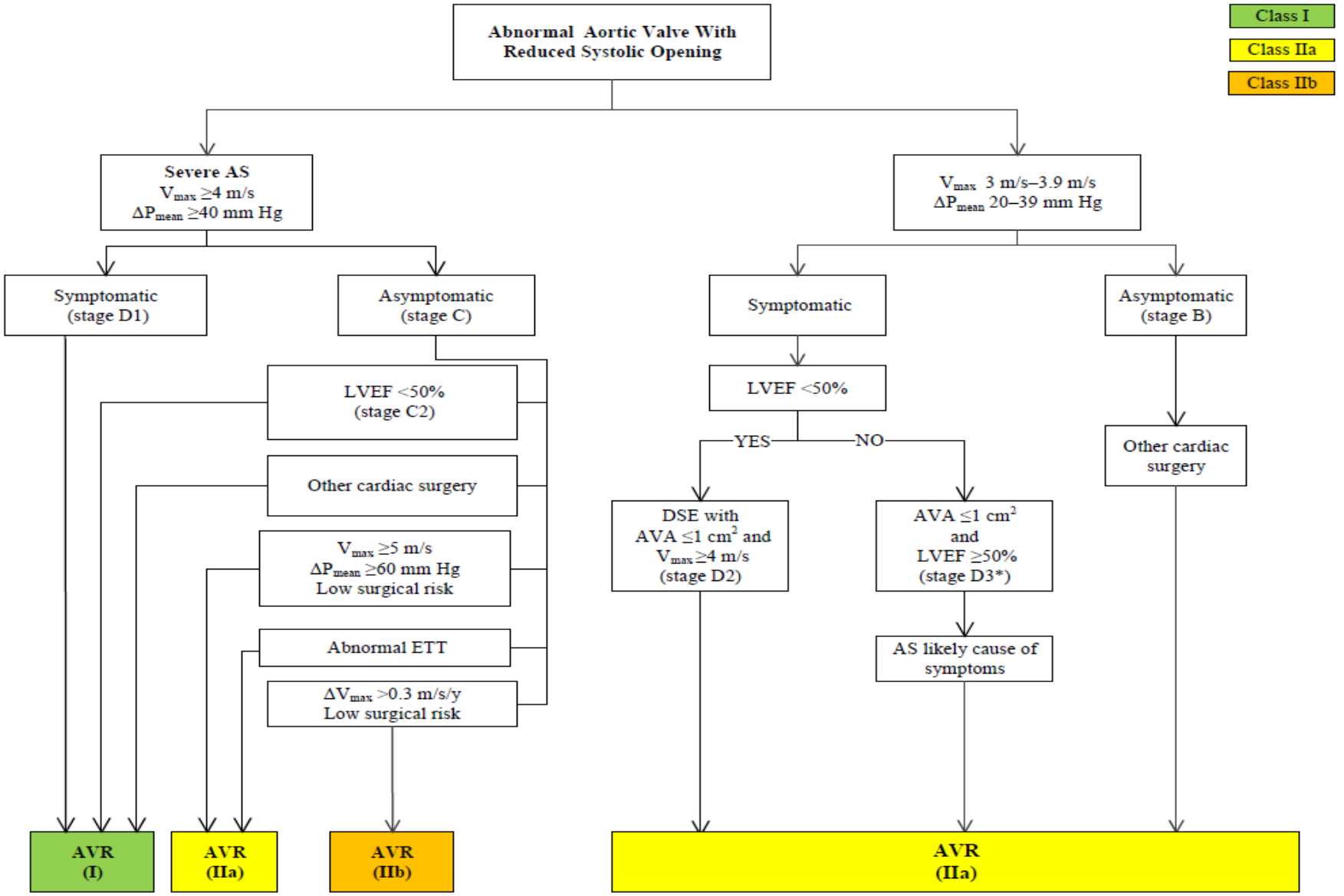
Indications for Aortic Valve Replacement in Patients With Aortic Stenosis



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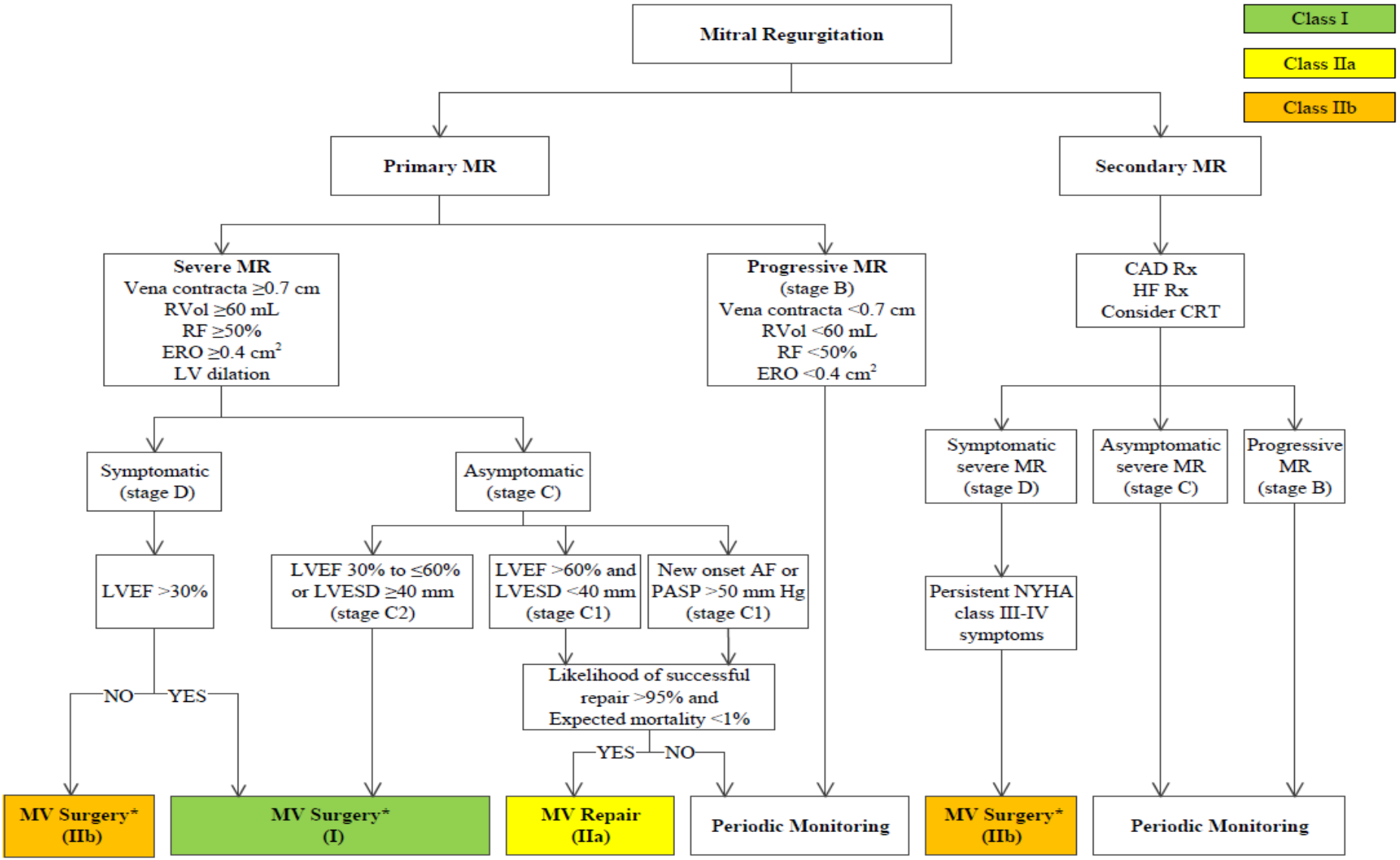
J Am Coll Cardiol. 2014;63(22):2438-2488

Indications for Surgery for Mitral Regurgitation



J Am Coll Cardiol. 2014;63(22):2438-2488

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Individualized treatment strategies and "shared decision making"

- Clinical picture
- Imaging parameters
- Frailty assessment
- Multidisciplinary approach
- Don't forget to ask the family and patient!

Heart Valve Centers of Excellence

- Heart Valve Team approach
- High level of expertise
- High patient volume
- Data registry participation
- Reporting own data with continuous improvement process

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The Heart Valve Team and Heart Valve Centers of Excellence

Recommendations	COR	LOE
Patients with severe VHD should be evaluated by a multidisciplinary Heart Valve Team when intervention is considered	I	C
Consultation with or referral to a Heart Valve Center of Excellence is reasonable when discussing treatment options for 1) asymptomatic patients with severe VHD, 2) patients who may benefit from valve repair versus valve replacement, or 3) patients with multiple comorbidities for whom valve intervention is considered	IIa	C

J Am Coll Cardiol. 2014;63(22):2438-2488

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Trends in Mitral Valve Surgery in the United States: Results From The Society of Thoracic Surgeons Adult Cardiac Database

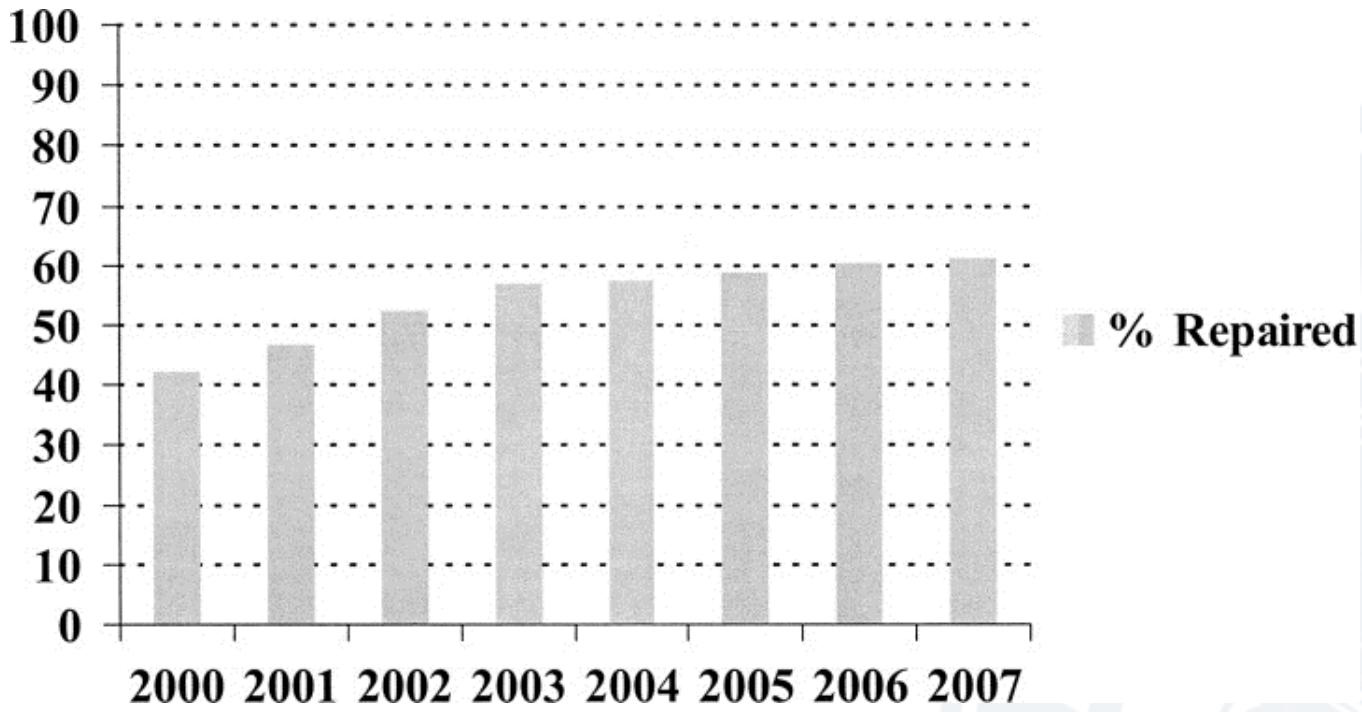


Fig 3. Overall mitral valve repair rates, percent repaired (gray bars), for isolated primary mitral valve operations, for the years 2000 to 2007 ($p < 0.0001$).

The Annals of Thoracic Surgery, Volume 87, Issue 5, 2009, 1431–1439

Less-Invasive Mitral Valve Operations: Trends and Outcomes From The Society of Thoracic Surgeons Adult Cardiac Surgery Database

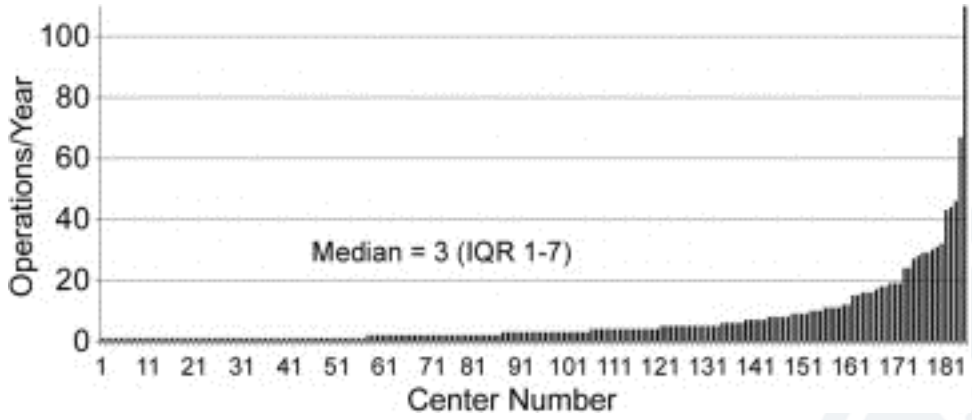


Fig 3. Distribution of less-invasive mitral valve operations among centers performing this operation. (IQR = interquartile range.)

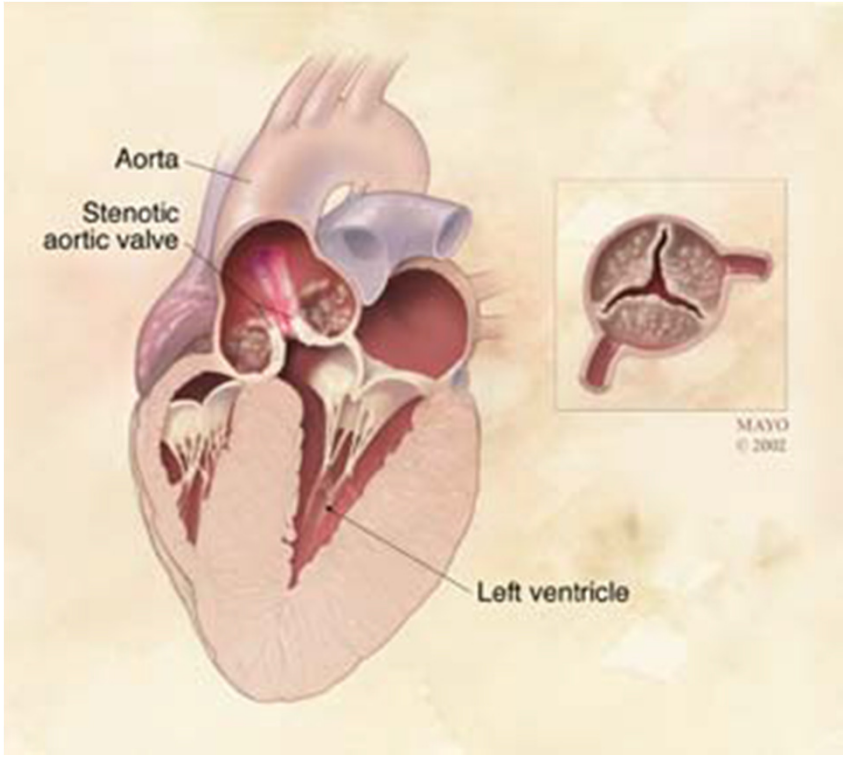
The Annals of Thoracic Surgery, Volume 90, Issue 5, 2010, 1401–1410.e1

Risk Assessment Combining STS Risk Estimate, Frailty, Major Organ System Dysfunction, and Procedure-Specific Impediments

	Low Risk (must meet ALL criteria in this column)	**Intermediate Risk (any 1 criteria in this column)**	**High Risk (any 1 criteria in this column)**	**Prohibitive Risk (any 1 criteria in this column)**
STS PROM	<4% **AND**	4% to 8% **OR**	>8% **OR**	Predicted risk with surgery of death or major morbidity (all-cause) >50% at 1 y **OR**
Frailty	None **AND**	1 index (mild) **OR**	2 or more indices (moderate-to-severe) **OR**	
Major organ system compromise not to be improved postoperatively	None **AND**	1 organ system **OR**	No more than 2 organ systems **OR**	3 or more organ systems **OR**
Procedure-specific impediment	None	Possible procedure-specific impediment	Possible procedure-specific impediment	Severe procedure-specific impediment

J Am Coll Cardiol. 2014;63(22):2438-2488

85 yo female with severe symptomatic aortic stenosis



Class I - AVR

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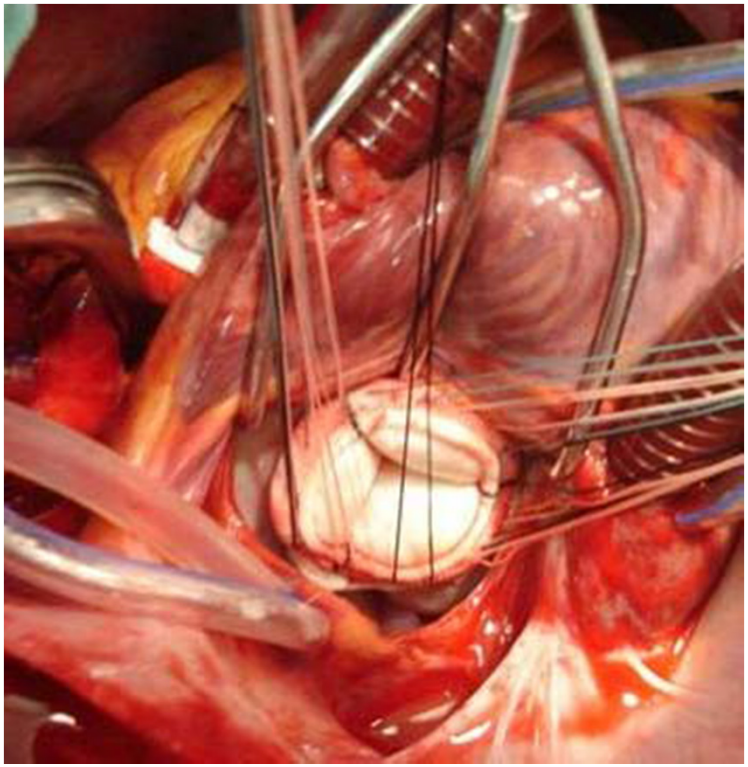

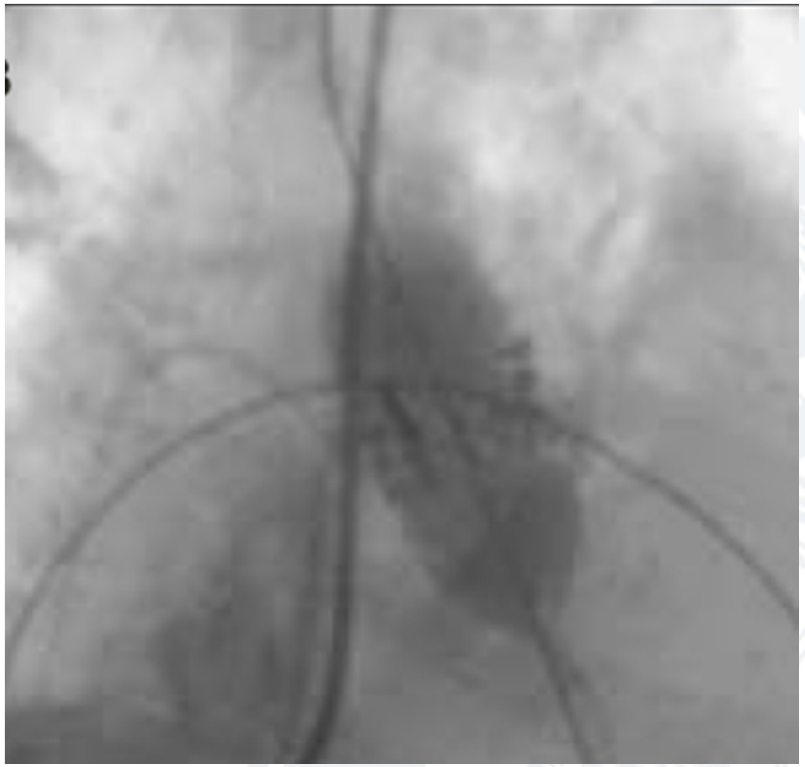

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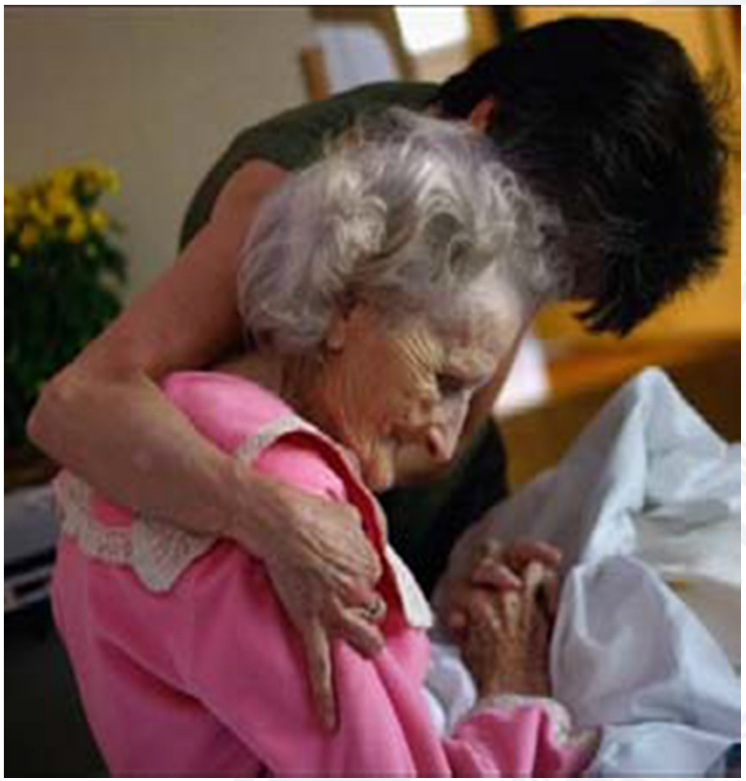
85 yo female with severe symptomatic aortic stenosis



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Frequency of Echocardiograms in Asymptomatic Patients With VHD and Normal Left Ventricular Function

Stage	Valve Lesion			
Stage	Aortic Stenosis	Aortic Regurgitation	Mitral Stenosis	Mitral Regurgitation
Progressive (stage B)	Every 3–5 y (mild severity V_{max} 2.0–2.9 m/s) Every 1–2 y (moderate severity V_{max} 3.0–3.9 m/s)	Every 3-5 y (mild severity) Every 1-2 y (moderate severity)	Every 3–5 y (MVA >1.5 cm^2)	Every 3–5 y (mild severity) Every 1–2 y (moderate severity)
Severe (stage C)	Every 1 y (V_{max} ≥4 m/s)	Every 1 y Dilating LV–more frequent	Every 1–2 y (MVA 1.0–1.5 cm^2) Every 1 y (MVA <1 cm^2)	Every 6 months to 1 y Dilating LV–more frequent

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Prosthetic Valve: Diagnosis and Follow-Up

Recommendations	COR	LOE
An initial TTE study is recommended in patients after prosthetic valve implantation for evaluation of valve hemodynamics	I	B
Repeat TTE is recommended in patients with prosthetic heart valves if there is a change in clinical symptoms or signs suggesting valve dysfunction	I	C
TEE is recommended when clinical symptoms or signs suggest prosthetic valve dysfunction	I	C
Annual TTE is reasonable in patients with a bioprosthetic valve after the first 10 years, even in the absence of a change in clinical status	IIa	C

21st Century ACC/AHA Valve Guidelines

What cool tools can help facilitate the use of our guidelines?

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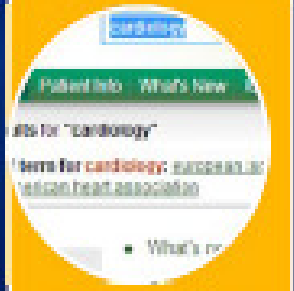
- 28 year old female student
  - mechanical St. Jude mitral valve 4 years ago
  - INR = 3.0
  - daily warfarin dose is 3 mg
  - now 8 weeks pregnant

Now what is a practitioner to do?

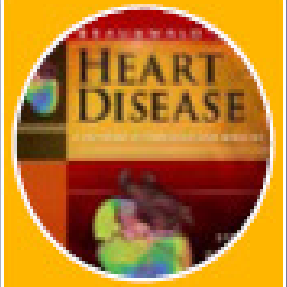
- Continue warfarin?
- Switch to low molecular weight heparin?
- Subcutaneous heparin?
- Not really sure?

Where do we go for knowledge? - quickly



Up to Date

Google



Textbooks

Med-line

Call the expert

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Where would you look for an answer?

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PRACTICE GUIDELINE

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Executive Summary

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

Developed in Collaboration With the American Association for Thoracic Surgery, American Society of Echocardiography, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Anesthesiologists, and Society of Thoracic Surgeons

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Table 4. Frequency of Echocardiograms in Asymptomatic Patients With VHD and Normal Left Ventricular Function

Stage	Valve Lesion			
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Progressive (stage B)	Every 3–5 y (mild severity V_{max} 2.0–2.9 m/s) Every 1–2 y (moderate severity V_{max} 3.0–3.9 m/s)	Every 3–5 y (mild severity) Every 1–2 y (moderate severity)	Every 3–5 y (MVA >1.5 cm^2)	Every 3–5 y (mild severity) Every 1–2 y (moderate severity)
Severe (stage C)	Every 6–12 mo (V_{max} ≥4 m/s)	Every 6–12 mo Dilating LV: more frequently	Every 1–2 y (MVA 1.0–1.5 cm^2) Once every year (MVA <1.0 cm^2)	Every 6–12 mo Dilating LV: more frequently

Patients with mixed valve disease may require serial evaluations at intervals earlier than recommended for single valve lesions.
*With normal stroke volume.
LV indicates left ventricle; MVA, mitral valve area; VHD, valvular heart disease; and V_{max}, maximum velocity.

Table 5. Risk Assessment Combining STS Risk Estimate, Frailty, Major Organ System Dysfunction, and Procedure-Specific Impediments

	Low Risk (Must Meet ALL Criteria in This Column)	Intermediate Risk (Any 1 Criterion in This Column)	High Risk (Any 1 Criterion in This Column)	Prohibitive Risk (Any 1 Criterion in This Column)
STS PROM*	<4% AND	4%–8% OR	>8% OR	Predicted risk with surgery of death or major morbidity (all-cause) >50% at 1 y OR
Frailty†	None AND	1 Index (mild) OR	≥2 Indices (moderate to severe) OR	
Major organ system compromise not to be improved postoperatively‡	None AND	1 Organ system OR	No more than 2 organ systems OR	≥3 Organ systems OR
Procedure-specific impediment§	None	Possible procedure-specific impediment	Possible procedure-specific impediment	Severe procedure-specific impediment

*Use of the STS PROM to predict risk in a given institution with reasonable reliability is appropriate only if institutional outcomes are within 1 standard deviation of STS average observed/expected ratio for the procedure in question.
†Seven frailty indices: Katz Activities of Daily Living (independence in feeding, bathing, dressing, transferring, toileting, and urinary continence) and independence in ambulation (no walking aid or assist required or 5-meter walk in <6 s). Other scoring systems can be applied to calculate no, mild-, or moderate-to-severe frailty.
‡Examples of major organ system compromise: Cardiac—severe LV systolic or diastolic dysfunction or RV dysfunction, fixed pulmonary hypertension; CKD stage 3 or worse; pulmonary dysfunction with FEV_1 <50% or $DLCO_2$ <50% of predicted; CNS dysfunction (dementia, Alzheimer's disease, Parkinson's disease, CVA with persistent physical limitation); GI dysfunction—Crohn's disease, ulcerative colitis, nutritional impairment, or serum albumin <3.0; cancer—active malignancy; and liver—any history of cirrhosis, variceal bleeding, or elevated INR in the absence of VKA therapy.
§Examples: tracheostomy present, heavily calcified ascending aorta, chest malformation, arterial coronary graft adherent to posterior chest wall, or radiation damage.
CKD indicates chronic kidney disease; CNS, central nervous system; CVA, stroke; $DLCO_2$, diffusion capacity for carbon dioxide; FEV_1, forced expiratory volume in 1 s; GI, gastrointestinal; INR, international normalized ratio; LV, left ventricular; PROM, predicted risk of mortality; RV, right ventricular; STS, Society of Thoracic Surgeons; and VKA, vitamin K antagonist.

CLASS IIa

1. **Prophylaxis against infective endocarditis (IE) is reasonable for the following patients at highest risk for adverse outcomes from IE before dental procedures that involve manipulation of gingival tissue, manipulation of the periapical region of teeth, or perforation of the oral mucosa (41–43) *(Level of Evidence: B)*:**
   - **Patients with prosthetic cardiac valves;**
   - **Patients with previous IE;**
   - **Cardiac transplant recipients with valve regurgitation due to a structurally abnormal valve; or**
   - **Patients with CHD with:**
     - **Unrepaired cyanotic CHD, including palliative shunts and conduits;**
     - **Completely repaired congenital heart defect repaired with prosthetic material or device, whether placed by surgery or catheter intervention, during the first 6 months after the procedure; or**
     - **Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device.**

CLASS III: No Benefit

1. **Prophylaxis against IE is not recommended in patients with VHD who are at risk of IE for nondental procedures (e.g., TEE, esophagogastroduodenoscopy, colonoscopy, or cystoscopy) in the absence of active infection (44). *(Level of Evidence: B)***

2.5. Evaluation of Surgical and Interventional Risk

See Table 5 for risk assessment combining STS risk estimate, frailty, major organ system dysfunction, and procedure-specific impediments.

2.6. The Heart Valve Team and Heart Valve Centers of Excellence: Recommendations

CLASS I

1. **Patients with severe VHD should be evaluated by a multidisciplinary Heart Valve Team when intervention is considered. *(Level of Evidence: C)***

CLASS IIa

1. **Consultation with or referral to a Heart Valve Center of Excellence is reasonable when discussing treatment options for 1) asymptomatic patients with severe VHD, 2) patients who may benefit from valve repair versus valve replacement, or 3) patients with multiple comorbidities for whom valve intervention is considered. *(Level of Evidence: C)***

A competent, practicing cardiologist should have the ability to diagnose and direct the treatment of most patients with VHD. For instance, otherwise healthy patients with

Have you found the answer yet?

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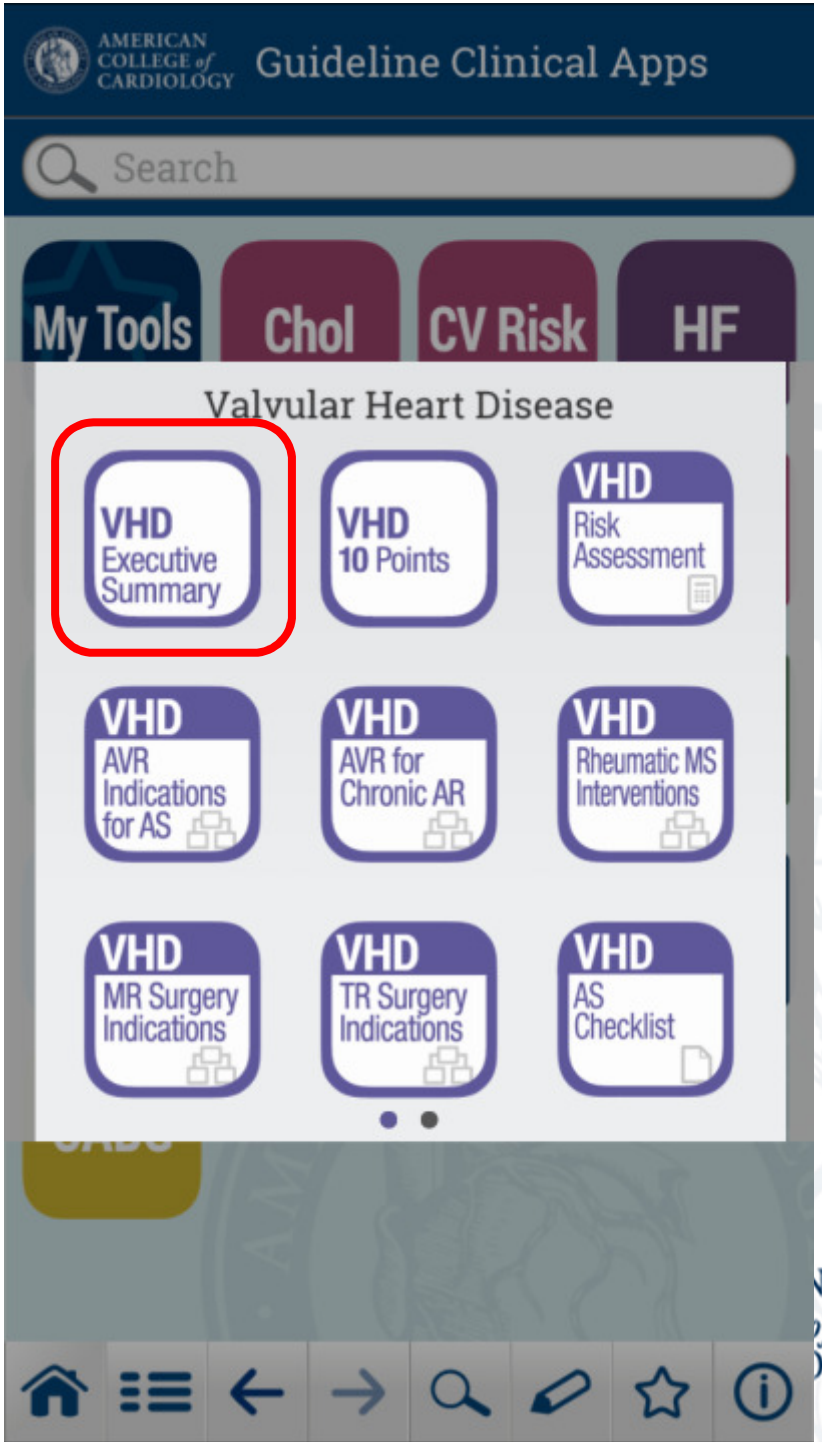
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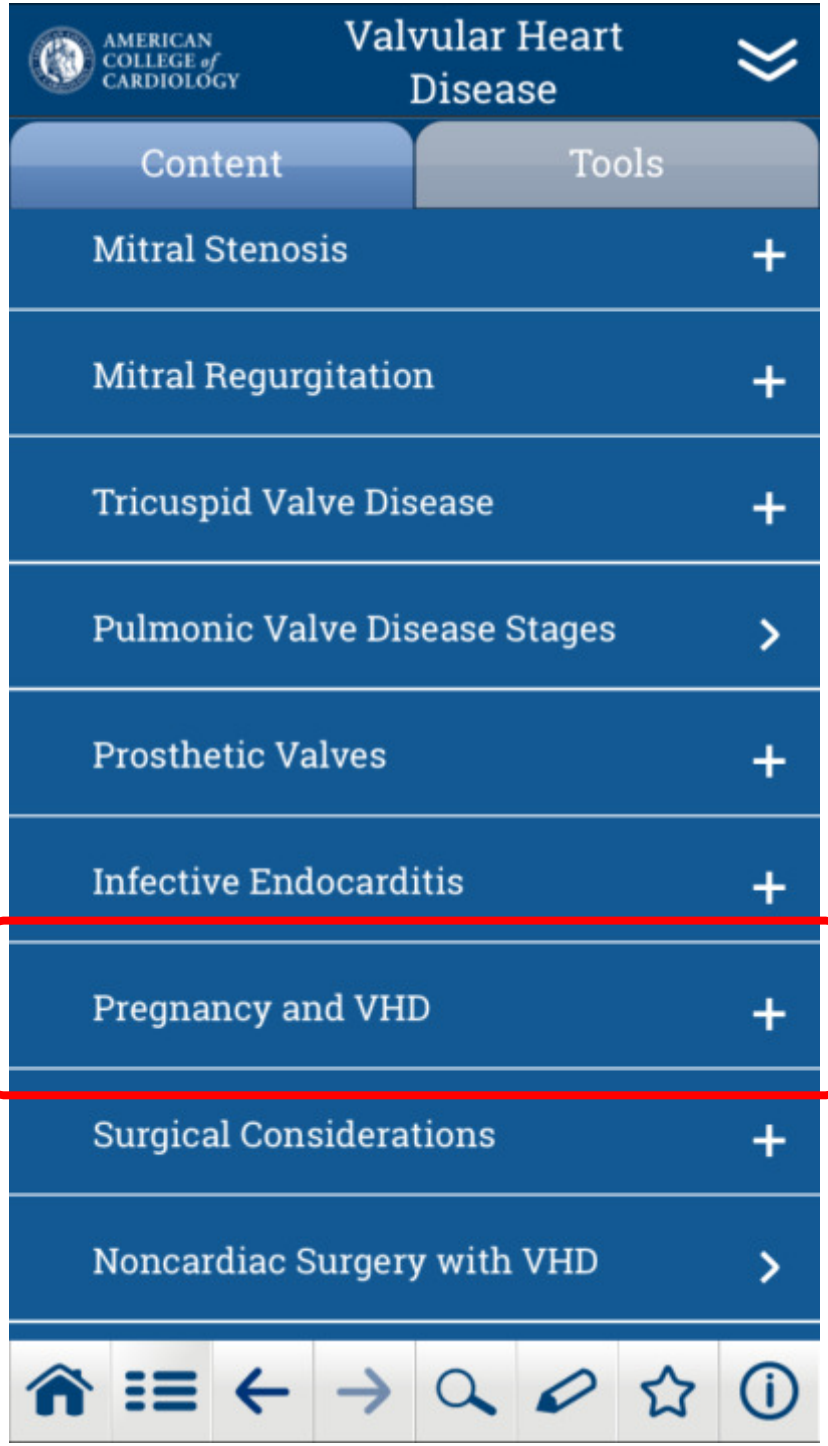
VHD TR Surgery Indications
VHD AS Checklist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Pregnancy and VHD
Surgical Considerations
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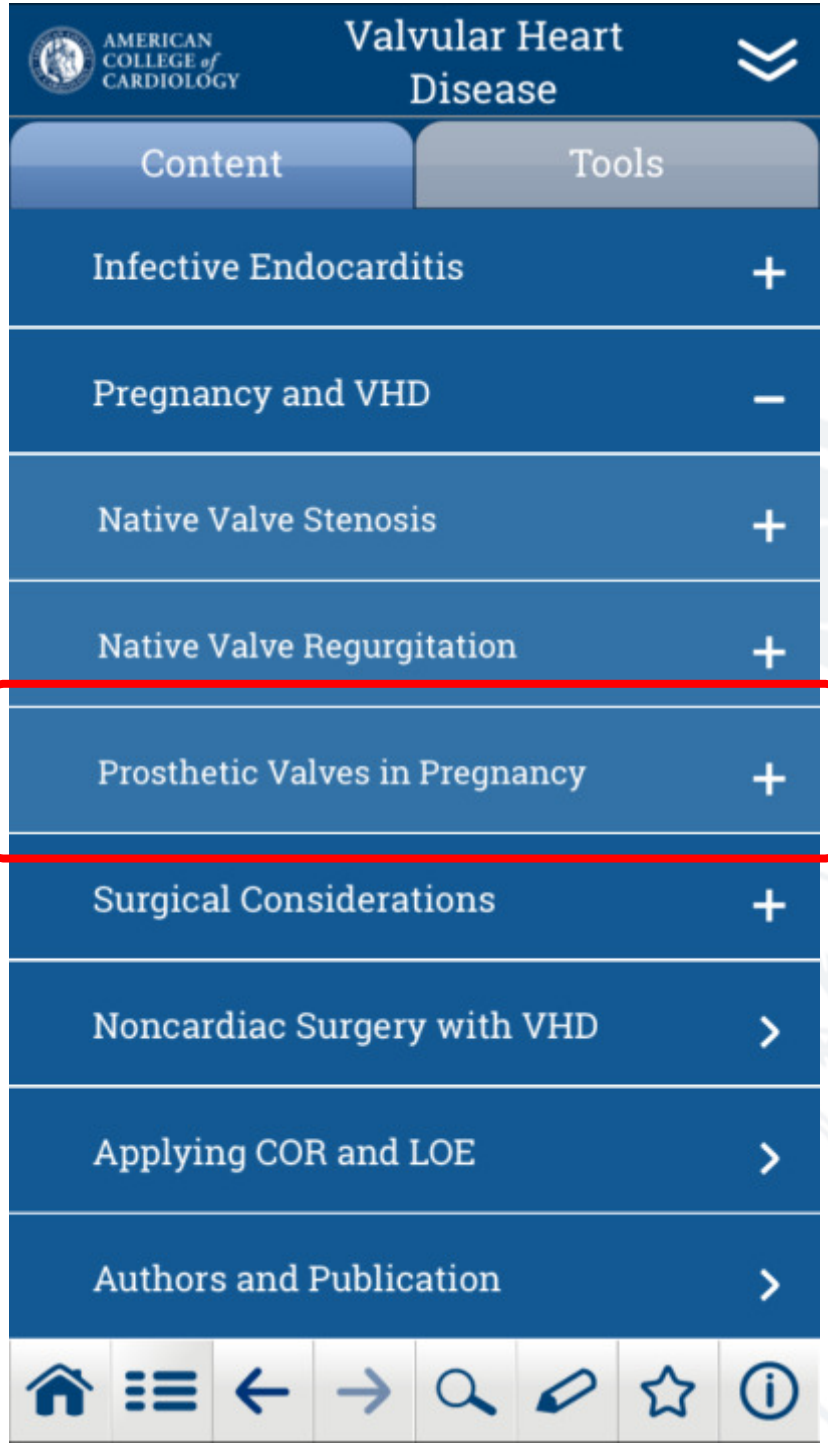
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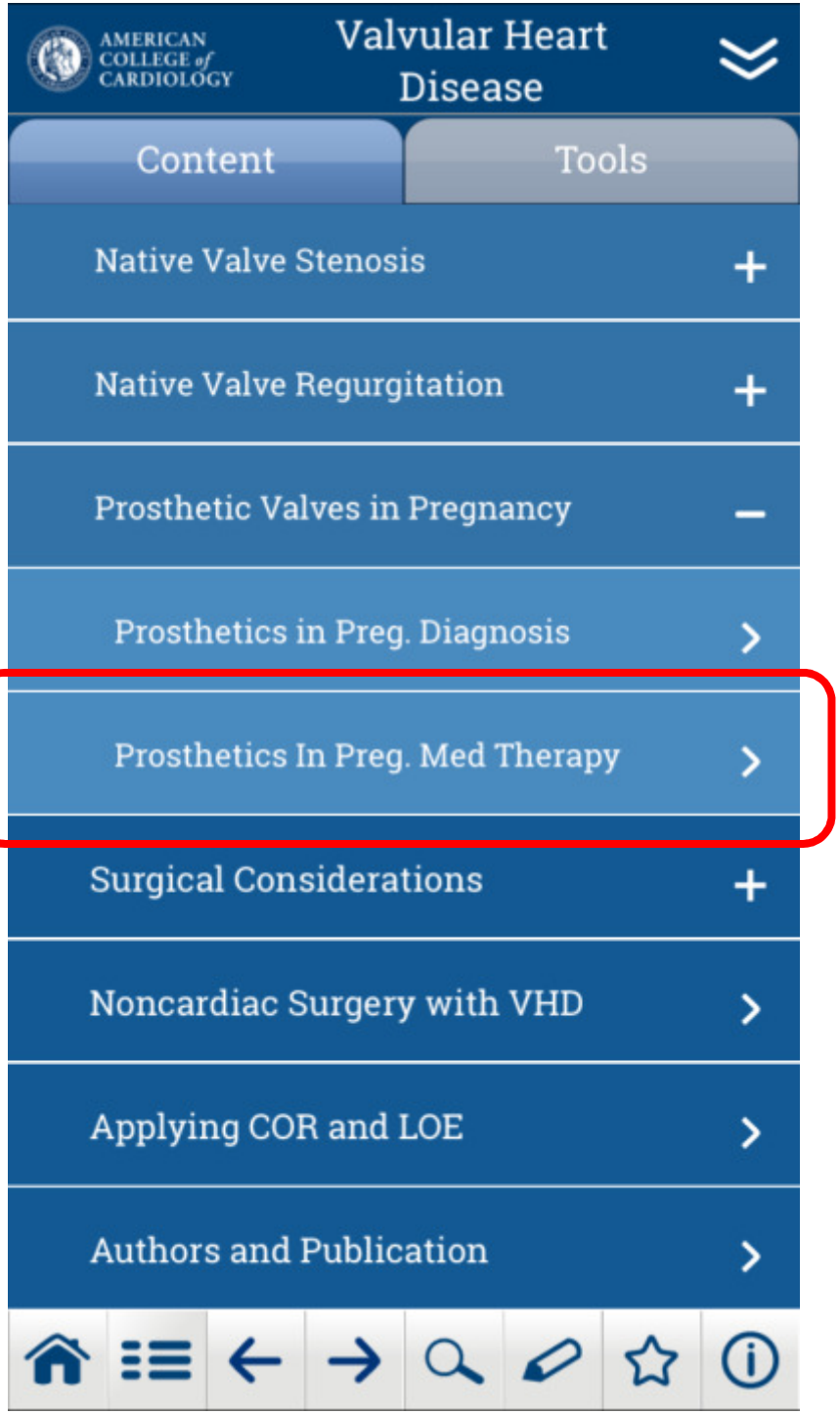

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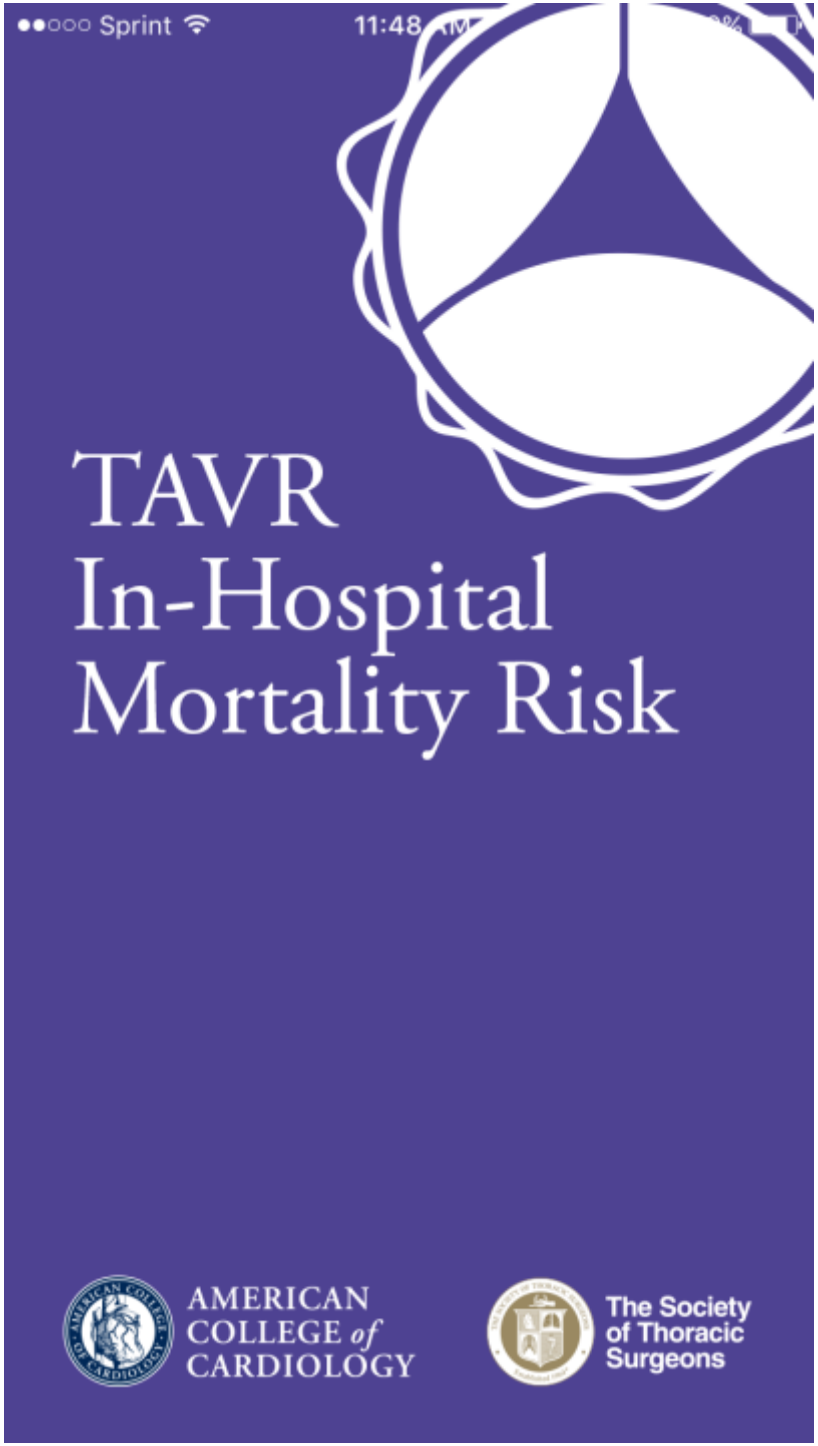
Recommendation	COR	LOE
1. Therapeutic anticoagulation with frequent monitoring is recommended for all pregnant patients with a mechanical prosthesis.	I	B
2. Warfarin is recommended in pregnant patients with a mechanical prosthesis to achieve a therapeutic INR in the second and third trimesters.	I	B
3. Discontinuation of warfarin with initiation of intravenous UFH (with an activated partial thromboplastin time [aPTT] >2 times control) is recommended before planned vaginal delivery in pregnant patients with a mechanical prosthesis.	I	C
4. Low-dose aspirin (75 mg to 100 mg) once per day is recommended for pregnant patients in the second and third trimesters with either a mechanical prosthesis or bioprosthesis.	I	C

Valvular Heart Disease
Pregnancy and VHD
Prosthetic Valves in Pregnancy
Prosthetics In Preg. Med Therapy

5. Continuation of warfarin during the first trimester is reasonable for pregnant patients with a mechanical prosthesis if the dose of warfarin to achieve a therapeutic INR is 5 mg per day or less after full discussion with the patient about risks and benefits.	IIa	B
6. Dose-adjusted LMWH at least 2 times per day (with a target anti-Xa level of 0.8 U/mL to 1.2 U/mL, 4 to 6 hours post-		



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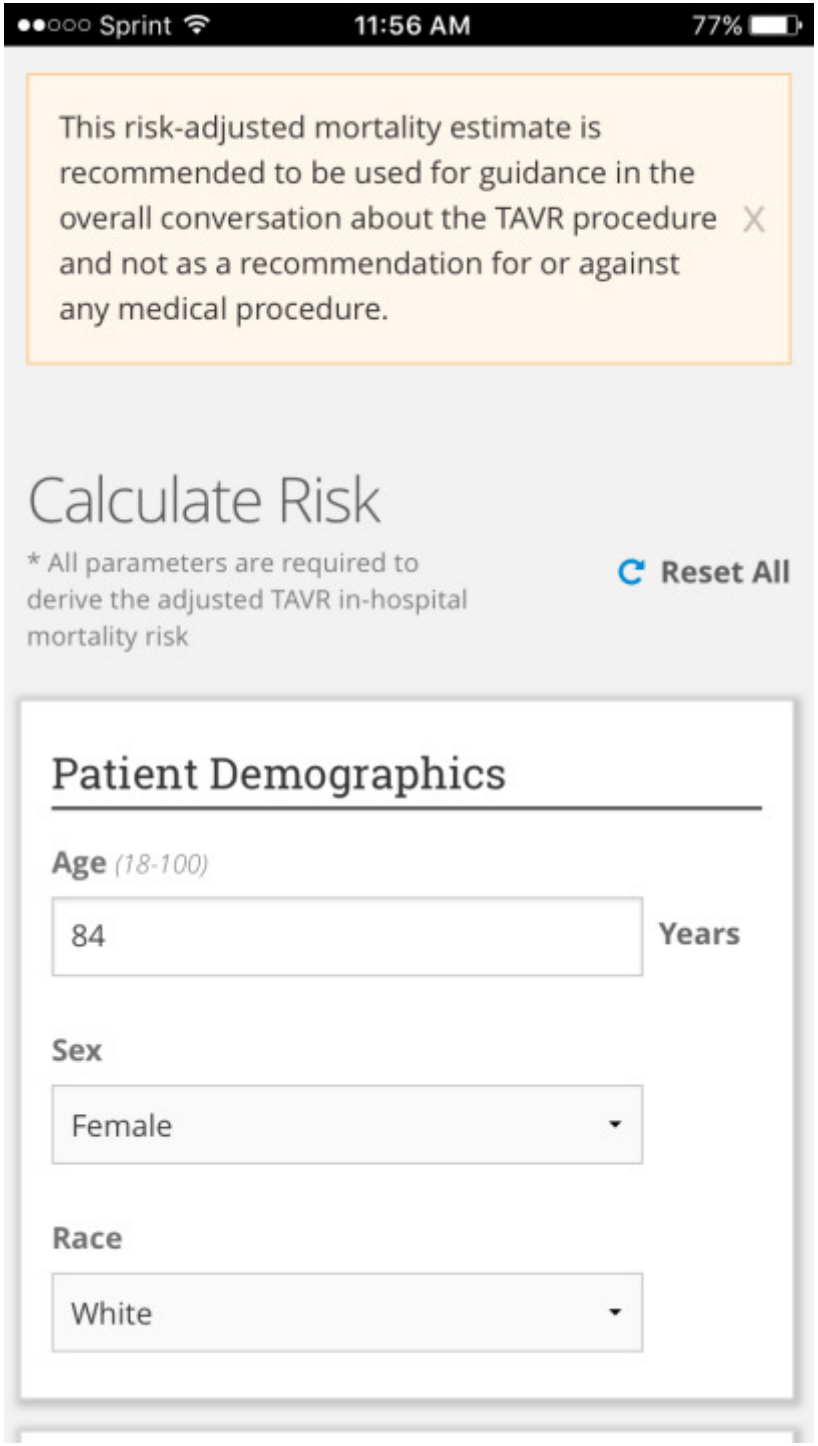

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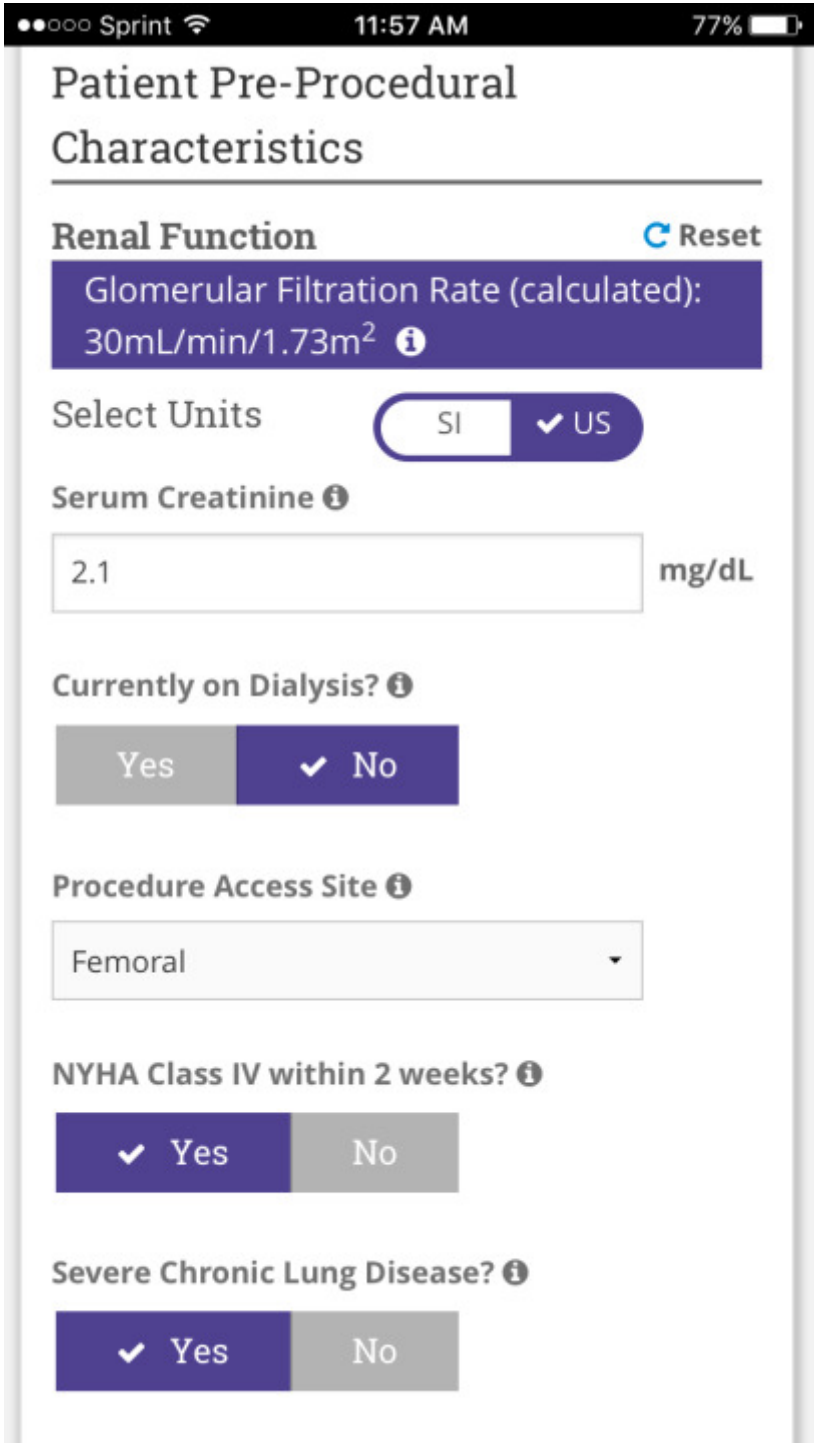

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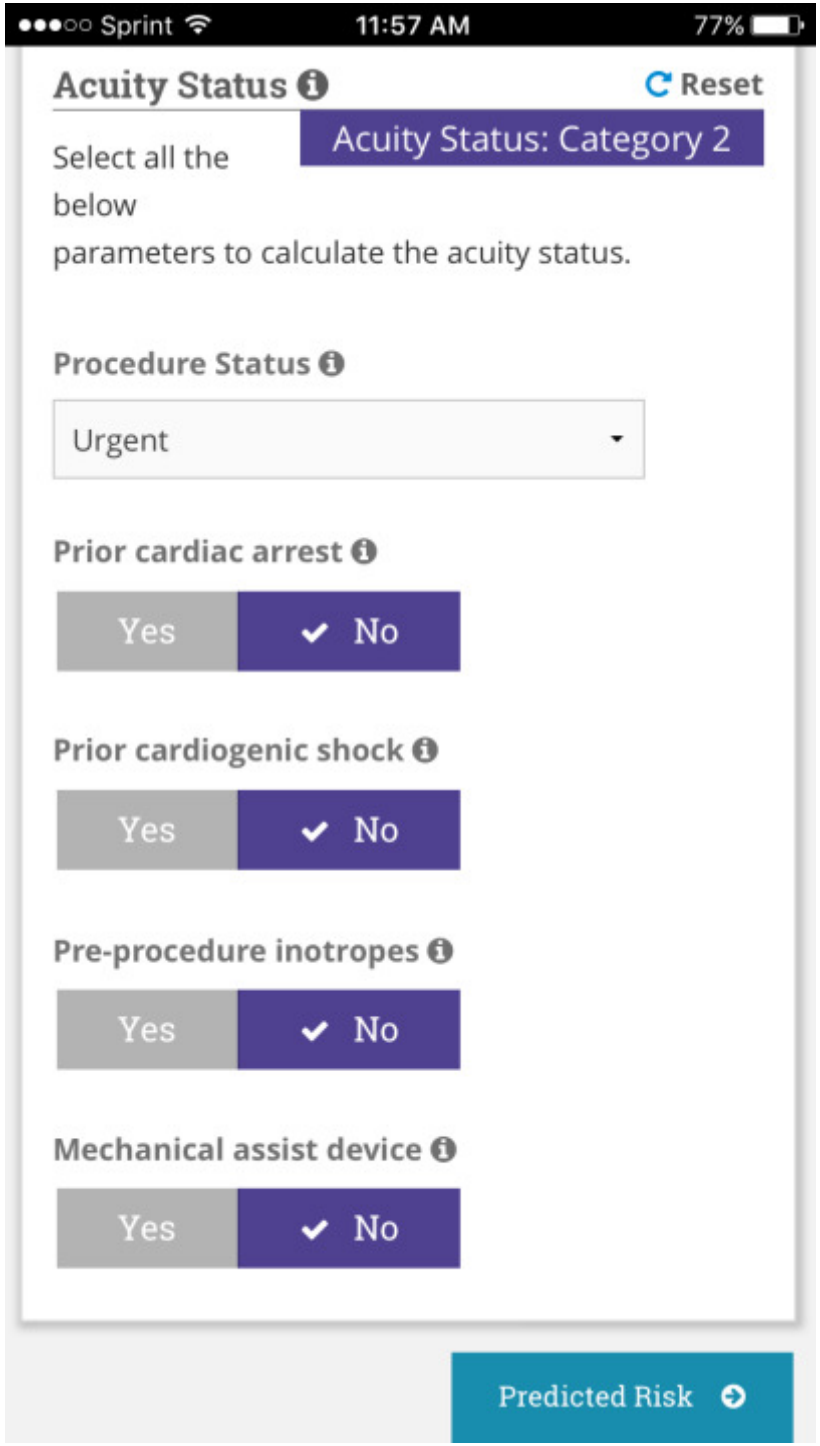

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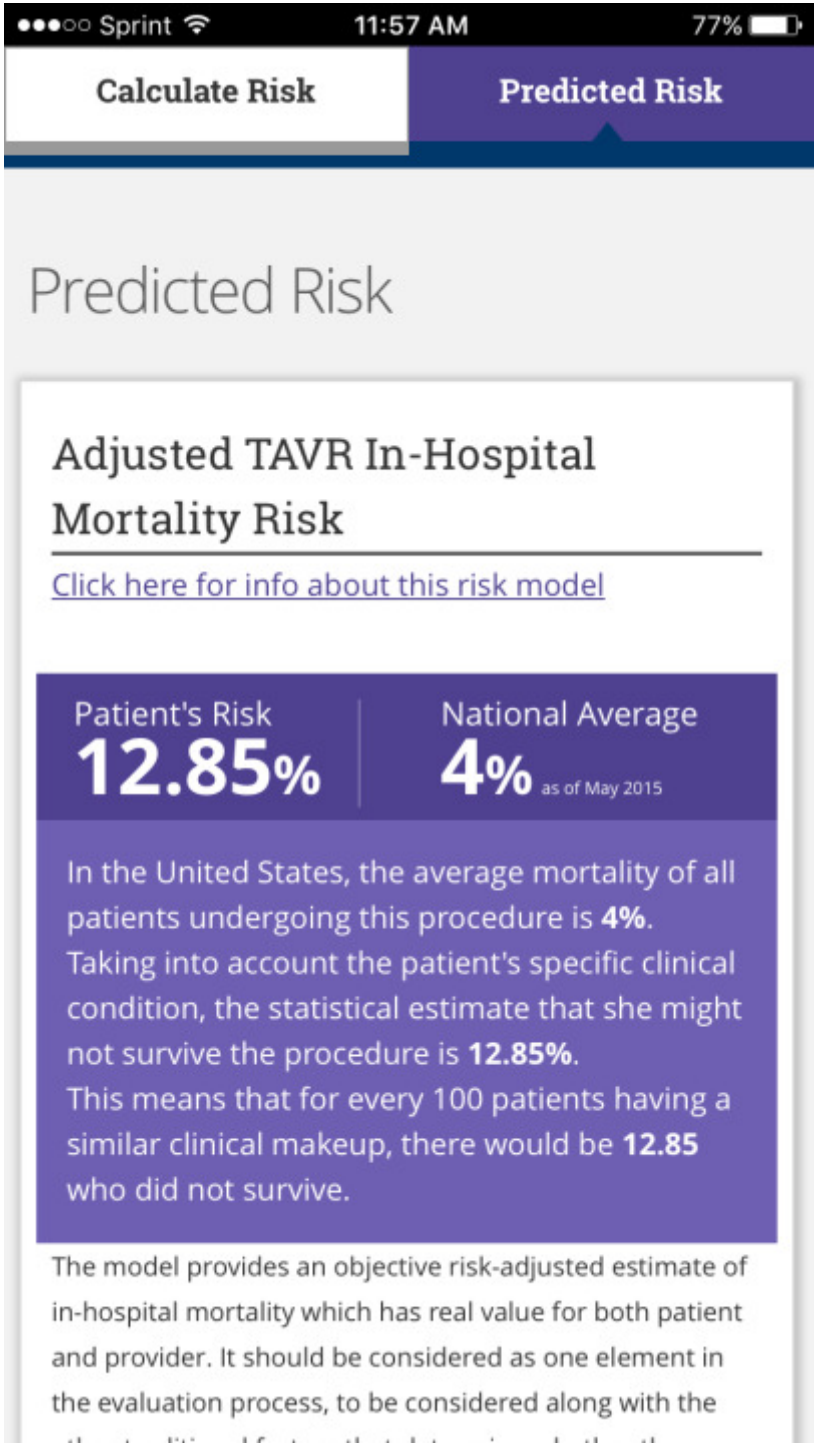

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Summary

- 2014 guidelines clarify stages of valve disease
- use recent data on natural history, outcomes, improved imaging, less invasive interventions
- endorse the "Heart Team" approach to care of valve disease patients
- emphasize individualized care
- facilitated the use of "point of care" tools

"The doctor will be with you in a few minutes. He's trying to figure out what disease goes with your insurance."