2020 Guideline for the Management of Patients With Valvular Heart Disease

GUIDELINES MADE SIMPLE

A Selection of Tables and Figures

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AMERICAN COLLEGE *of* CARDIOLOGY

2020 Guideline for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

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The ACC/AHA Joint Committee on Clinical Practice Guidelines has commissioned this guideline to focus on the diagnosis and management of adult patients with valvular heart disease (VHD). The guideline recommends a combination of lifestyle modifications and medications that constitute components of GDMT. For both GDMT and other recommended drug treatment regimens, the reader is advised to confirm dosages with product insert material and to carefully evaluate for contraindications and drug–drug interactions.

The following resource contains tables and figures from the 2020 Guideline for the Management of Patients With Valvular Heart Disease. The resource is only an excerpt from the Guideline and the full publication should be reviewed for more tables and figures as well as important context.

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2020 Guideline for the Management of Patients With Valvular Heart Disease

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Class of Recommendation (COR)/ Level of Evidence (LOE) Table

CLASS (STRENGTH) OF RECOMMENDATION	
CLASS 1 (STRONG)	**Benefit >>> Risk**
Suggested phrases for writing recommendations: • Is recommended • Is indicated/useful/effective/beneficial • Should be performed/administered/other • Comparative-Effectiveness Phrases†: – Treatment/strategy A is recommended/indicated in preference to treatment B – Treatment A should be chosen over treatment B	
CLASS 2a (MODERATE)	**Benefit >> Risk**
Suggested phrases for writing recommendations: • Is reasonable • Can be useful/effective/beneficial • Comparative-Effectiveness Phrases†: – Treatment/strategy A is probably recommended/indicated in preference to treatment B – It is reasonable to choose treatment A over treatment B	
CLASS 2b (WEAK)	**Benefit ≥ Risk**
Suggested phrases for writing recommendations: • May/might be reasonable • May/might be considered • Usefulness/effectiveness is unknown/unclear/uncertain or not well-established	
CLASS 3: No Benefit (MODERATE) **(Generally, LOE A or B use only)**	**Benefit = Risk**
Suggested phrases for writing recommendations: • Is not recommended • Is not indicated/useful/effective/beneficial • Should not be performed/administered/other	
Class 3: Harm (STRONG)	**Risk > Benefit**
Suggested phrases for writing recommendations: • Potentially harmful • Causes harm • Associated with excess morbidity/mortality • Should not be performed/administered/other	

LEVEL (QUALITY) OF EVIDENCE‡	
LEVEL A	
• High-quality evidence‡ from more than 1 RCT • Meta-analyses of high-quality RCTs • One or more RCTs corroborated by high-quality registry studies	
LEVEL B-R	**(Randomized)**
• Moderate-quality evidence‡ from 1 or more RCTs • Meta-analyses of moderate-quality RCTs	
LEVEL B-NR	**(Nonrandomized)**
• Moderate-quality evidence‡ from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies • Meta-analyses of such studies	
LEVEL C-LD	**(Limited Data)**
• Randomized or nonrandomized observational or registry studies with limitations of design or execution • Meta-analyses of such studies • Physiological or mechanistic studies in human subjects	
LEVEL C-EO	**(Expert Opinion)**
• Consensus of expert opinion based on clinical experience	

COR and LOE are determined independently (any COR may be paired with any LOE).

A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR 1 and 2a; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely-used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.

(Updated May 2019)

Master Abbreviation List

Abbreviation	Meaning/Phrase
AF	atrial fibrillation
AR	aortic regurgitation
AS	aortic stenosis
AVA	aortic valve area circulation
AVAi	AVA indexed to body surface area
AVR	aortic valve replacement
BAV	bicuspid aortic valve
CABG	coronary artery bypass graft
CAD	coronary artery disease
COR	Class of Recommendation
CVC	Comprehensive Valve Center
ECG	electrocardiogram
ERO	effective regurgitant orifice
ESD	end-systolic dimension
GDMT	guideline-directed management and therapy
HF	heart failure
LA	left atrium (left atrial)
LOE	Level of Evidence
LV	left ventricle (left ventricular)
LVEDD	left ventricular end-diastolic dimension
LVEF	left ventricular ejection fraction
LVESD	left ventricular end-systolic dimension

Abbreviation	Meaning/Phrase
MDT	multidisciplinary team
MR	mitral regurgitation
MS	mitral stenosis
MV	mitral valve
MVR	mitral valve replacement
NOAC	non–vitamin K oral anticoagulant
NYHA	New York Heart Association
RCT	randomized controlled trial
RV	right ventricle (right ventricular)
SAVR	surgical aortic valve replacement
TAVI	transcatheter aortic valve implantation
TEE	transesophageal echocardiography (echocardiogram)
TF	transfemoral
TR	tricuspid regurgitation
TTE	transthoracic echocardiography (echocardiogram)
VHD	valvular heart disease
ViV	valve-in-valve
VKA	vitamin K antagonist

Top 10 Take-Home Messages *(1 of 2)*

1 **Disease stages** in patients with valvular heart disease should be classified (Stages A, B, C, and D) on the basis of symptoms, valve anatomy, the severity of valve dysfunction, and the response of the ventricle and pulmonary circulation.

2 In the **evaluation of a patient with valvular heart disease,** history and physical examination findings should be correlated with the results of noninvasive testing (i.e., ECG, chest x-ray, transthoracic echocardiogram). If there is discordance between the physical examination and initial noninvasive testing, consider further noninvasive (computed tomography, cardiac magnetic resonance imaging, stress testing) or invasive (transesophageal echocardiography, cardiac catheterization) testing to determine optimal treatment strategy.

3 For patients with valvular heart disease and atrial fibrillation (except for patients with rheumatic mitral stenosis or a mechanical prosthesis), **the decision to use oral anticoagulation to prevent thromboembolic events,** with either a vitamin K antagonist or a non–vitamin K antagonist anticoagulant, should be made in a shared decision-making process based on the CHA2DS2-VASc score. Patients with rheumatic mitral stenosis or a mechanical prosthesis and atrial fibrillation should have oral anticoagulation with a vitamin K antagonist.

4 All patients with severe valvular heart disease being considered for valve intervention should be evaluated by a multidisciplinary team, with either referral to or consultation with a **Primary or Comprehensive Valve Center.**

5 **Treatment of severe aortic stenosis** with either a transcatheter or surgical valve prosthesis should be based primarily on symptoms or reduced ventricular systolic function. Earlier intervention may be considered if indicated by results of exercise testing, biomarkers, rapid progression, or the presence of very severe stenosis.

"Top Ten Messages" is continued in the next page.

Top 10 Take-Home Messages *(2 of 2)*

6 **Indications for transcatheter aortic valve implantation are expanding** as a result of multiple randomized trials of transcatheter aortic valve implantation versus surgical aortic valve replacement. The choice of type of intervention for a patient with severe aortic stenosis should be a shared decision-making process that considers the lifetime risks and benefits associated with type of valve (mechanical versus bioprosthetic) and type of approach (transcatheter versus surgical).

7 **Indications for intervention for valvular regurgitation** are relief of symptoms and prevention of the irreversible long-term consequences of left ventricular volume overload. Thresholds for intervention now are lower than they were previously because of more durable treatment options and lower procedural risks.

8 A **mitral transcatheter edge-to-edge repair** is of benefit to patients with severely symptomatic primary mitral regurgitation who are at high or prohibitive risk for surgery, as well as to a select subset of patients with secondary mitral regurgitation who remain severely symptomatic despite guideline-directed management and therapy for heart failure.

9 Patients presenting with **severe symptomatic isolated tricuspid regurgitation,** commonly associated with device leads and atrial fibrillation, may benefit from surgical intervention to reduce symptoms and recurrent hospitalizations if done before the onset of severe right ventricular dysfunction or end-organ damage to the liver and kidney.

10 **Bioprosthetic valve dysfunction** may occur because of either degeneration of the valve leaflets or valve thrombosis. Catheter-based treatment for prosthetic valve dysfunction is reasonable in selected patients for bioprosthetic leaflet degeneration or paravalvular leak in the absence of active infection.

WHAT IS NEW IN AORTIC STENOSIS

Major Changes in Valvular Heart Disease Guideline Recommendations	
Aortic Stenosis	
2017	2020
Surgical AR is recommended for symptomatic patients with severe AS (Stage D) and asymptomatic patients with severe AS (Stage C) who meet an indication for AVR when surgical risk is low or intermediate. COR 1, LOE B-NR	For symptomatic patients with severe AS who are >80 years of age or for younger patients with a life expectancy <10 years and no anatomic contraindication to transfemoral TAVI, transfemoral TAVI is recommended in preference to SAVR. COR 1, LOE A

Table 14. A Simplified Framework With Examples of Factors Favoring SAVR, TAVI, or Palliation Instead of Aortic Valve Intervention

	Favors SAVR	Favors TAVI	Favors Palliation
Age/life expectancy*	• Younger age/longer life expectancy	• Older age/fewer expected remaining years of life	• Limited life expectancy
Valve anatomy	• BAV • Subaortic (LV outflow tract) calcification • Rheumatic valve disease • Small or large aortic annulus†	• Calcific AS of a trileaflet valve	
Prosthetic valve preference	• Mechanical or surgical bioprosthetic valve preferred • Concern for patient–prosthesis mismatch (annular enlargement might be considered)	• Bioprosthetic valve preferred • Favorable ratio of life expectancy to valve durability • TAVI provides larger valve area than same size SAVR	
Concurrent cardiac conditions	• Aortic dilation‡ • Severe primary MR • Severe CAD requiring bypass grafting • Septal hypertrophy requiring myectomy • AF	• Severe calcification of the ascending aorta (“porcelain” aorta)	• Irreversible severe LV systolic dysfunction • Severe MR attributable to annular calcification

Noncardiac conditions		• Severe lung, liver, or renal disease • Mobility issues (high procedural risk with sternotomy)	• Symptoms likely attributable to noncardiac conditions • Severe dementia • Moderate to severe involvement of ≥2 other organ systems
Frailty	• Not frail or few frailty measures	• Frailty likely to improve after TAVI	• Severe frailty unlikely to improve after TAVI
Estimated procedural or surgical risk of SAVR or TAVI	• SAVR risk low • TAVI risk high	• TAVI risk low to medium • SAVR risk high to prohibitive	• Prohibitive SAVR risk (>15%) or post-TAVI life expectancy <1 y
Procedure-specific impediments	• Valve anatomy, annular size, or low coronary ostial height precludes TAVI • Vascular access does not allow transfemoral TAVI	• Previous cardiac surgery with at-risk coronary grafts • Previous chest irradiation	• Valve anatomy, annular size, or coronary ostial height precludes TAVI • Vascular access does not allow transfemoral TAVI
Goals of Care and patient preferences and values	• Less uncertainty about valve durability • Avoid repeat intervention • Lower risk of permanent pacer • Life prolongation • Symptom relief • Improved long-term exercise capacity and QOL • Avoid vascular complications • Accepts longer hospital stay, pain in recovery period	• Accepts uncertainty about valve durability and possible repeat intervention • Higher risk of permanent pacer • Life prolongation • Symptom relief • Improved exercise capacity and QOL • Prefers shorter hospital stay, less postprocedural pain	• Life prolongation not an important goal • Avoid futile or unnecessary diagnostic or therapeutic procedures • Avoid procedural stroke risk • Avoid possibility of cardiac pacer

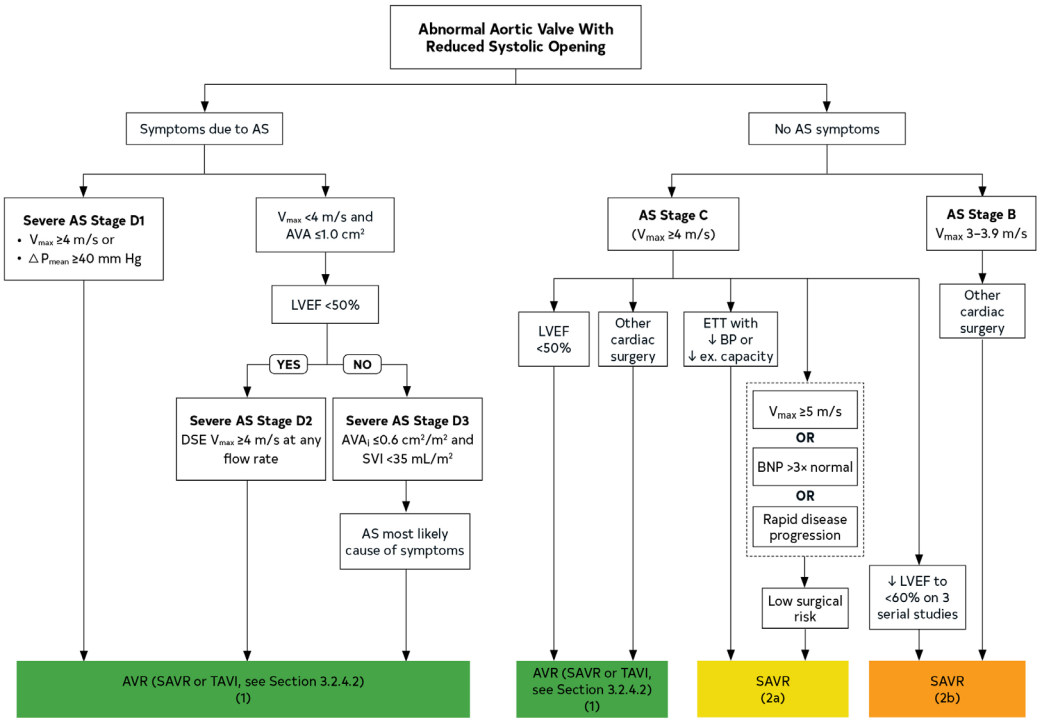
*Expected remaining years of life can be estimated from U.S. Actuarial Life Expectancy tables. The balance between expected patient longevity and valve durability varies continuously across the age range, with more durable valves preferred for patients with a longer life expectancy. Bioprosthetic valve durability is finite (with shorter durability for younger patients), whereas mechanical valves are very durable but require lifelong anticoagulation. Long-term (20-y) data on outcomes with surgical bioprosthetic valves are available; robust data on transcatheter bioprosthetic valves extend only to 5 y, leading to uncertainty about longer-term outcomes. The decision about valve type should be individualized on the basis of patient-specific factors that might affect expected longevity.

†A large aortic annulus may not be suitable for currently available transcatheter valve sizes. With a small aortic annulus or aorta, a surgical annulus-enlarging procedure may be needed to allow placement of a larger prosthesis and avoid patient–prosthesis mismatch.

‡Dilation of the aortic sinuses or ascending aorta may require concurrent surgical replacement, particularly in younger patients with a BAV.

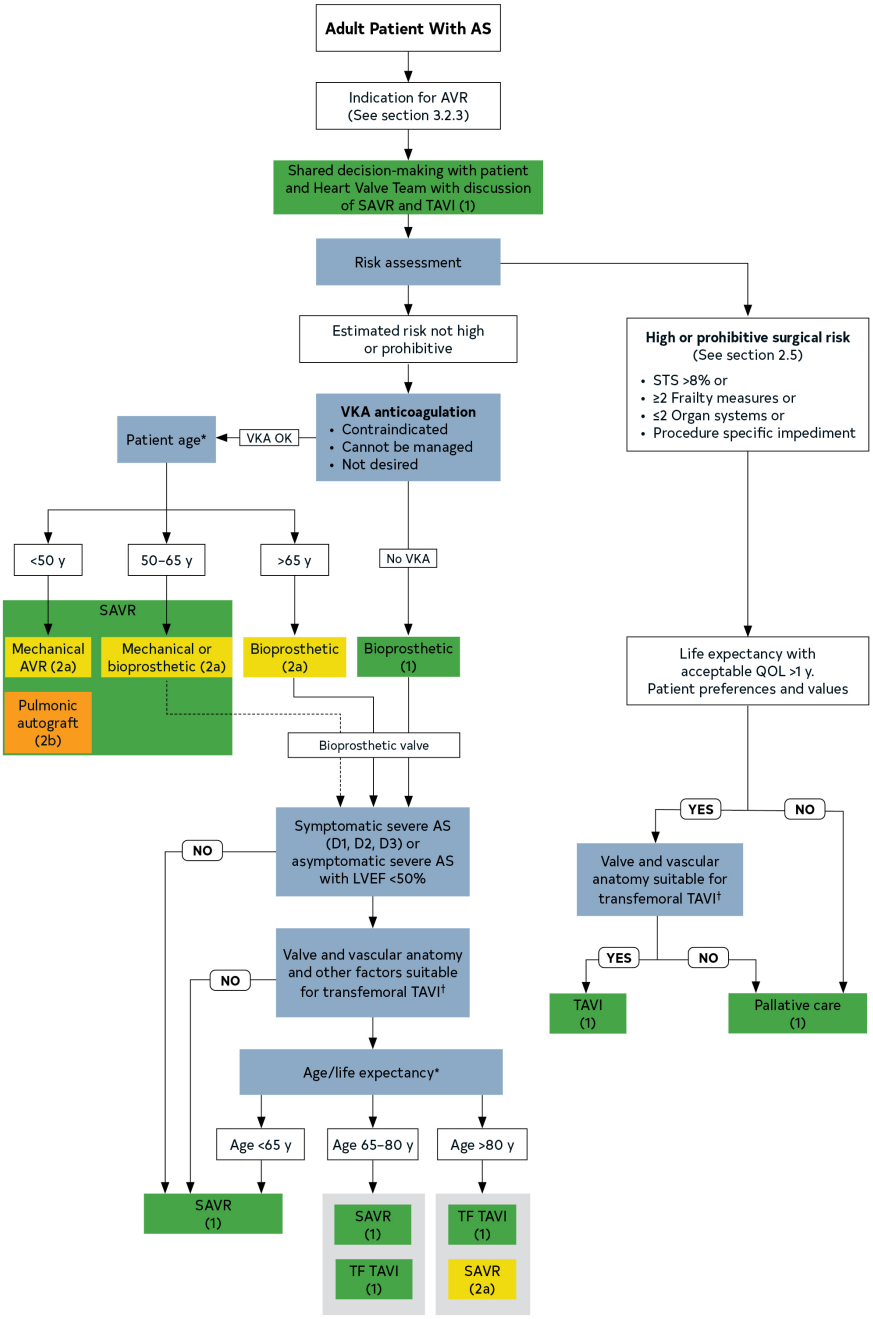
Modified from Burke CR, Kirkpatrick JN, Otto CM. Goals of care in patients with severe aortic stenosis. Eur Heart J. 2020;41:929-32.

Figure 2. Timing of intervention for AS



For definition of stages see Table 13. Stages of AS on Page 12.

Figure 3. Choice of SAVR versus TAVI when AVR is indicated for valvular AS.



*Approximate ages, based on U.S. Actuarial Life Expectancy tables, are provided for guidance. The balance between expected patient longevity and valve durability varies continuously across the age range, with more durable valves preferred for patients with a longer life expectancy. Bioprosthetic valve durability is finite (with shorter durability for younger patients), whereas mechanical valves are very durable but require lifelong anticoagulation. Long-term (20-year) data on outcomes with surgical bioprosthetic valves are available; robust data on transcatheter bioprosthetic valves extend to only 5 years, leading to uncertainty about longer-term outcomes. The decision about valve type should be individualized on the basis of patient-specific factors that might affect expected longevity.

†Placement of a transcatheter valve requires vascular anatomy that allows transfemoral delivery and the absence of aortic root dilation that would require surgical replacement. Valvular anatomy must be suitable for placement of the specific prosthetic valve, including annulus size and shape, leaflet number and calcification, and coronary ostial height.

For definition of stages see Table 13. Stages of AS on Page 12.

Table 13. Stages of Aortic Stenosis

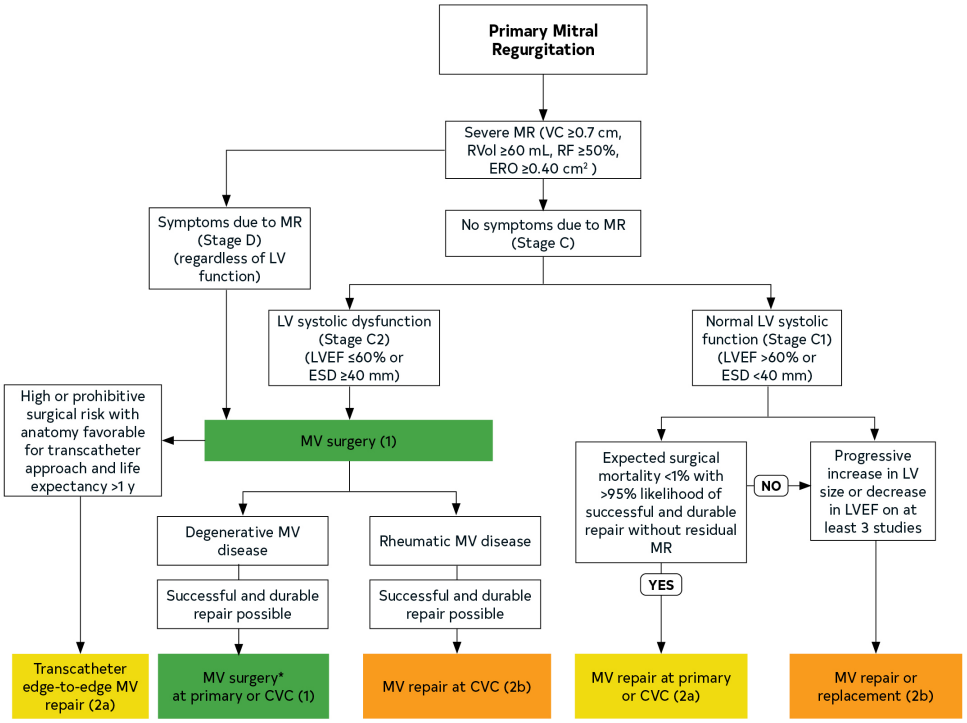
Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AS	• BAV (or other congenital valve anomaly) • Aortic valve sclerosis	• Aortic V_{max} <2 m/s with normal leaflet motion	None	None
B	Progressive AS	• Mild to moderate leaflet calcification/ fibrosis of a bicuspid or trileaflet valve with some reduction in systolic motion or • Rheumatic valve changes with commissural fusion	• Mild AS: aortic V_{max} 2.0–2.9 m/s or mean ΔP <20 mm Hg • Moderate AS: aortic V_{max} 3.0–3.9 m/s or mean 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/ fibrosis or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg • AVA typically is ≤1.0 cm^2 (or AVAi 0.6 cm^2/m^2) but not required to define severe AS • Very severe AS is an aortic V_{max} ≥5 m/s or mean P ≥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 systolic dysfunction	Severe leaflet calcification/fibrosis or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or mean P ≥40 mm Hg • AVA typically ≤1.0 cm^2 (or AVAi 0.6 cm^2/m^2) but not required to define severe AS	LVEF <50%	None

D: Symptomatic severe AS					
D1	Symptomatic severe high-gradient AS	Severe leaflet calcification/fibrosis or congenital stenosis with severely reduced leaflet opening	• Aortic V_{max} ≥4 m/s or mean ΔP ≥40 mm Hg • AVA typically ≤1.0 cm^2 (or AVAi ≤ 0.6 cm^2/m^2) but may be larger with mixed AS/AR	• LV diastolic dysfunction • LV hypertrophy • Pulmonary hypertension may be present	• Exertional dyspnea, decreased exercise tolerance, or HF • Exertional angina • Exertional syncope or presyncope
D2	Symptomatic severe low-flow, low-gradient AS with reduced LVEF	Severe leaflet calcification/fibrosis with severely reduced leaflet motion	• AVA ≤1.0 cm^2 with resting aortic Vmax <4 m/s or mean ΔP <40 mm Hg • Dobutamine stress echocardiography shows AVA <1.0 cm^2 with V_{max} ≥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/fibrosis with severely reduced leaflet motion	• AVA ≤1.0 cm^2 (indexed AVA 0.6 cm^2/m^2) with an aortic V_{max} <4 m/s or mean ΔP <40 mm Hg AND • Stroke volume index <35 mL/m^2 • Measured when patient is normotensive (systolic blood pressure <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

WHAT IS NEW IN MITRAL REGURGITATION

Major Changes in Valvular Heart Disease Guideline Recommendations	
Mitral regurgitation	
2017	2020
No equivalent 2017 recommendation.	**In patients with chronic severe secondary MR related to LV systolic dysfunction (LVEF <50%) who have persistent severe symptoms (NYHA class II, III, or IV) while on optimal GDMT for HF (Stage D), transcatheter edge-to-edge mitral valve (TEER) repair is reasonable in patients with appropriate anatomy as defined on TEE and with LVEF between 20% and 50%, LVESD ≤70 mm, and pulmonary artery systolic pressure ≤70 mm Hg.** **COR 2a, LOE B-R**

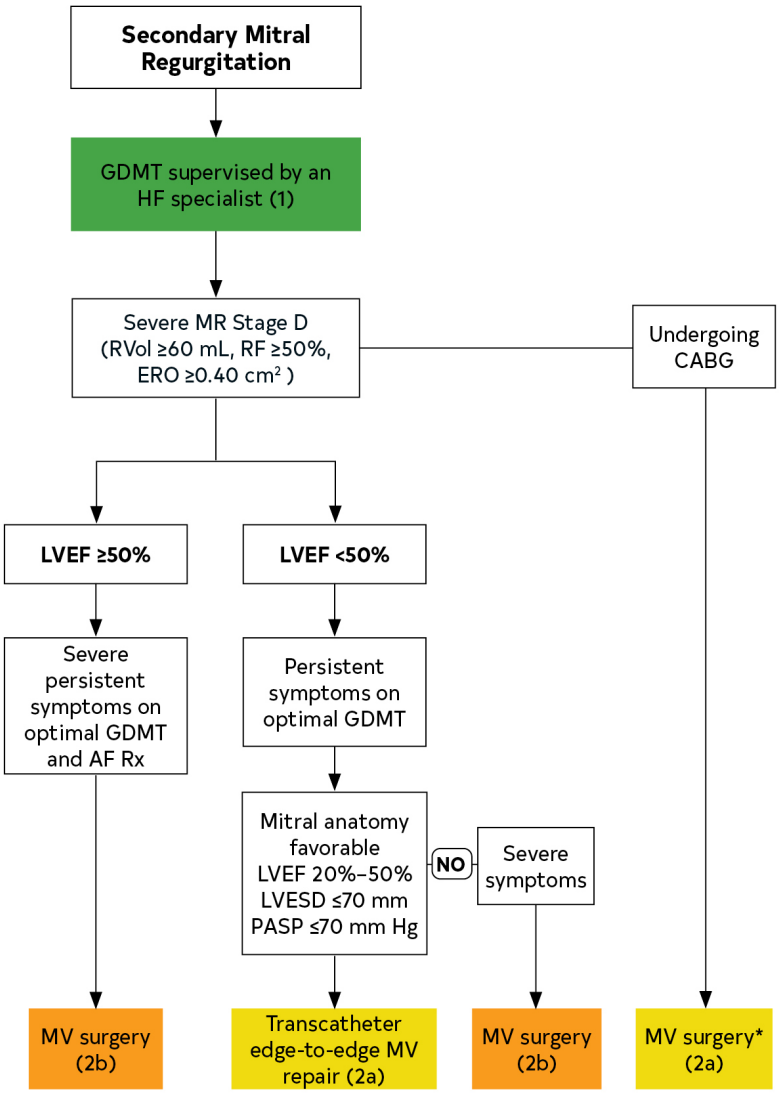
Figure 8. Primary MR.



For definition of stages see Table 18. Stages of Secondary MR on Page 16.

*See Prosthetic Valve section (11.1.2) for choice of mitral valve replacement if mitral valve repair is not possible.

Figure 9. Secondary MR.



For definition of stages see Table 18. Stages of Secondary MR on page X.

*Chordal-sparing MV replacement may be reasonable to choose over downsized annuloplasty repair.

Table 18. Stages of Secondary MR.

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of MR	• Normal valve leaflets, chords, and annulus in a patient with CAD or cardiomyopathy	• No MR jet or small central jet area <20% LA on Doppler • Small vena contracta <0.30 cm	• Normal or mildly dilated LV size with fixed (infarction) or inducible (ischemia) regional wall motion abnormalities • Primary myocardial disease with LV dilation and systolic dysfunction	• Symptoms attributable to coronary ischemia or HF may be present that respond to revascularization and appropriate medical therapy
B	Progressive MR	• Regional wall motion abnormalities with mild tethering of mitral leaflet • Annular dilation with mild loss of central coaptation of the mitral leaflets	• ERO <0.40 cm^2† • Regurgitant volume <60 mL • Regurgitant fraction <50%	• Regional wall motion abnormalities with reduced LV systolic function • LV dilation and systolic dysfunction attributable to primary myocardial disease	• Symptoms attributable to coronary ischemia or HF may be present that respond to revascularization and appropriate medical therapy
C	Asymptomatic severe MR	• Regional wall motion abnormalities and/or LV dilation with severe tethering of mitral leaflet • Annular dilation with severe loss of central coaptation of the mitral leaflets	• ERO ≥0.40 cm^2† • Regurgitant volume ≥60 mL‡ • Regurgitant fraction ≥50%	• Regional wall motion abnormalities with reduced LV systolic function • LV dilation and systolic dysfunction attributable to primary myocardial disease	• Symptoms attributable to coronary ischemia or HF may be present that respond to revascularization and appropriate medical therapy
D	Symptomatic severe MR	• Regional wall motion abnormalities and/or LV dilation with severe tethering of mitral leaflet • Annular dilation with severe loss of central coaptation of the mitral leaflets	• ERO ≥0.40 cm^2† • Regurgitant volume ≥60 mL‡ • Regurgitant fraction ≥50%	• Regional wall motion abnormalities with reduced LV systolic function • LV dilation and systolic dysfunction attributable to primary myocardial disease	• HF symptoms attributable to MR persist even after revascularization and optimization of medical therapy • Decreased exercise tolerance • Exertional dyspnea

*Several valve hemodynamic criteria are provided for assessment of MR severity, but not all criteria for each category will be present in each patient. Categorization of MR severity as mild, moderate, or severe depends on data quality and integration of these parameters in conjunction with other clinical evidence.

†The measurement of the proximal isovelocity surface area by 2D TTE in patients with secondary MR underestimates the true ERO because of the crescentic shape of the proximal convergence.

‡May be lower in low-flow states.

WHAT IS NEW IN ANTICOAGULATION

Major Changes in Valvular Heart Disease Guideline Recommendations	
Anticoagulation for AF in patients with VHD	
2017	2020
It is reasonable to use a DOAC as an alternative to a VKA in patients with AF and native aortic valve disease, tricuspid valve disease, or MR and a CHA2DS2-VASc score of 2 or greater. COR 2a, LOE C-LD	For patients with AF and native valve heart disease (except rheumatic mitral stenosis) or who received a bioprosthetic valve >3 months ago, a non–vitamin K oral anticoagulant is an effective alternative to VKA anticoagulation and should be administered on the basis of the patient's CHA2DS2-VASc score. COR 1, LOE A
No equivalent 2017 recommendation.	For patients with new-onset AF ≤3 months after surgical or transcatheter bioprosthetic valve replacement, anticoagulation with a VKA is reasonable. COR 2a, LOE B-NR
No equivalent 2017 recommendation.	In patients with mechanical heart valves with or without AF who require long-term anticoagulation with VKA to prevent valve thrombosis, NOACs are not recommended. COR 3: Harm, LOE B-R

Figure 1. Anticoagulation for AF in Patients With VHD.