Advanced Course of

Reconstruction of the Aortic Valve and Root:
A practical approach

Aortic regurgitation and aneurysm – Epidemiology and guidelines

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I have NO conflict of interest

Why does epidemiology matter?

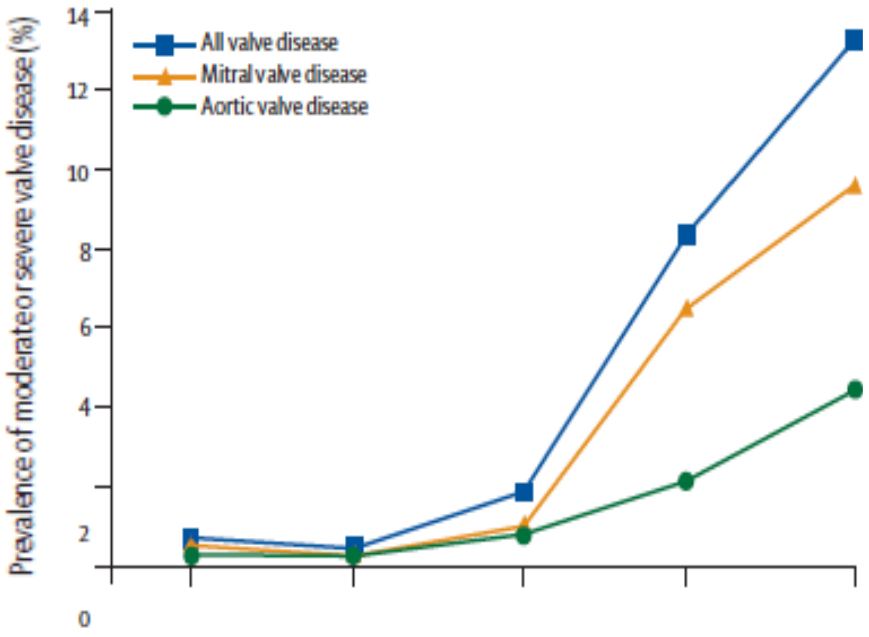
- HV disease only produces symptoms when disease is advanced
- Poor definition of natural history of HV disease
- No medical treatment that alters evolution or prognosis
- Implications for health policies and strategies

Do we know the real prevalence of AR & AA?

- Scarce studies & small size
- Prevalence in asymptomatic patients??
- Relative low use of stethoscope by GPs (50%)
- No routine screening
- Low awareness of VHD in the population:
  - Germany 28%
  - <5% UK, Ireland, Norway,…

Burden of valve disease

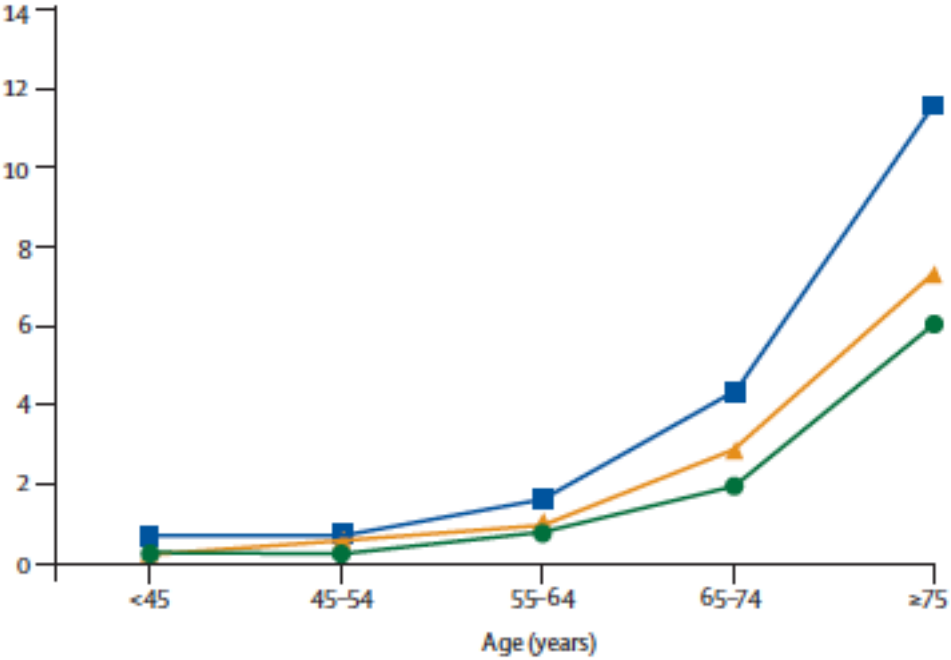
Population Study



n= 11911

Prevalence VHD 2,5%

Community Study



n= 16501

Prevalence VHD 1,8%

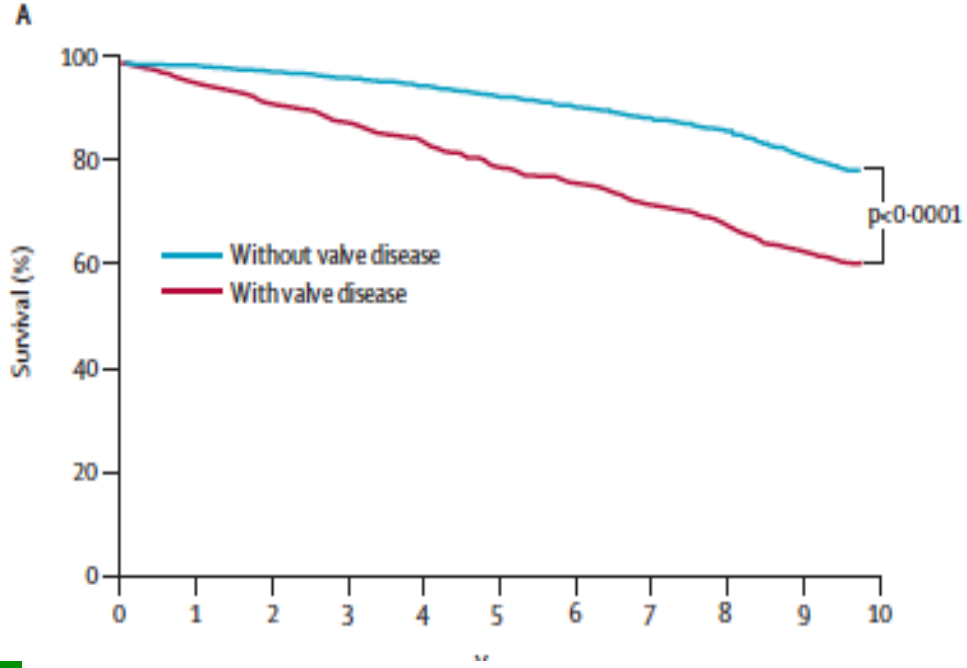
Nkomo et al. Lancet 2006;368:1005-11.

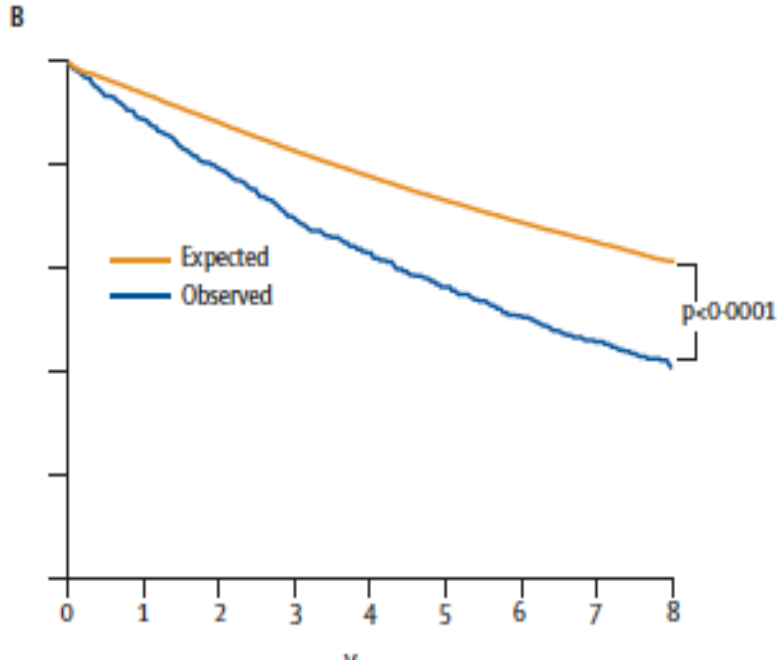
Mortality &VHD

adjusted mortality risk ratio associated with VHD

Population:
1.36 (1.15–1.62; p=0.0005)

Community:
1.75 (1.61–1.90; p<0.0001)





Nkomo et al. Lancet 2006;368:1005-11.

The EuroHeart Survey on VHD - 2003

5001 adults

Moderate-severe native VHD, infective endocarditis, or previous valve intervention

3rd cause of VHD
3rd reason for intervention

Table 2 Type of valvular heart disease

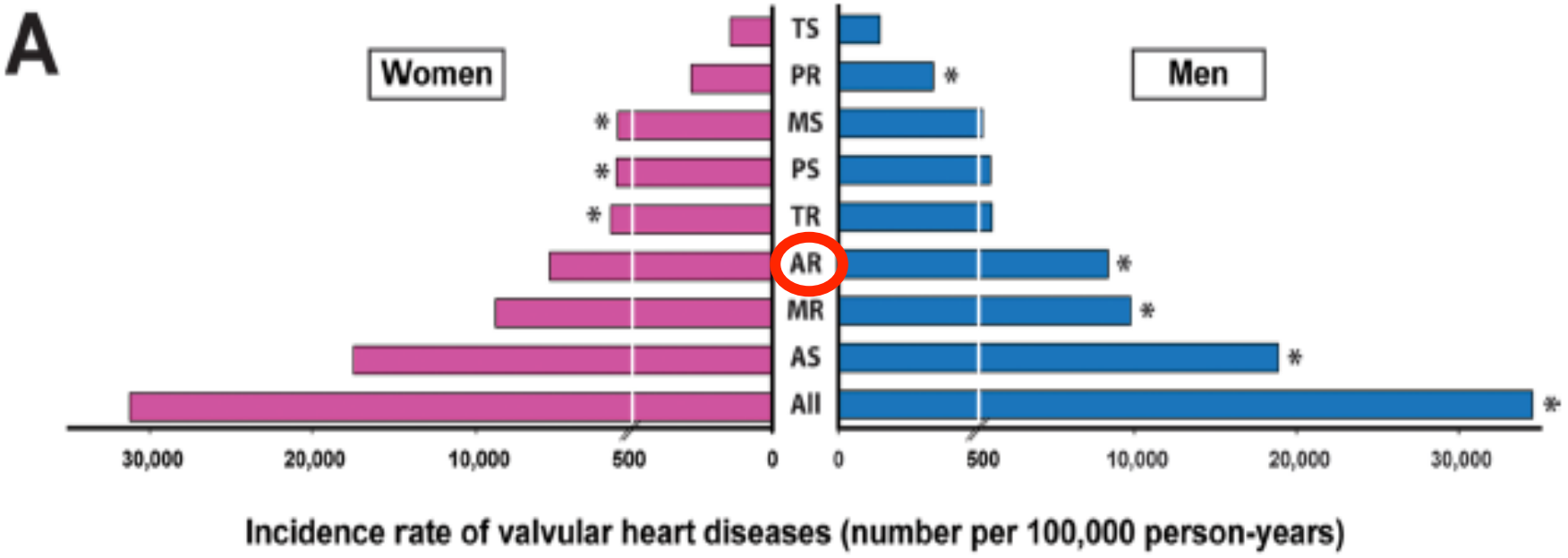
	Total population *n*=5001		Patients with intervention *n*=1269	
Native valve disease (%)	71.9		87.0	
Aortic (% native)	44.3		57.4	
Aortic stenosis (%)		33.9		46.6
Aortic regurgitation (%)		10.4		10.8
Mitral (% native)	34.3		24.3	
Mitral stenosis (%)		9.5		10.2
Mitral regurgitation (%)		24.8		14.1
Multiple (% native)	20.2		16.8	
Right (% native)	1.2		1.5	
Previous intervention (%)	28.1		13.0	
Conservative surgery (%)	18.4		28.7	
Valve replacement (%)	81.6		71.3	

Iung B et al. Eur Heart J 2003; 24:1231-43

VHD in Sweeden

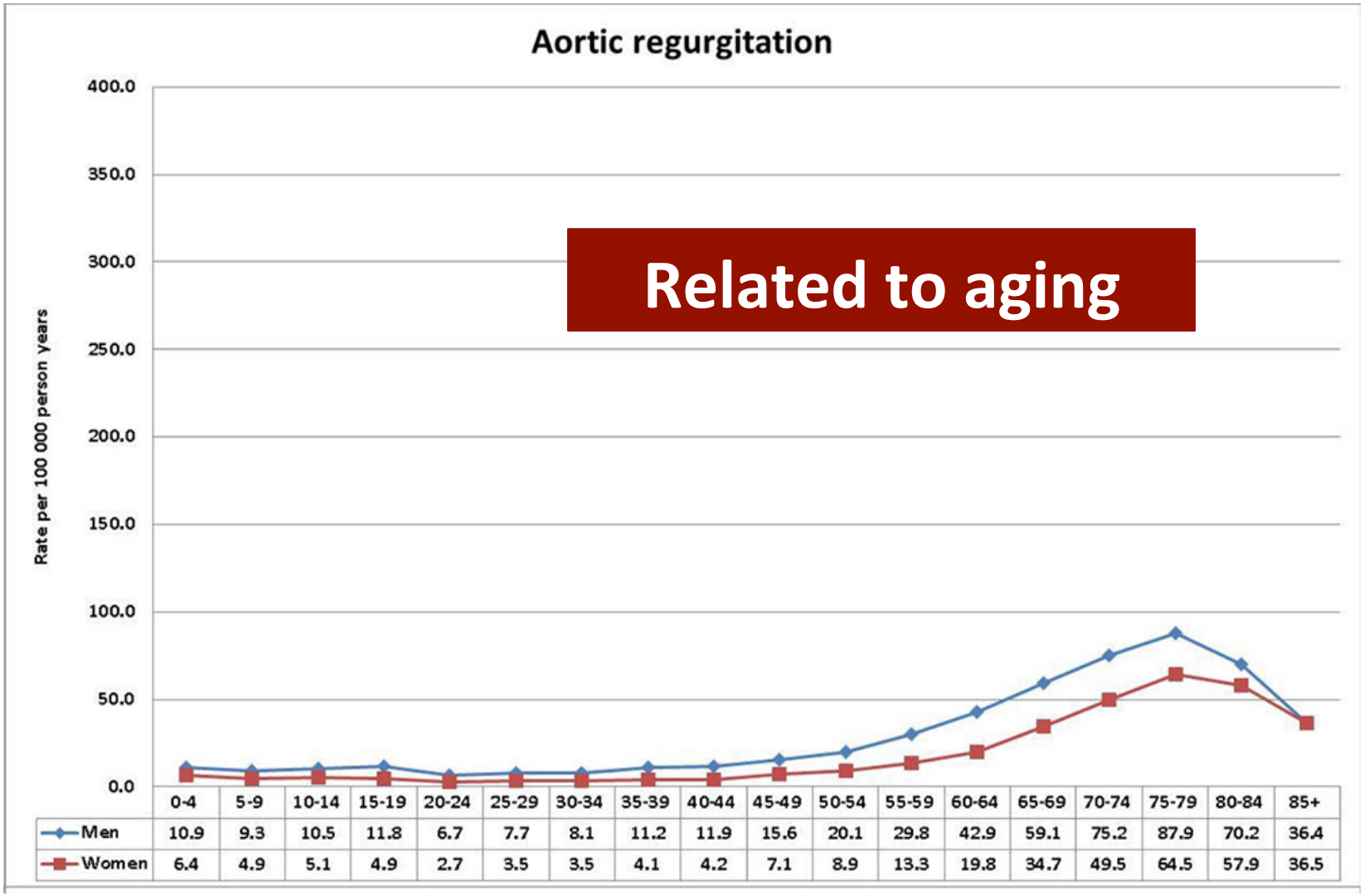
Nationwide registers from hospitals in Swedeen 2003-2010: patients with a first diagnosis of VHD

- **3rd most frequent Valve Disease**
- **IR: 11 /100 000 person-years** **IR: 20 /100 000 person-years**



Andell P, et al. Heart 2017;103:1696–1703
Clavel MA, et al. Heart 2017; 103(21)

VHD in Sweeden

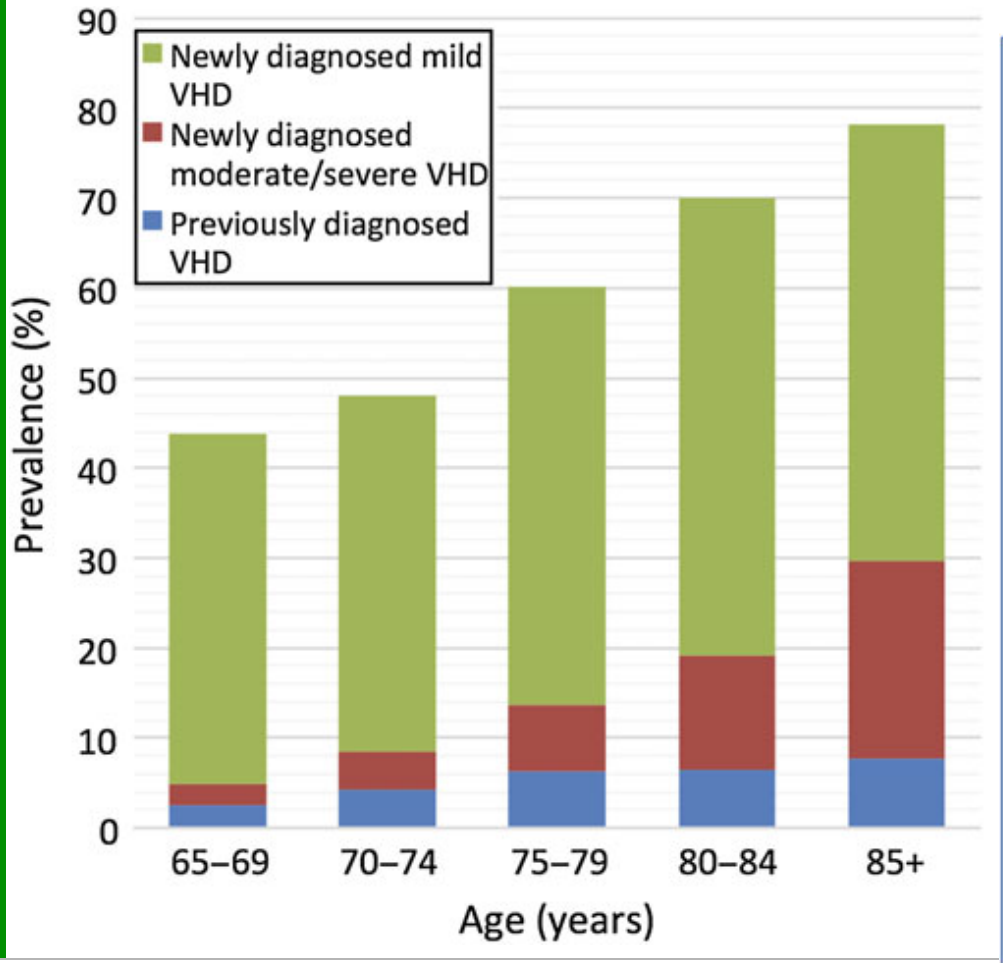


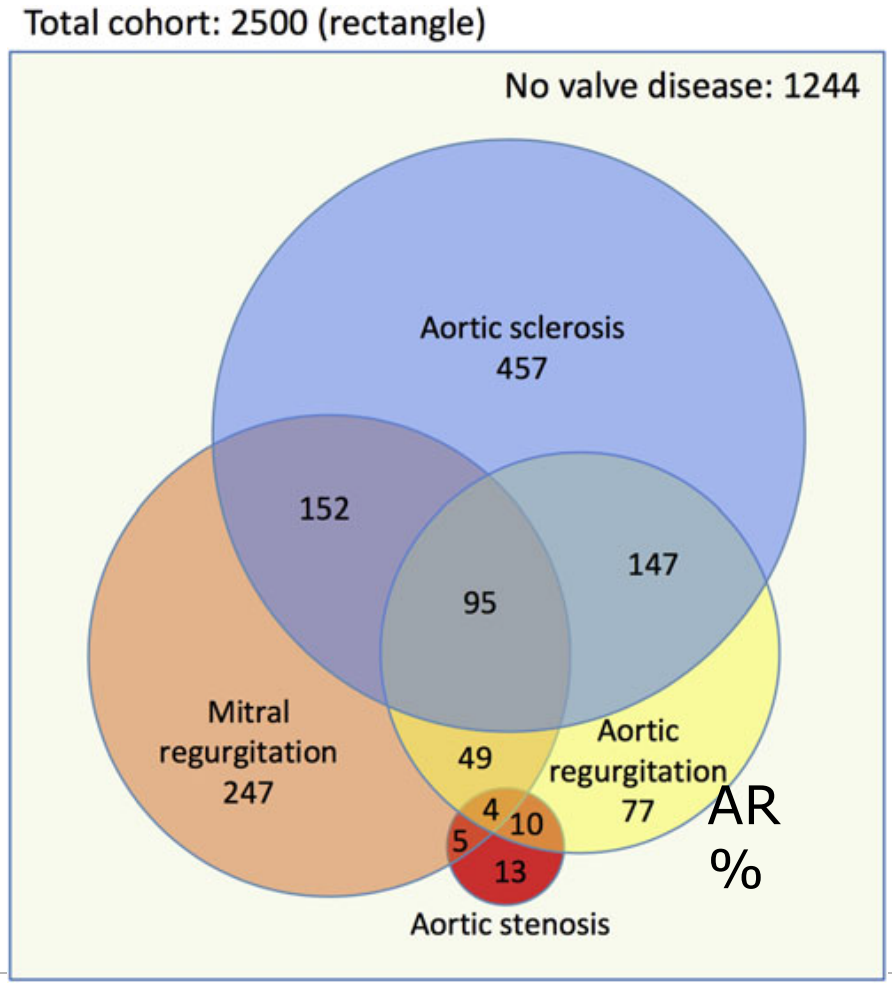
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
Men	10.9	9.3	10.5	11.8	6.7	7.7	8.1	11.2	11.9	15.6	20.1	29.8	42.9	59.1	75.2	87.9	70.2	36.4
Women	6.4	4.9	5.1	4.9	2.7	3.5	3.5	4.1	4.2	7.1	8.9	13.3	19.8	34.7	49.5	64.5	57.9	36.5

Andell P, et al. Heart 2017;103:1696–1703
Clavel MA, et al. Heart 2017; 103(21)

VHD in the UK

Screening in 2500 subjects with TTE (73 y.o, 50% female)





D'Arcy JL et al. Eur Heart J. 2016; 37, 3515–3522

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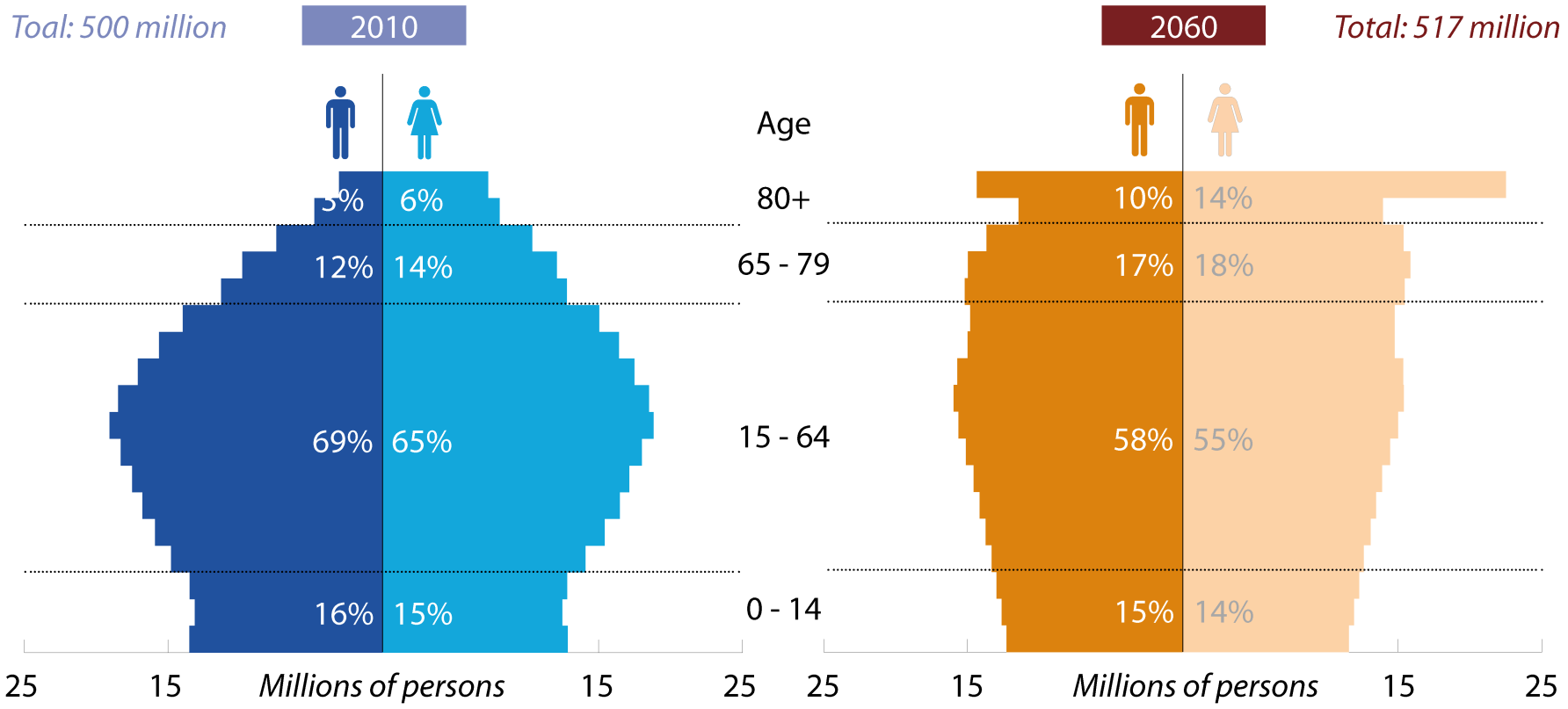
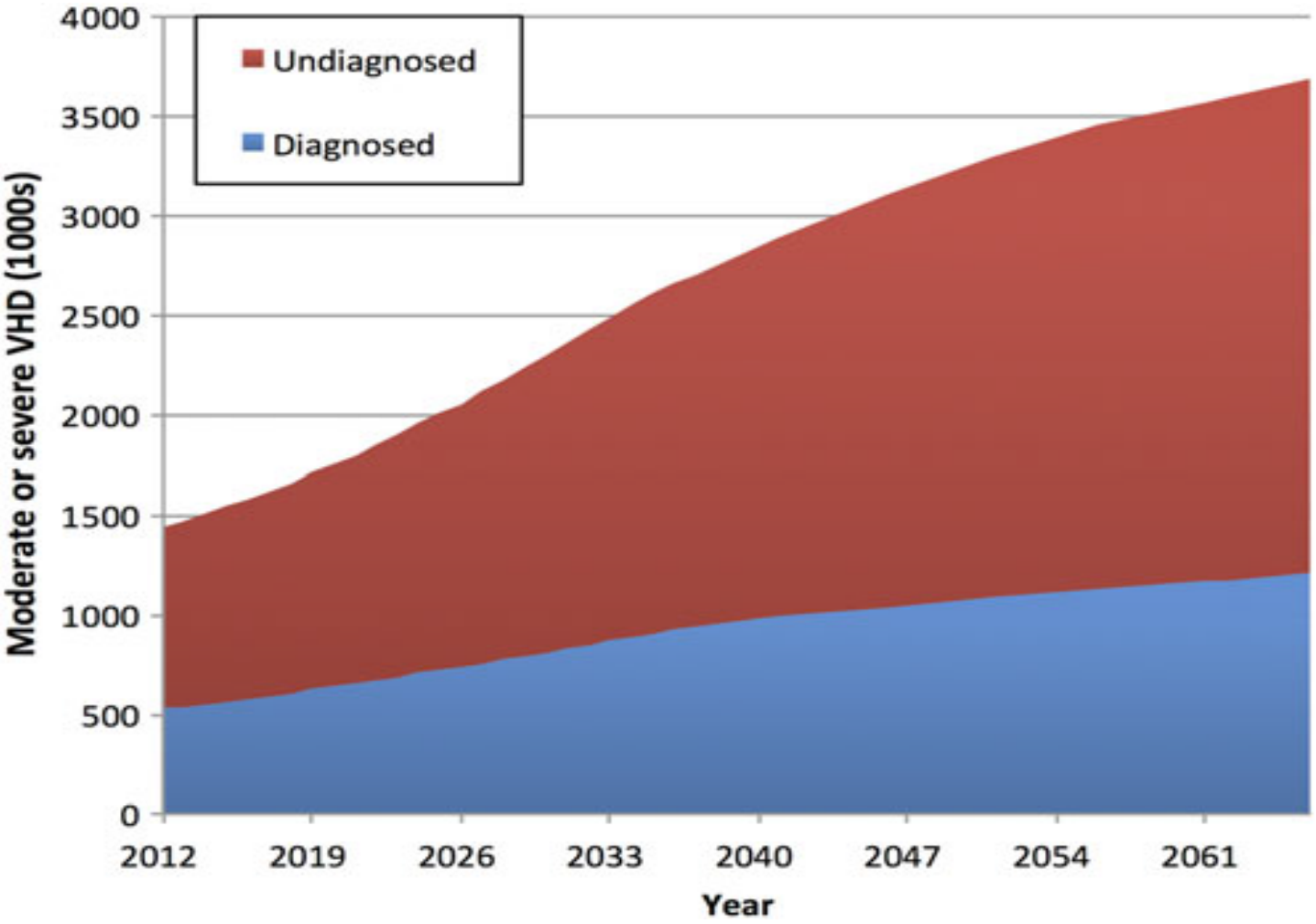
This will get worse...

EU27 population by age and sex



Projected VHD in the UK

Projection: this will double!!



D'Arcy JL et al. Eur Heart J. 2016; 37, 3515–3522

What do we know about epidemiology of AR & AA?

1. Related to aging:

- Comorbidities
- Projected increase in prevalence
- Higher social demand: elderly important population

2. Underdiagnosed disease (asymptomatic?, AA?):

- Late diagnosis: more difficult treatment and higher costs
- Underestimated prevalence
- Unknown natural history

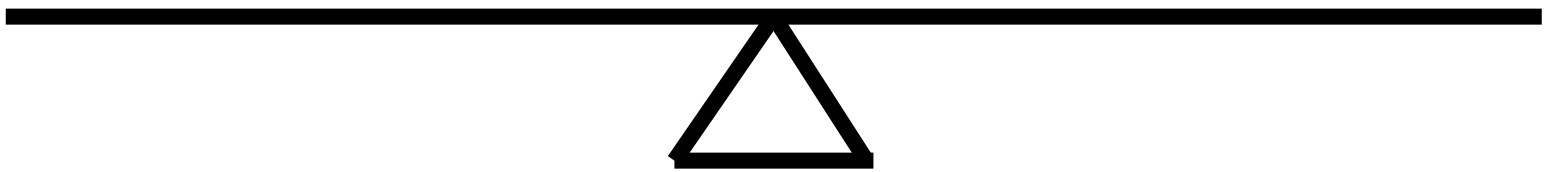
When to go for intervention in AR & AA?

PRO

- Symptoms due to AR
- Signs of hemodynamic impact (AR)
- Signs of risk of aortic rupture (AA)

Influencers

- Comorbidities (HTA, Bicuspid, Marfan,..)
- Lifestyle (sport)
- Intervention results and risks



Essential questions in the evaluation of patients for valvular intervention

Questions
• How severe is VHD?
• What is the aetiology of VHD?
• Does the patient have symptoms?
• Are symptoms related to valvular disease?
• Are any signs present in asymptomatic patients that indicate a worse outcome if the intervention is delayed?
• What are the patient's life expectancy and expected quality of life?

Essential questions in the evaluation of patients for valvular intervention *(continued)*

Questions *(continued)*
• Do the expected benefits of intervention (versus spontaneous outcome) outweigh its risks?
• What is the optimal treatment modality? Surgical valve replacement (mechanical or biological), surgical valve repair, or catheter intervention?
• Are local resources (local experience and outcome data for a given intervention) optimal for the planned intervention?
• What are the patient's wishes?

The 50s in asymptomatic AR

- LV EF < 50 %
- LVESD > 50 mm (25 mm/m2 BSA)
- Asc aorta diameter 55 mm

2017 ESC/EACTS Guidelines for the management of valvular heart disease

The Task Force for the Management of Valvular Heart Disease of the European Society of Cardiology (ESC) & the European Association for Cardio-Thoracic Surgery (EACTS)

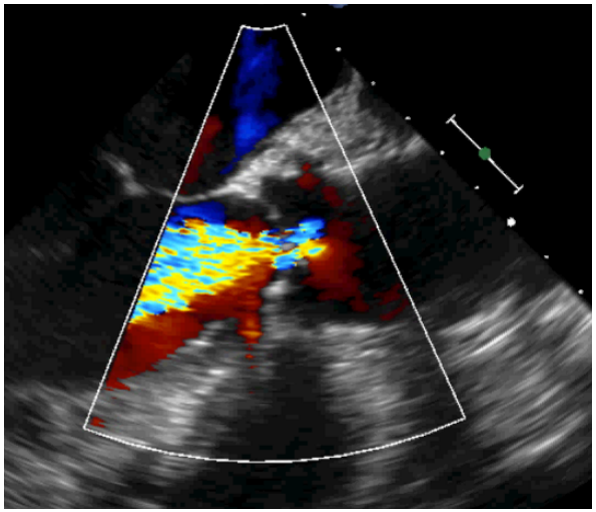
ESC Chairperson: Helmut Baumgartner (Germany).
EACTS Chairperson: Volkmar Falk[1] (Germany).

Authors/Task Force Members: Jeroen J. Bax (The Netherlands), Michele De Bonis[1] (Italy), Christian Hamm (Germany), Per Johan Holm (Sweden), Bernard Iung (France), Patrizio Lancellotti (Belgium), Emmanuel Lansac[1] (France), Daniel Rodriguez Muñoz (Spain), Raphael Rosenhek (Austria), Johan Sjögren[1] (Sweden), Pilar Tornos Mas (Spain), Alec Vahanian (France), Thomas Walther[1] (Germany), Olaf Wendler[1] (UK), Stephan Windecker (Switzerland), Jose Luis Zamorano (Spain).

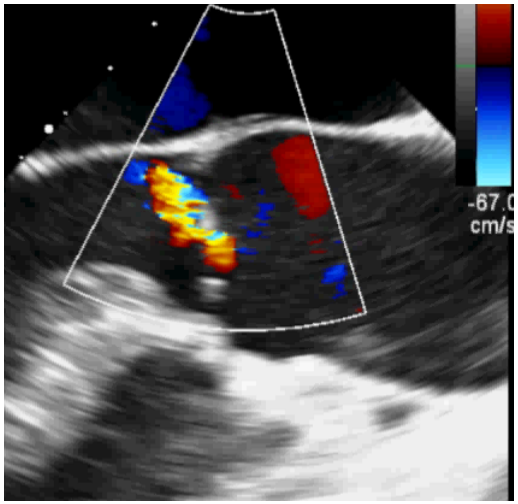
[1] Representing the European Association for Cardio-Thoracic Surgery (EACTS)

Eur Heart J. 2017 Sep 21;38(36):2739-2791

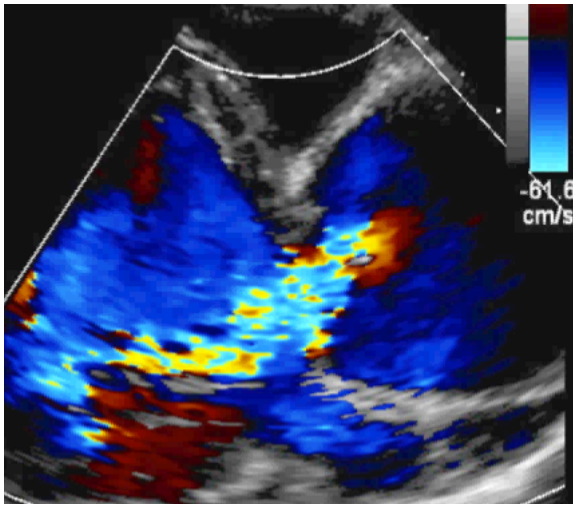
Indication by the valve, by the AA or by both



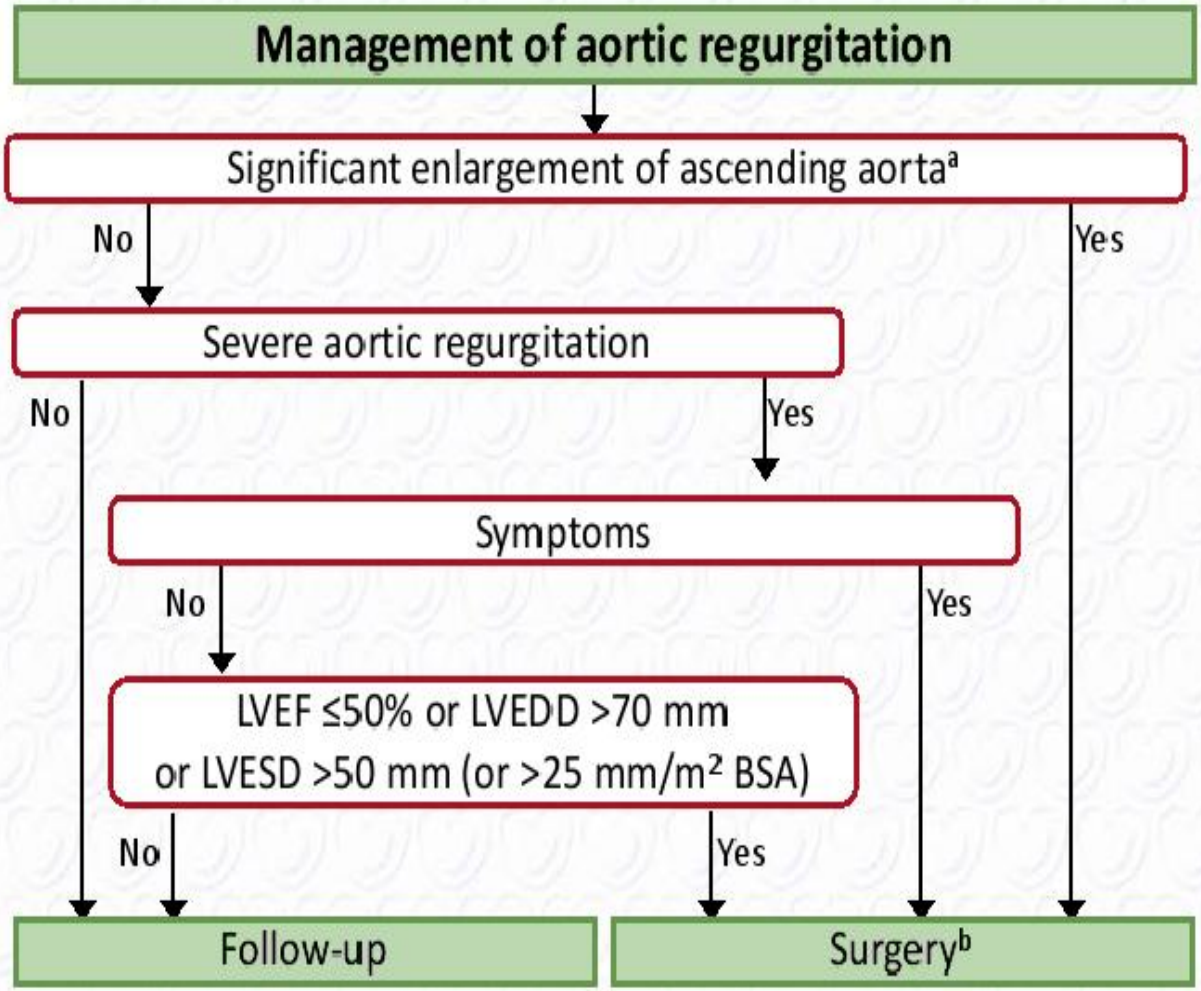
Severe AR
AA 35 mm



Moderate AR
Bicuspid AV
AA 54 mm



Severe AR
AA 70 mm



[a] *See table of recommendations for definitions of aortic diameter*

[b] *Surgery should also be considered if significant changes in LV and aortic size occur during FU (see table)*

ESC/ACTS Guidelines. Eur Heart J. 2017 Sep 21;38(36):2739-2791

Indications for surgery in aortic root dis. *(continued)*

Recommendations	Class	Level
B. Aortic root or tubular ascending aorta aneurysm (irrespective of the severity of aortic regurgitation) *(continued)*		
Surgery should be considered in patients who have aortic root disease with maximal ascending aortic diameter: • ≥45 mm in the presence of Marfan syndrome and additional risk factors[a], or patients with a *TGFBR1* or *TGFBR2* mutation (including Loeys-Dietz syndrome)[b] • ≥50 mm in the presence of a bicuspid valve with additional risk factors[a] or coarctation. • ≥55 mm for all other patients.	IIa	C
When surgery is primarily indicated for the aortic valve, replacement of the aortic root or tubular ascending aorta should be considered when ≥45 mm, particularly in the presence of a bicuspid valve.	IIa	C

[a] *Family history of aortic dissection (or personal history of spontaneous vascular dissection), severe aortic regurgitation or mitral regurgitation, desire of pregnancy, systemic hypertension, and/or aortic size increase >3 mm/year*

[b] *A lower threshold of 40 mm may be considered in women with low BSA, in patients with a TGFBR2 mutation, or in patients with severe extra-aortic features*

Nishimura, et al.
2017 AHA/ACC Focused Update on VHD

2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease

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

Circulation. 2017 Jun 20;135(25):e1159-e1195.

Table 11. Stages of Chronic AR

Stage	Definition	Valve Anatomy	Valve Hemodynamics	Hemodynamic Consequences	Symptoms
A	At risk of AR	• Bicuspid aortic valve (or other congenital valve anomaly) • Aortic valve sclerosis • Diseases of the aortic sinuses or ascending aorta • History of rheumatic fever or known rheumatic heart disease • IE	• AR severity: none or trace	• None	• None
B	Progressive AR	• Mild-to-moderate calcification of a trileaflet valve bicuspid aortic valve (or other congenital valve anomaly) • Dilated aortic sinuses • Rheumatic valve changes • Previous IE	• **Mild AR:** o Jet width <25% of LVOT; o Vena contracta <0.3 cm; o RVol <30 mL/beat; o RF <30%; o ERO <0.10 cm^2; o Angiography grade 1+ • **Moderate AR:** o Jet width 25%–64% of LVOT; o Vena contracta 0.3–0.6 cm; o RVol 30–59 mL/beat; o RF 30%–49%; o ERO 0.10–0.29 cm^2; o Angiography grade 2+	• Normal LV systolic function • Normal LV volume or mild LV dilation	• None
C	Asymptomatic severe AR	• Calcific aortic valve disease • Bicuspid valve (or other congenital abnormality) • Dilated aortic sinuses or ascending aorta • Rheumatic valve changes • IE with abnormal leaflet closure or perforation	• **Severe AR:** o Jet width ≥65% of LVOT; o Vena contracta >0.6 cm; o Holodiastolic flow reversal in the proximal abdominal aorta o RVol ≥60 mL/beat; o RF ≥50%; o ERO ≥0.3 cm^2; o Angiography grade 3+ to 4+; o In addition, diagnosis of chronic severe AR requires evidence of LV dilation	**C1:** Normal LVEF (≥50%) and mild-to-moderate LV dilation (LVESD ≤50 mm) **C2:** Abnormal LV systolic function with depressed LVEF (<50%) or severe LV dilatation (LVESD >50 mm or indexed LVESD >25 mm/m^2)	• None; exercise testing is reasonable to confirm symptom status

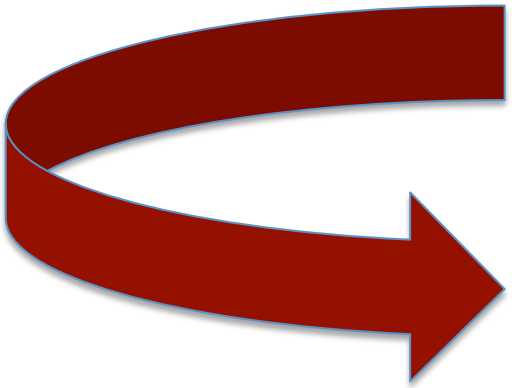
ACC/AHA Guidelines. Circulation. 2017 Jun 20;135(25):e1159-e1195.

D	**Symptomatic severe AR**	• Calcific valve disease • Bicuspid valve (or other congenital abnormality) • Dilated aortic sinuses or ascending aorta • Rheumatic valve changes • Previous IE with abnormal leaflet closure or perforation	• **Severe AR:** o Doppler jet width ≥65% of LVOT; o Vena contracta >0.6 cm, o Holodiastolic flow reversal in the proximal abdominal aorta, o RVol ≥60 mL/beat; o RF ≥50%; o ERO ≥0.3 cm^2; o Angiography grade 3+ to 4+ o In addition, diagnosis of chronic severe AR requires evidence of LV dilation	• Symptomatic severe AR may occur with normal systolic function (LVEF ≥50%), mild-to-moderate LV dysfunction (LVEF 40% to 50%), or severe LV dysfunction (LVEF <40%); • Moderate-to-severe LV dilation is present.	• Exertional dyspnea or angina or more severe HF symptoms

AR indicates aortic regurgitation; ERO, effective regurgitant orifice; HF, heart failure; IE, infective endocarditis; LV, left ventricular; LVEF, left ventricular ejection fraction; LVESD, left ventricular end-systolic dimension; LVOT, left ventricular outflow tract; RF, regurgitant fraction; and RVol, regurgitant volume.

Take home messages

- **AR &AA: Underdiagnosed and expected to increase disease**
- **Related to ageing and lately diagnosed & treated**
- **Classical indication for intervention based on earlier surgical results (less repair, more advanced disease,..)**



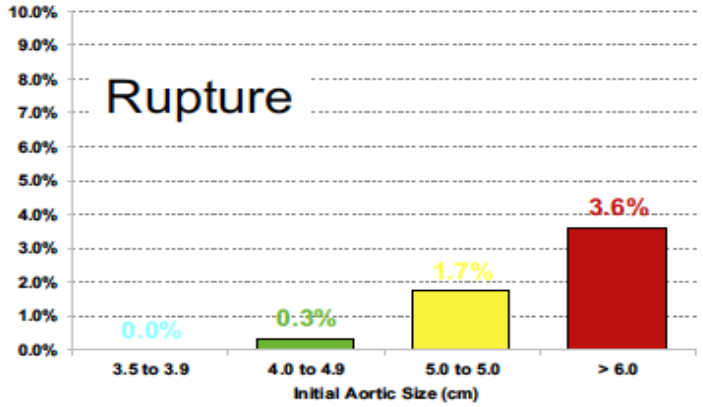
Room for improvement:

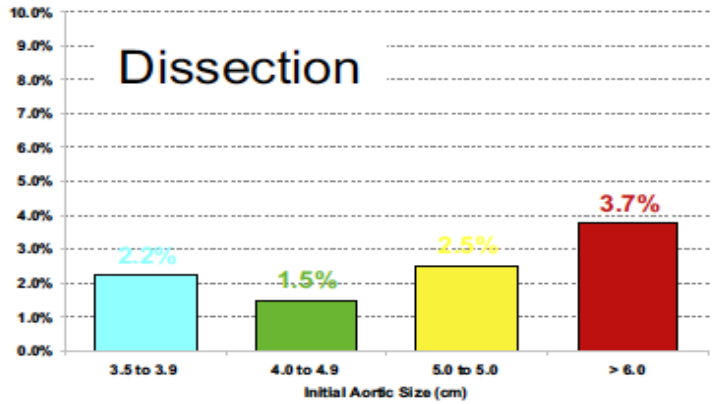
- **to increase awareness,**
- **diagnose earlier and more precisely**
- **treat it more timely and properly**

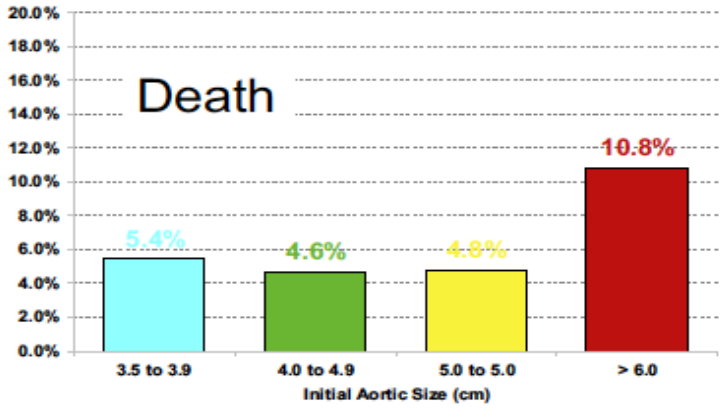

Thanks for your attention

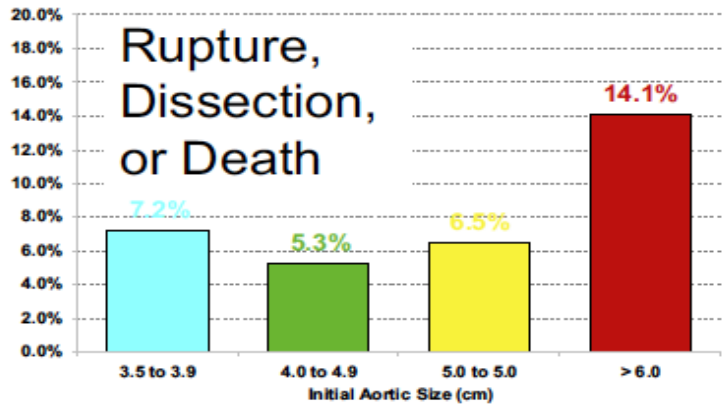
Epidemiology of Thoracic Aortic Aneurysms

TAA incidence in US: 10/100.000 inhab./year
Increasing diagnosis and increasing with age









Chau KH et al. Prog in Cardiovasc Dis 2013; 56: 74-8

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