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

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

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Disclosures

Biosense Webster (a J&J Co.) consultant
Disclosures

I am not an echocardiographer!
Disclosures

Did I mention that I am not an echocardiographer???
Anderson giving valve talk at Core Curriculum

"please be dolphins, please be dolphins"

Core Curriculum Audience

Anderson giving valve talk at Core Curriculum
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
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!”
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)


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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

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Catherine M. Otto, MD, FACC, FAHA
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Jack S. Shanewise, MD
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
Why did we need new guidelines in 2014?
Survival with asymptomatic aortic stenosis

More data on natural history
We have better imaging and quantification techniques.
Proximal Isovelocity Surface Area (PISA)
We also now have better outcomes from interventions!
Access to minimally invasive therapies.
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

[+] Author Information

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
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

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At risk</td>
<td>Patients with risk factors for the development of VHD</td>
</tr>
<tr>
<td>B</td>
<td>Progressive</td>
<td>Patients with progressive VHD (mild-to-moderate severity and asymptomatic)</td>
</tr>
</tbody>
</table>
| 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
Survival with asymptomatic aortic stenosis

Does area matter as much?

![Graph showing event-free survival over years for patients with AVA ≥ 0.6 cm² and AVA < 0.6 cm². The graph includes P = 0.12 for the comparison.]

**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

Asymptomatic Mitral Regurgitation

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

Survival (%)

Years

P=0.0001

EF ≥60%
EF 50-60%
EF <50%

72%
53%
32%

Enriquez-Sarano, M. et al.
### Aortic Stenosis: Stages of Disease

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

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

*AVA = Aortic Valve Area, AVAI = Aortic Valve Area Index, LVEF = Left Ventricular Ejection Fraction, ΔP = Pressure Gradient*
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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
<th>Valve Anatomy</th>
<th>Valve Hemodynamics*</th>
<th>Hemodynamic Consequences</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At risk of MR</td>
<td>• Mild mitral valve prolapse with normal coaptation • Mild valve thickening and leaflet restriction</td>
<td>• No MR jet or small central jet area &lt;20% LA on Doppler • Small vena contracta &lt;0.3 cm</td>
<td>• None</td>
<td>• None</td>
</tr>
<tr>
<td>B</td>
<td>Progressive MR</td>
<td>• Severe mitral valve prolapse with normal coaptation • Rheumatic valve changes with leaflet restriction and loss of central coaptation • Prior IE</td>
<td>• Central jet MR 20%–40% LA or late systolic eccentric jet MR • Vena contracta &lt;0.7 cm • Regurgitant volume &lt;60 mL • Regurgitant fraction &lt;50% • ERO &lt;0.40 cm² • Angiographic grade 1–2+</td>
<td>• Mild LA enlargement • No LV enlargement • Normal pulmonary pressure</td>
<td>• None</td>
</tr>
<tr>
<td>C</td>
<td>Asymptomatic severe MR</td>
<td>• 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</td>
<td>• Central jet MR &gt;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+</td>
<td>• Moderate or severe LA enlargement • LV enlargement • Pulmonary hypertension may be present at rest or with exercise • C1: LVEF &gt;60% and LVESD &lt;40 mm • C2: LVEF ≤60% and LVESD ≥40 mm</td>
<td>• None</td>
</tr>
<tr>
<td>D</td>
<td>Symptomatic severe MR</td>
<td>• 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</td>
<td>• Central jet MR &gt;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+</td>
<td>• Moderate or severe LA enlargement • LV enlargement • Pulmonary hypertension present</td>
<td>• Decreased exercise tolerance • Exertional dyspnea</td>
</tr>
</tbody>
</table>
2014 ACC/AHA Valve Guidelines
Mitral Regurgitation

• **Stage C: Severe disease (asymptomatic)**
  - C1: EF > 60%  ESD < 40 mm
  - C2: EF < 60%  ESD ≥ 40 mm

• **Stage D: Severe disease (symptomatic)**
  - central jet >40% LA
  - eccentric jet MR-Vena Contracta > 0.7 cm
  - regurgitant volume ≥ 60 ml
  - regurgitant fraction ≥ 50%
  - ERO ≥ 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.

- Positive (44 patients)
- Negative (22 patients)

\[ p = 0.0001 \]
Survival with asymptomatic aortic stenosis

![Graph showing survival rates for different AV-Vel categories](image)

**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

Indications for Aortic Valve Replacement in Patients With Aortic Stenosis

Abnormal Aortic Valve With Reduced Systolic Opening

Severe AS
\[ V_{max} \geq 4 \text{ m/s} \]
\[ \Delta P_{max} \geq 40 \text{ mm Hg} \]

Symptomatic (stage D1)

Asymptomatic (stage C)

LVEF <50% (stage C2)

Other cardiac surgery

\[ V_{max} \geq 5 \text{ m/s} \]
\[ \Delta P_{max} \geq 60 \text{ mm Hg} \]
Low surgical risk

Abnormal ETT

\[ \Delta V_{max} > 0.3 \text{ m/s/yr} \]
Low surgical risk

AVR (I)

AVR (IIa)

AVR (IIb)

\[ V_{max} = 3 \text{ m/s} - 3.9 \text{ m/s} \]
\[ \Delta P_{max} = 20 - 39 \text{ mm Hg} \]

Symptomatic

LVEF <50%

YES

NO

DSE with
\[ AVA \leq 1 \text{ cm}^2 \]
and
\[ V_{max} \geq 4 \text{ m/s} \]
(stages D2)

AVR (IIa)

AVR (IIa)

AVR (IIb)

AVR (I)

Asymptomatic (stage B)

Other cardiac surgery

AVA <1 cm² and LVEF <50% (stage D3*)

AS likely cause of symptoms

J Am Coll Cardiol. 2014;63(22):2438-2488
Indications for Surgery for Mitral Regurgitation

Mitral Regurgitation

Primary MR

Severe MR
Vena contracta ≥0.7 cm
RVol ≥60 mL
RF ≥50%
ERO ≥0.4 cm²
LV dilation

Symptomatic (stage D)
LVEF >30%

MV Surgery (IIb)

Asymptomatic (stage C)
LVEF 30% to ≤60%
LVEF >60% and LVESD <40 mm
New onset AF or PASP >50 mm Hg

MV Surgery (I)

MV Repair (IIa)

Periodic Monitoring

Secondary MR

Progressive MR (stage B)
Vena contracta <0.7 cm
RVol <60 mL
RF <50%
ERO <0.4 cm²

Symptomatic severe MR (stage D)
Persistent NYHA class III-IV symptoms

CAD Rx
HF Rx
Consider CRT

MV Surgery (IIb)

Periodic Monitoring

Class I

Class IIa

Class IIb
MEN
to the left because
WOMEN
are always right!
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
The Heart Valve Team and Heart Valve Centers of Excellence

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with severe VHD should be evaluated by a multidisciplinary Heart Valve Team when intervention is considered</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>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</td>
<td>IIa</td>
<td>C</td>
</tr>
</tbody>
</table>

*J Am Coll Cardiol. 2014;63(22):2438-2488*
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).
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.)
## Risk Assessment Combining STS Risk Estimate, Frailty, Major Organ System Dysfunction, and Procedure-Specific Impediments

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

*J Am Coll Cardiol. 2014;63(22):2438-2488*
85 yo female with severe symptomatic aortic stenosis

Class I - AVR
85 yo female with severe symptomatic aortic stenosis
85 yo female with severe symptomatic aortic stenosis
## Frequency of Echocardiograms in Asymptomatic Patients With VHD and Normal Left Ventricular Function

<table>
<thead>
<tr>
<th>Stage</th>
<th>Aortic Stenosis</th>
<th>Aortic Regurgitation</th>
<th>Mitral Stenosis</th>
<th>Mitral Regurgitation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Progressive</strong></td>
<td>Every 3–5 y (mild severity $V_{\text{max}}$ 2.0–2.9 m/s)</td>
<td>Every 3–5 y (mild severity) Every 1–2 y (moderate severity)</td>
<td>Every 3–5 y (MVA $&gt;1.5$ cm$^2$)</td>
<td>Every 3–5 y (mild severity) Every 1–2 y (moderate severity)</td>
</tr>
<tr>
<td>(stage B)</td>
<td>Every 1–2 y (moderate severity $V_{\text{max}}$ 3.0–3.9 m/s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td>Every 1 y ($V_{\text{max}}$ $\geq$4 m/s)</td>
<td>Every 1 y Dilating LV–more frequent</td>
<td>Every 1–2 y (MVA 1.0–1.5 cm$^2$)</td>
<td>Every 6 months to 1 y Dilating LV–more frequent</td>
</tr>
<tr>
<td>(stage C)</td>
<td></td>
<td></td>
<td>Every 1 y (MVA $&lt;1$ cm$^2$)</td>
<td></td>
</tr>
</tbody>
</table>

*J Am Coll Cardiol. 2014;63(22):2438-2488*
# Prosthetic Valve: Diagnosis and Follow-Up

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>An initial TTE study is recommended in patients after prosthetic valve implantation for evaluation of valve hemodynamics</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Repeat TTE is recommended in patients with prosthetic heart valves if there is a change in clinical symptoms or signs suggesting valve dysfunction</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>TEE is recommended when clinical symptoms or signs suggest prosthetic valve dysfunction</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>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</td>
<td>IIa</td>
<td>C</td>
</tr>
</tbody>
</table>
What cool tools can help facilitate the use of our guidelines?
• 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
Where would you look for an answer?
Have you found the answer yet?
Valvular Heart Disease

Content

Native Valve Stenosis
Native Valve Regurgitation
Prosthetic Valves in Pregnancy
Prosthetics in Preg. Diagnosis
Prosthetics In Preg. Med Therapy
Surgical Considerations
Noncardiac Surgery with VHD
Applying COR and LOE
Authors and Publication

Tools
<table>
<thead>
<tr>
<th>Recommendation</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Therapeutic anticoagulation with frequent monitoring is recommended for all pregnant patients with a mechanical prosthesis.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>2. Warfarin is recommended in pregnant patients with a mechanical prosthesis to achieve a therapeutic INR in the second and third trimesters.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>3. Discontinuation of warfarin with initiation of intravenous UFH (with an activated partial thromboplastin time [aPTT] &gt;2 times control) is recommended before planned vaginal delivery in pregnant patients with a mechanical prosthesis.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
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<tr>
<td>5.</td>
<td>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.</td>
<td></td>
</tr>
<tr>
<td>IIa</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Dose-adjusted <strong>LMWH</strong> 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-injection).</td>
<td></td>
</tr>
</tbody>
</table>
TAVR
In-Hospital Mortality Risk
This risk-adjusted mortality estimate is recommended to be used for guidance in the overall conversation about the TAVR procedure and not as a recommendation for or against any medical procedure.

Calculate Risk

* All parameters are required to derive the adjusted TAVR in-hospital mortality risk

Patient Demographics

Age (18-100)

84 years

Sex

Female

Race

White
Patient Pre-Procedural Characteristics

Renal Function

Glomerular Filtration Rate (calculated):
30mL/min/1.73m²

Select Units
SI  US

Serum Creatinine

2.1 mg/dL

Currently on Dialysis?
Yes  No

Procedure Access Site
Femoral

NYHA Class IV within 2 weeks?
Yes  No

Severe Chronic Lung Disease?
Yes  No
Acuity Status

Select all the below parameters to calculate the acuity status.

Procedure Status

- Urgent

Prior cardiac arrest

- Yes ✔ No

Prior cardiogenic shock

- Yes ✔ No

Pre-procedure inotropes

- Yes ✔ No

Mechanical assist device

- Yes ✔ No

Predicted Risk
Adjusted TAVR In-Hospital Mortality Risk

Patient's Risk 12.85% | National Average 4% as of May 2015

In the United States, the average mortality of all patients undergoing this procedure is 4%. Taking into account the patient’s specific clinical condition, the statistical estimate that she might not survive the procedure is 12.85%. This means that for every 100 patients having a similar clinical makeup, there would be 12.85 who did not survive.

The model provides an objective risk-adjusted estimate of in-hospital mortality which has real value for both patient and provider. It should be considered as one element in the evaluation process, to be considered along with the patient’s clinical condition and other pertinent factors.
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."