TAVR IN VIETNAM
CURRRENT STATUS AND FUTURE PERSPECTIVE

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Conflicts of interest

Speaker’s name: Nguyen Hoang Dinh

I have the following potential conflicts of interest to declare:

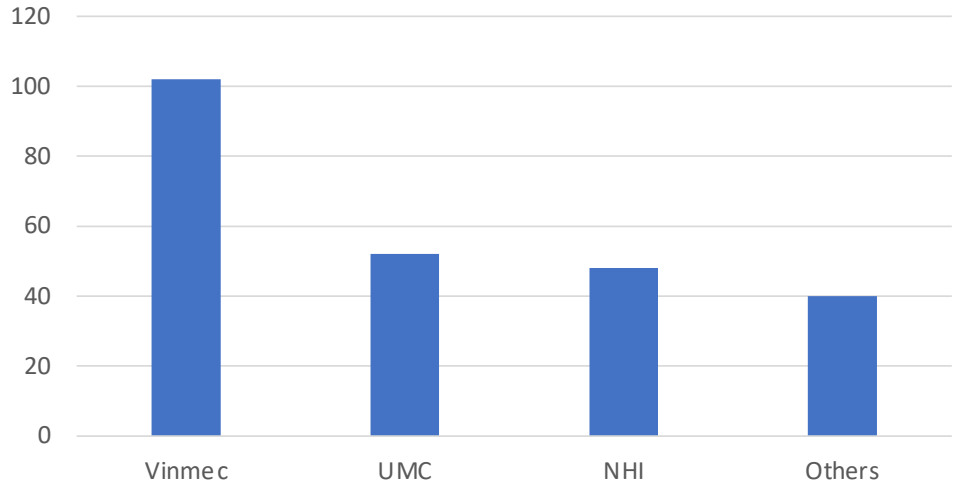
- Receipt of honoraria or consultation fees: Edwards Lifesciences, Medtronic

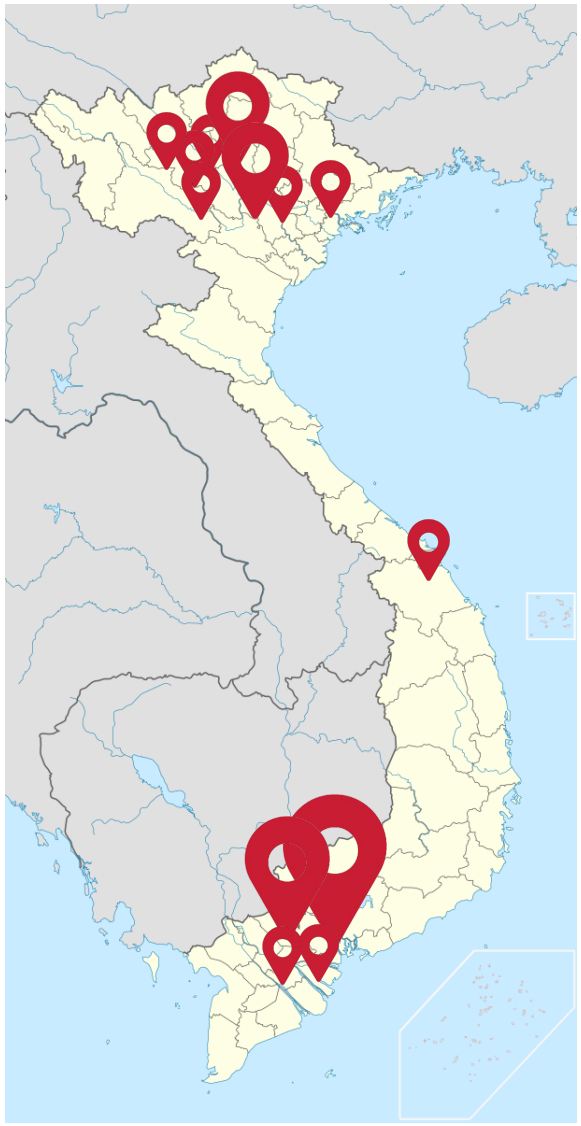
Background

- 2002 – 2022: over 1.5 million TAVR cases worldwide
- Asians patients exhibit different anatomical characteristics: smaller aortic annulus, higher prevalence of BAV
- In developped Asian countries: optimistic outcomes
- Lack of data on TAVR outcomes in Viet Nam
- Scarce documentation regarding implementation and technology transfer models

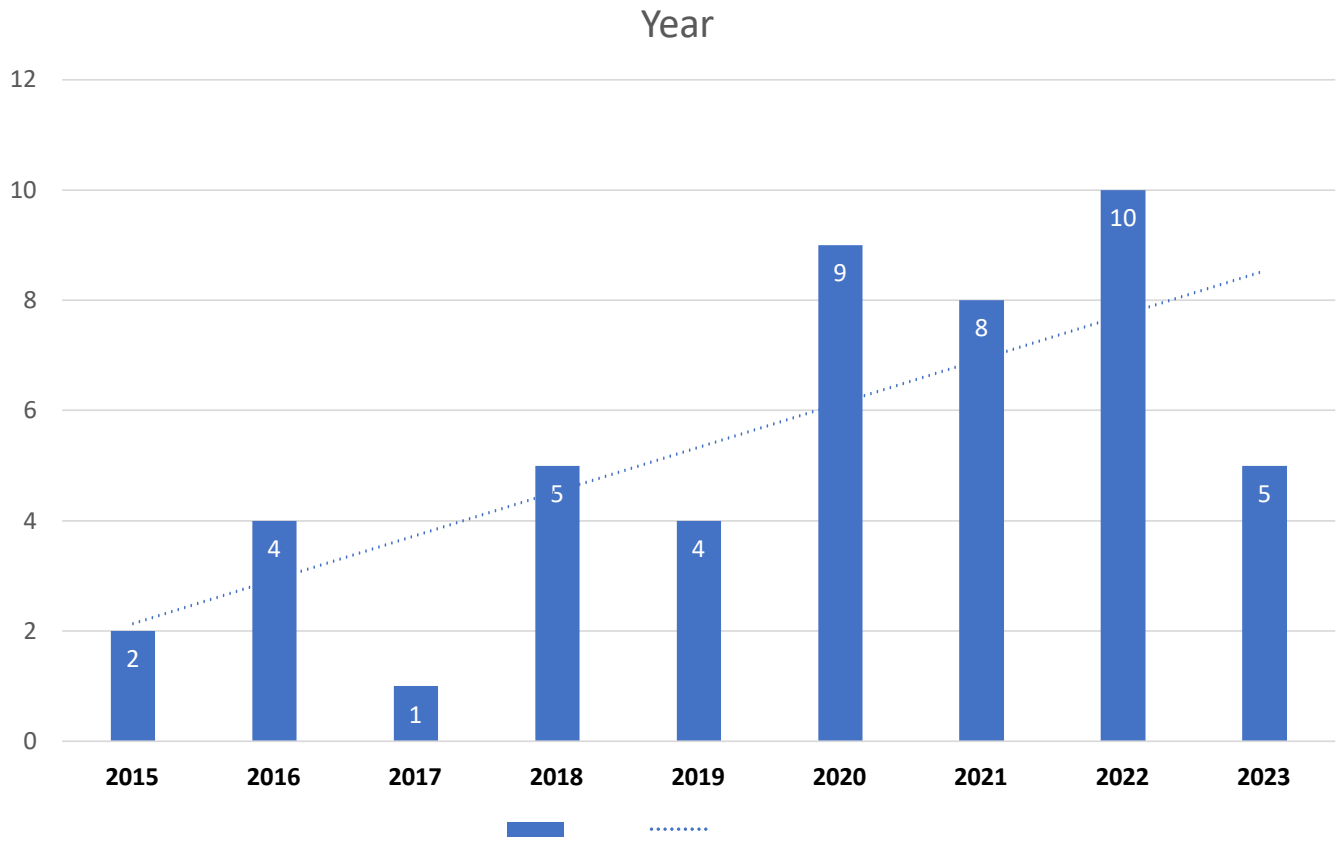
TAVI in Viet nam

- First Corevalve case 2014
- 13 centers, 3 Solo
- 202 cases
- Platforms: 98% SEV – 2% BEV



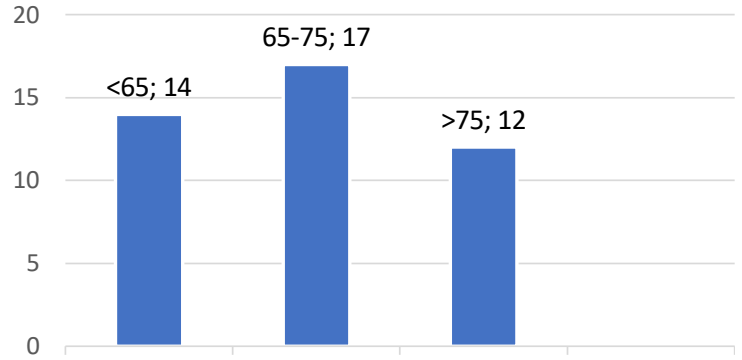


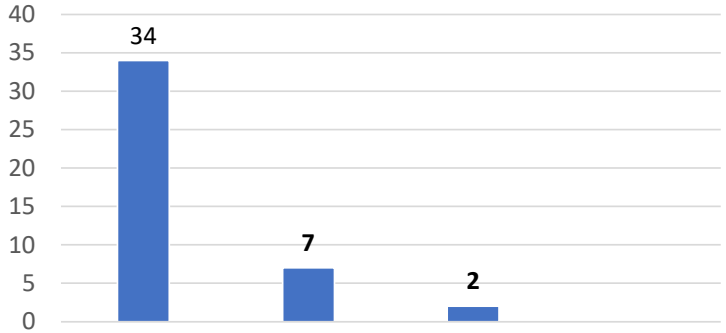
UMC’s experience (48)



Dermographic

- Age: 71.9±8.9 (59,92)
- Sex: M/F: 27/16
- BSA: 1.66±0.15
- EuroSCORE: 3.1±4.2 (0.56-21.72)
- STS: 2.78±1.79 (0.57-6.7)
- BAV: 45.2%





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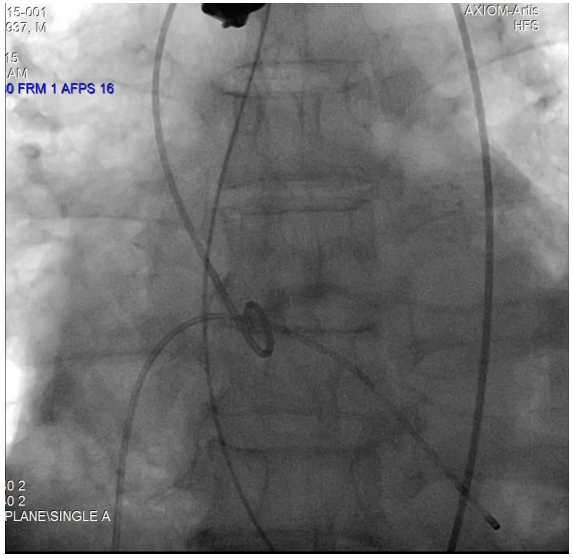
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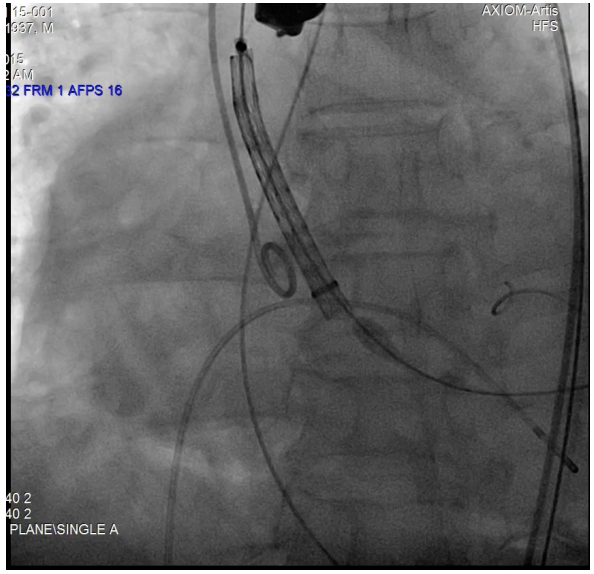
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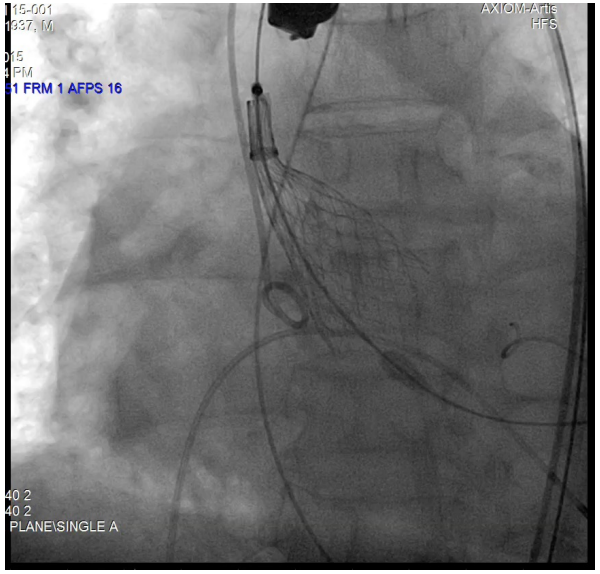
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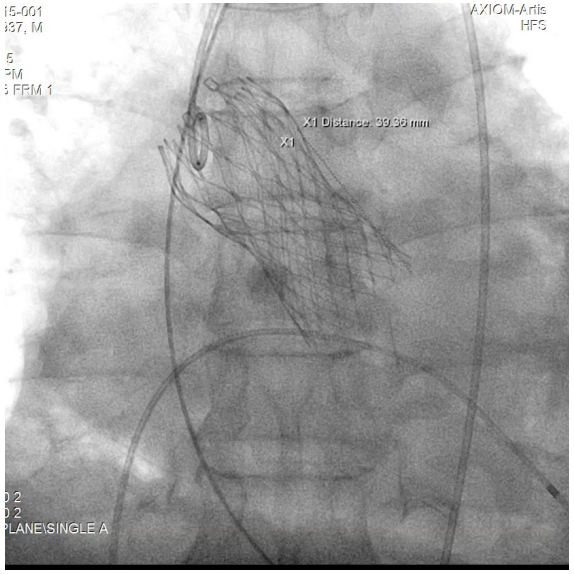
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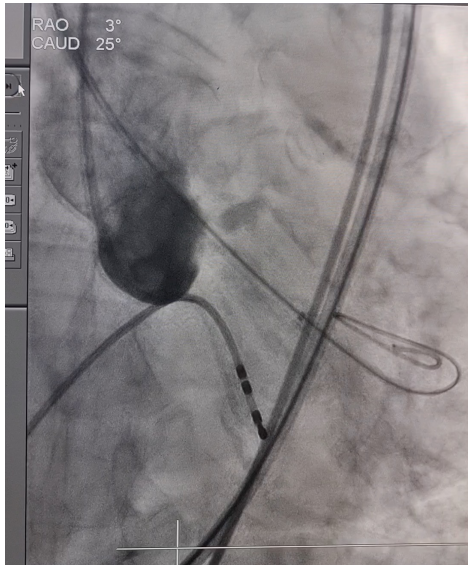
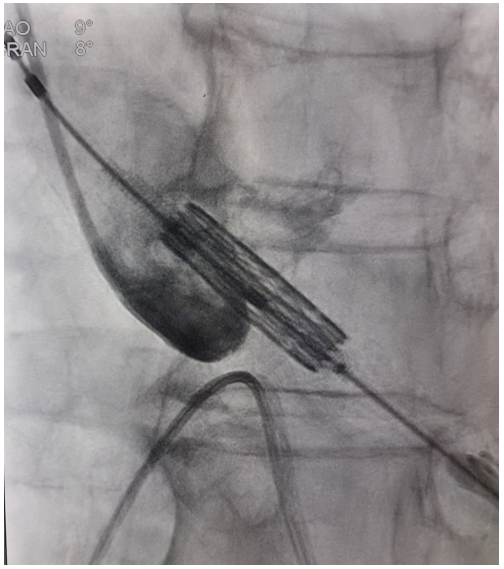
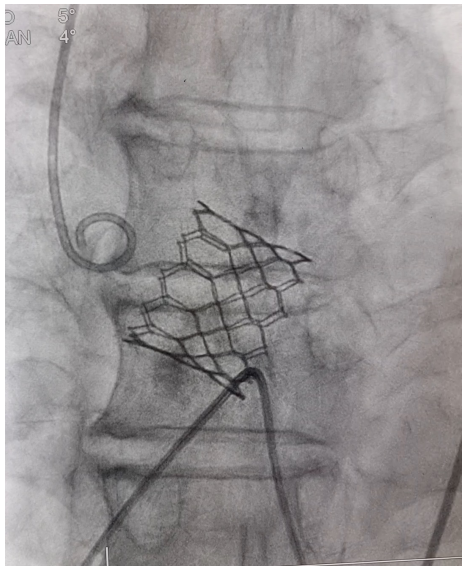
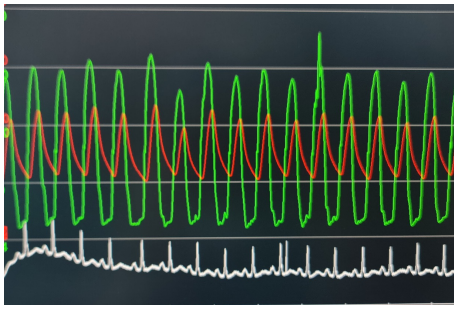
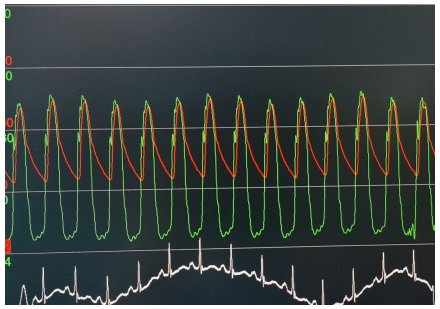




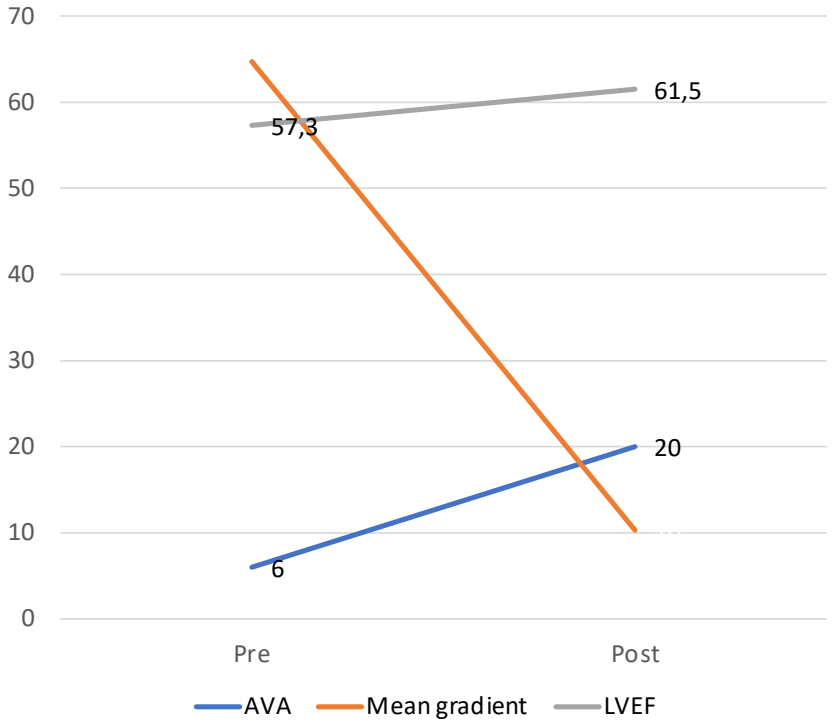






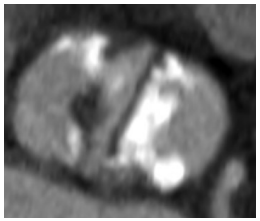
Early outcomes

- Mortality: 2 (4.1%)
- PPM: 5 (10.4%)
- PVL: 5 (10.4%)
- Vasc.: 1 (2%)
- Stroke: 1 (2%)
- Convert: 1 (2%)
- CCU (median): 48 hrs



Characteristics	BAV	TAV
Total	22	23
Age	70.2 (±9)	72.7 (±8.6)
Female	10 (45.45%)	8 (34.78%)
STS score	2.42% (±1.68%)	3% (±1.8%)
NYHA class		
I	0	0
II	8 (36%)	6 (26%)
III	14 (64%)	11 (48%)
IV	0	6 (26%)
Diabetes II	6 (27.27%)	7 (30.3%)
Hypertension	15 (68.18%)	18 (78%)
Chronic lung disease	1 (4.55%)	3 (13.5%)
Chronic kidney disease	1 (4.55%)	1 (4,55%)
CAD	8 (36.36%)	9 (39%)
Pacemaker before TAVR	1 (4.55%)	2 (8.7%)
EF	58.39 (±8.02)	55.8 (±11.9)
AVA cm2	0.6 (±0.16)	0.63 (±0.21)
MeanPG	67.72 (±21.16)	60.7 (±15.9)

BAV vs TAV



Sievers	
Type 0	3 (13%)
Type 1	9 (41%)
Type 2	10 (46%)
Jilaihawi	
Bi-commissural without raphe	10 (46%)
Bi-commissural with raphe	9 (41%)
Tri-commissural	3 (13%)

Outcomes	BAV	TAV
Femoral artery	22 (100%)	23 (100%)
Death	1 (4.55%) (right ventricular wall rupture)	1 (4.3%) (heart failure)
Stroke	0	0
Myocardial infarction after TAVR	0	0
Major bleeding	1 (4.55%)	0
Pacemaker after TAVR	2 (9%)	
CCU time	42 (±26.8)	
EF	61.6 (±7.34)	
MeanPG	10.37 (±3.6)	
MeanPG decrease	54.41(±24.17)	
Perivalvular leak		
No	10 (47.62%)	
Mild	8 (38.1%)	
Moderate	3 (14.29%)	
Severe	0	

Characteristics	Our BAV	SURTAVI	PARTNER 3	Yoon and Cs
Age	70.2 (±9)	79.8(±6.2)	73.3(±5.8)	74.7 (±9.3)
Female	10 (45.45%)	42.4%	32.5%	41%
STS score	2.42% (±1.68%)	4.4±1.5	1.9(±0.7)	3.7±3.3
Before TAVR				
EF	58.39 (±8.02)			53.5±15.3
AVA	0.6 (±0.16)			0.7±0.2
MeanPG	67.72 (±21.16)			47.5±16.5
After TAVR				
EF	61.6 (±7.34)			56.3 (±14.0)
MeanPG	10.37 (±3.6)			
Death	1 (4.55%)	2.8%	6.9%	2%
Stroke	0	3.4%	4.3%	2.7%

Vinmec experience

	All (N = 90)	TAV (N = 48)	BAV (N = 40)	p-value
Age, years	70.7 ± 8.8	71.7 ± 9.4	69.6 ± 8.2	0.264
60–79	69 (76.7)	33 (68.8)	34 (85.0)	0.085
≥80	21 (23.3)	15 (31.2)	6 (15.0)	
Sex male	48 (53.3)	27 (56.2)	21 (52.5)	0.830
BMI, kg/m^2	22.6 ± 3.0	22.5 ± 2.8	22.9 ± 3.2	0.602
NYHA functional classification				0.781
II	12 (13.3)	8 (16.7)	4 (10.0)	
III	66 (73.3)	34 (70.8)	30 (75.0)	
IV	12 (13.3)	6 (12.5)	6 (15.0)	
STS score, %	5.8 ± 1.0	5.7 ± 0.9	5.9 ± 1.1	0.323
Hypertension	75 (83.3)	37 (77.1)	36 (90.0)	0.156
Hyperlipidemia	66 (73.3)	31 (64.6)	33 (82.5)	0.092
Chronic heart failure	27 (30.0)	10 (20.8)	15 (37.5)	0.100
Diabetes mellitus	25 (27.8)	11 (22.9)	14 (35.0)	0.242
Prior PCI	17 (18.9)	11 (22.9)	6 (15.0)	0.422
Chronic pulmonary disease	16 (17.)	9 (18.8)	7 (17.5)	1
Peripheral arterial disease	13 (14.4)	7 (14.6)	6 (15.0)	1
Chronic atrial fibrillation	9 (10.0)	4 (8.3)	3 (7.5)	1
Cerebral vascular disease	6 (6.7)	2 (4.2)	4 (10.0)	0.405
Chronic kidney disease	14 (15.6)	4 (8.3)	8 (20.0)	0.131
Chronic kidney dialysis	1 (1.1)	1 (2.1)	0 (0.0)	1
eGFR, ml/min/1.73 m^2	67.4 ± 18.7	67.5 ± 18.6	69.9 ± 19.0	0.561
Prior permanent pacemaker	1 (1.1)	1 (2.1)	0 (0.0)	1
Prior biological aortic valve prosthesis	2 (2.2)			
Prior biological mitral valve prosthesis	2 (2.2)			
Echocardiographic findings				
LVEF, %	60.8 ± 14.5	60.5 ± 14.5	61.2 ± 14.9	0.819
Aortic valve area, cm^2	0.62 ± 0.18	0.67 ± 0.18	0.57 ± 0.15	0.008
Mean pressure gradient, mmHg	64.0 ± 20.4	58.2 ± 18.2	71.7 ± 20.7	0.002
Moderate/severe aortic regurgitation	6 (6.7)	3 (6.2)	1 (2.5)	0.623
Moderate/severe aortic calcification	76 (84.4)	35 (72.9)	40 (100.0)	<0.001
MSCT findings				
Bicuspid aortic valve	40 (45.5)			
Annulus diameter, mm	23.8 ± 2.8	23.9 ± 2.5	24.1 ± 2.6	0.630
Aortic angulation, degree	49.1 ± 10.0	46.2 ± 9.1	52.6 ± 10.3	0.003

Summary statistics are presented as mean ± standard deviation or n (%). Apart from 48 patients with TAV and 40 patients with BAV, 2 patients with failed aortic bioprosthetic surgery underwent valve-in-valve TAVI. BAV, bicuspid aortic valve; BMI, body mass index; eGFR, estimated glomerular filtration rate; LVEF, left ventricular ejection fraction; MSCT, multi-slice computed tomography; NYHA, New York Heart Association; PCI, percutaneous coronary intervention; STS, Society of Thoracic Surgeons; TAV, transcatheter aortic valve.

***Table 1:* Baseline characteristics of the patients.**

	All			TAV			BAV		
	1–30 (N = 30)	31–90 (N = 60)	p-value	1–30 (N = 17)	31–90 (N = 31)	p-value	1–30 (N = 13)	31–90 (N = 27)	p-value
Age, years	70.5 ± 9.5	70.8 ± 8.5	0.872	72.4 ± 10.5	71.3 ± 8.9	0.726	68.1 ± 7.7	70.3 ± 8.5	0.426
NYHA III–IV	26 (86.7%)	52 (86.7%)	>0.999	15 (88.2%)	25 (80.6%)	0.694	11 (84.6%)	25 (92.6%)	0.584
STS score, %	6.2 ± 0.9	5.7 ± 1.0	0.025	6.0 ± 0.8	5.5 ± 0.9	0.048	6.3 ± 1.0	5.7 ± 1.2	0.125
Chronic heart failure	5 (16.7%)	22 (36.7%)	0.056	4 (23.5%)	6 (19.4%)	0.727	1 (7.7%)	14 (51.9%)	0.013
Cerebral vascular disease	1 (3.3%)	5 (8.3%)	0.659	1 (5.9%)	1 (3.2%)	>0.999	0 (0.0%)	4 (14.8%)	0.284
Mean transaortic pressure gradient, mmHg	65.1 ± 20.7	63.4 ± 20.4	0.711	54.1 ± 10.7	60.5 ± 21.1	0.176	79.4 ± 22.2	68.0 ± 19.3	0.127
Aortic valve area, cm^2	0.66 ± 0.18	0.60 ± 0.17	0.119	0.74 ± 0.17	0.63 ± 0.18	0.042	0.56 ± 0.15	0.57 ± 0.16	0.827
Bicuspid aortic valve (MSCT)	13 (43.3%)	27 (46.6%)	0.824	-	-	-	13 (100.0%)	27 (100.0%)	>0.999
Procedural time, min	208.7 ± 76.8	182.3 ± 46.8	0.092	207.4 ± 64.8	184.2 ± 41.3	0.196	210.4 ± 93.0	180.9 ± 54.5	0.306
Fluoroscopy time, min	33.4 ± 11.0	28.9 ± 12.2	0.081	32.2 ± 10.4	27.5 ± 11.1	0.154	35.1 ± 11.9	31.0 ± 13.5	0.340
Device success	28 (93.3%)	58 (96.7%)	0.598	17 (100.0%)	30 (96.8%)	>0.999	11 (84.6%)	26 (96.3%)	0.242
30-day all-cause mortality	1 (3.4%)	1 (1.7%)	>0.999	0 (0.0%)	0 (0.0%)	–	1 (8.3%)	1 (3.7%)	0.526
1-year all-cause mortality	2 (6.9%)	2 (4.8%)	>0.999	0 (0.0%)	0 (0.0%)	–	2 (16.7%)	2 (11.8%)	>0.999

Summary statistics are presented as n (%). TAV, transcatheter aortic valve; BAV, bicuspid aortic valve.

***Table 3:* Baseline characteristics of the patients and outcomes between proctor support and solo operator phases.**

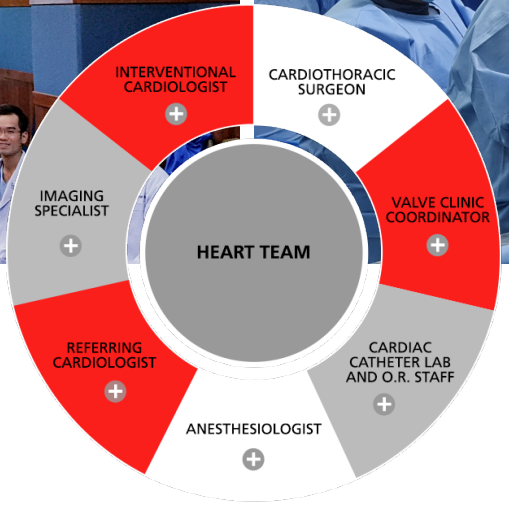
	Our study	CARRY[29]	Asia Pacific TAVI[6]	FRANCE TAVI[10]	STS-ACC TVT[a,17]	SURTAVI[12]
Time to collect TAVI data, year	2017–2022	2012–2020	2009–2017	2013–2015	2011–2019	2012–2016
Sample size	90	1204	1125	12,804	276,316	864
Mean age, year	70.7 ± 8.8	73.8 ± 6.5	79.9 ± 8.1	83.4 ± 7.2	81	79.9 ± 6.2
STS or Log EuroSCORE	5.8 ± 1.0	6.0	7.1 ± 6.2	17.9 ± 12.3	5.22	4.4 ± 1.5
Med-Eds valves, %[b]	98.9–1.1	–	32.7–38.9	34.9–64.3	–	100.0–0.0
30-day all-cause mortality, %	2.3	2.3	2.5	5.4	3.32	2.8
1-year all-cause mortality, %	5.6	4.5	8.8	–	15.62	8.1

STS, Society of Thoracic Surgeons; TAVI, transcatheter aortic valve implantation. [a]Nonmissing data. [b]Med-Eds valves: CoreValve, Evolut R, Evolut Pro-Sapien, Sapien XT, Sapien 3 valves.

***Table 6:* Comparisons of 30-day and 1-year outcomes between our study and others.**

Vo Thanh Nhan, Lancet regional (2023)

The Heart Team and role of cardiac surgeons



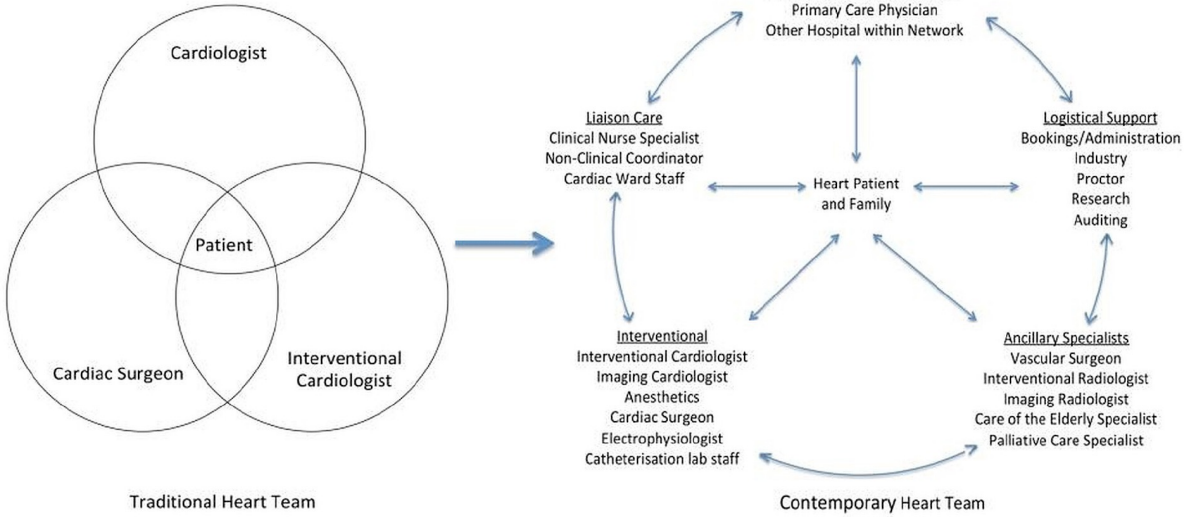
Guideline or consensus statement

Getting the best from the Heart Team: guidance for cardiac multidisciplinary meetings

Andrew Archbold,[1] Enoch Akowuah,[2] Adrian P Banning,[3] Andreas Baumbach,[4,5] Peter Braidley,[6] Graham Cooper,[6] Simon Kendall,[2] Philip MacCarthy ,[7] Peter O'Kane,[8] Niall O'Keeffe,[9] Benoy Nalin Shah ,[10] Victoria Watt,[11] Simon Ray [11]

MDM should inculde:

- Myocardial revascularisation
- Aortic valve disease
- Mitral and tricuspid disease
- Endocarditis



Archbold, Heart 2022 NHS (UK) guidelines

Additional dataset for multidisciplinary meeting review

- A TAVI CT (gated cardiac study, non-gated contrast aortogram from lung apices to femoral arteries) should be available for any patient where TAVI is considered as an option.
- 12-lead ECG.
- N-terminal pro-brain natriuretic peptide, where there are concerns about left ventricular function or symptomatic heart failure.
- Lung function tests±arterial blood gases if history of lung disease.
- Six-minute walk where there are concerns about functional status or frailty.
- Formal assessment of cognitive function such as the Montreal Cognitive Assessment (MoCA), if there are concerns regarding cognitive function.
- Patient's and referrer's treatment preferences.

Core attendees

- MDM coordinator.
- Cardiologist with expertise in echocardiography and valve disease.
- Cardiologist or radiologist with expertise in cardiac structural CT.
- Surgeon with expertise in aortic valve surgery±TAVI.
- Interventional cardiologist with expertise in TAVI.

Additional attendees

- Specialist nurses—cardiac surgical and structural.
- Cardiac anaesthetist/intensivist.
- Elderly care physician.
- Cardiology and surgical trainees.
- Cardiac physiologists.
- Medical students.

Box 2 Examples of possible triage to illustrate the aortic MDM pathway

Scenario 1: a man aged 68 years with severe bicuspid AS and 5 cm aortic root
Triaged to group 1. Summary to MDM, review in specialist aortic surgical clinic. Listed for sAVR and root replacement.

Scenario 2: a woman aged 88 years, CKD stage 3, suffering from diabetes
Triaged to group 2. Summary to MDM, review in TAVI clinic. Accepted for TAVI. Review in TAVI technical MDM to confirm access, valve size and choice of prosthesis.

Scenario 3: a man aged 75 years, limited mobility, Parkinson's disease
Triaged to group 3. MDM review. Predicted slow/difficult recovery from sAVR. Review in TAVI clinic. Accepted for TAVI. Review in TAVI technical MDM to confirm access, valve size and choice of prosthesis.

Scenario 4: a man aged 78 years, severe AS, severely symptomatic, myelodysplasia, platelet count 25, transfusion dependent
Triaged to group 4. Poor non-cardiac prognosis and high procedural risk. Not appropriate for intervention. Discharged back to referring team.

Scenario 5: a man aged 82 years, severe tricuspid AS, 70% mid-LAD stenosis, otherwise fit and active
Triaged to group 3. MDM review. Good candidate for both sAVR and TAVI. Joint review by surgeon and TAVI operator. Patient opted for sAVR and CABG. Listed for sAVR and LIMA.

Scenario 6: a woman aged 78 years, severe AS
Triaged to group 1. Summary to MDM. Review in surgical clinic. Recently widowed and now sole carer for disabled daughter. Referred back to MDM. TAVI likely better option in view of recovery time. Reviewed in TAVI clinic. Accepted for TAVI. Review in TAVI technical MDM to confirm access, valve size and choice of prosthesis.

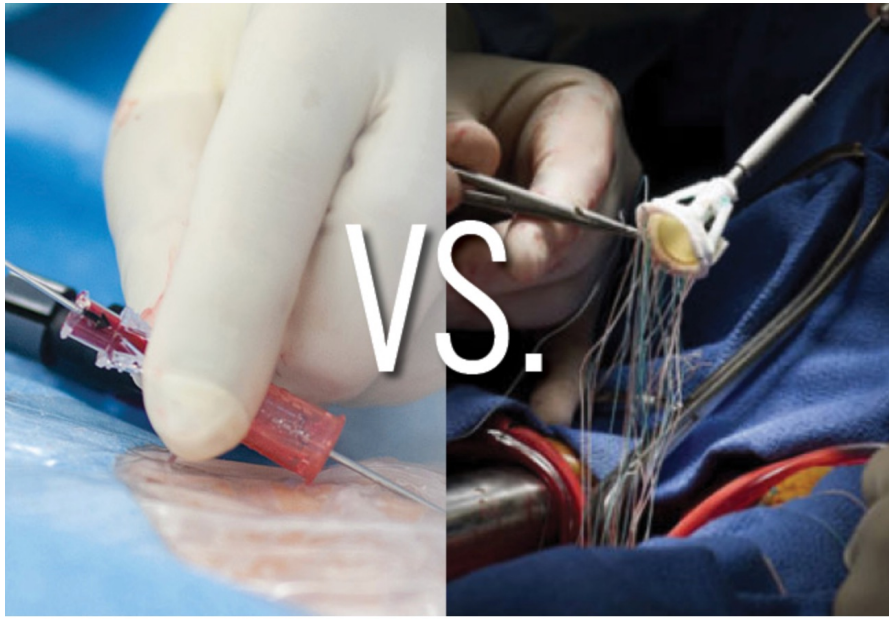
Scenario 7: a man aged 81 years, severe AS, recent reduced mobility
Triaged to group 2. Summary to MDM. Review in TAVI clinic. In clinic found to be limited solely by symptoms from severe AS, otherwise very fit and independent. Wishes to consider sAVR. Referred back to MDM. Seen in sAVR clinic. Accepted for sAVR.

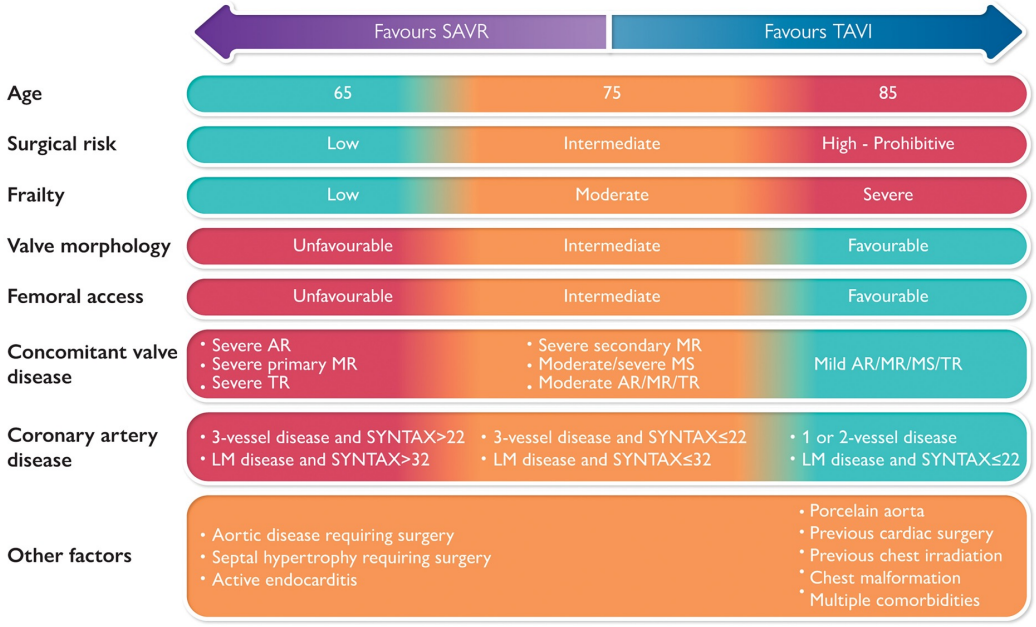
Gaps in TAVR's current evidence base

- Evidence supporting TAVR: limited to carefully chosen patient populations
- Long-term durability of TAVR (and SAVR) prostheses?
- Lifetime management for patients with severe aortic stenosis, especially in young, low risk patients?

When to Refer for SAVR in an Era of Expanding TAVR Use?

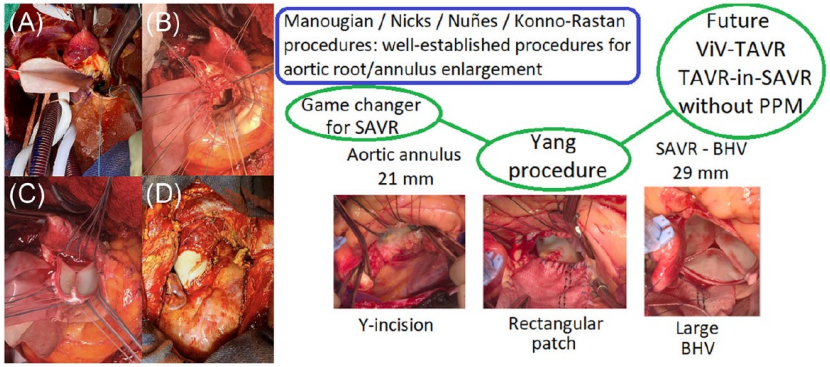
Heart Team Decision Making / Lifetime management/ Patients' Preference



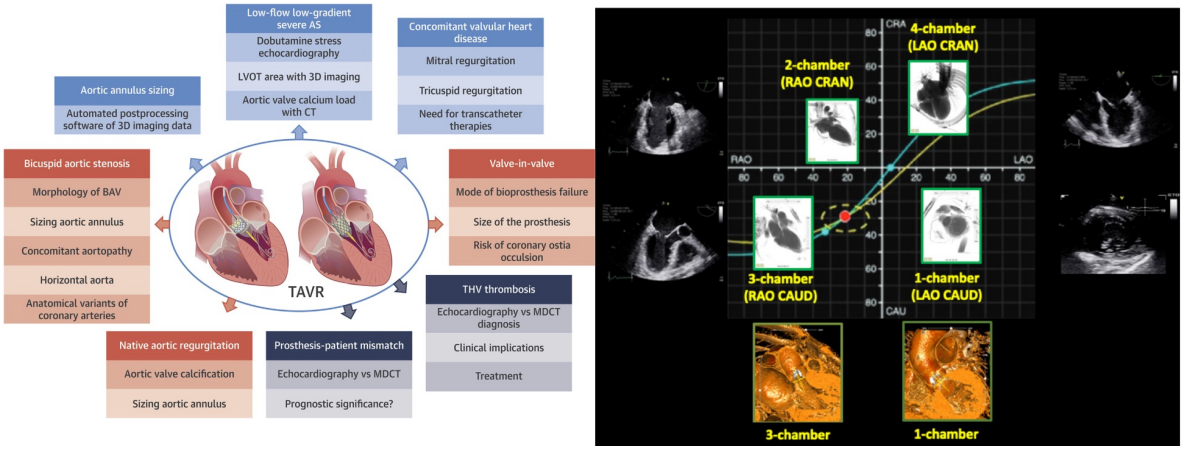


Windecker, Eur Heart J, 2022

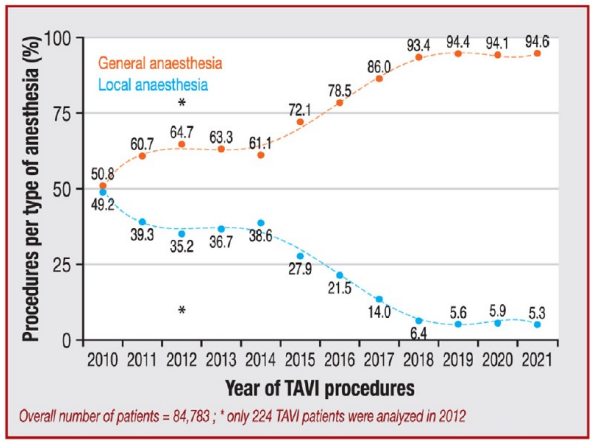
Lessons learned

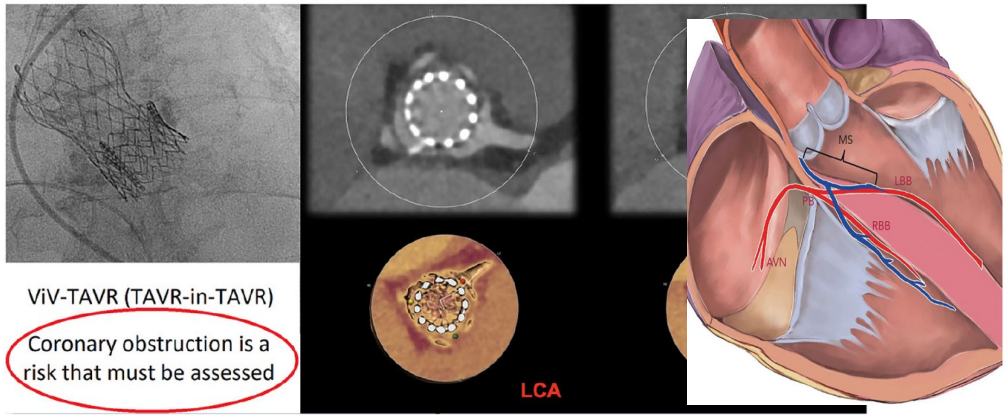


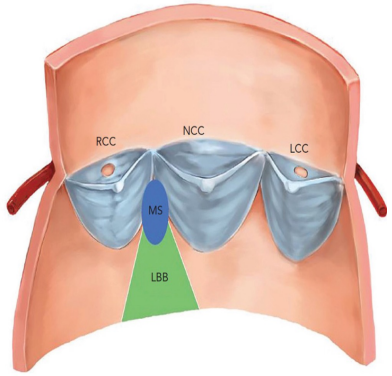
1. Optimize hemodynamic, valve type in SAVR



2. Imaging is the eyes of Heart Team

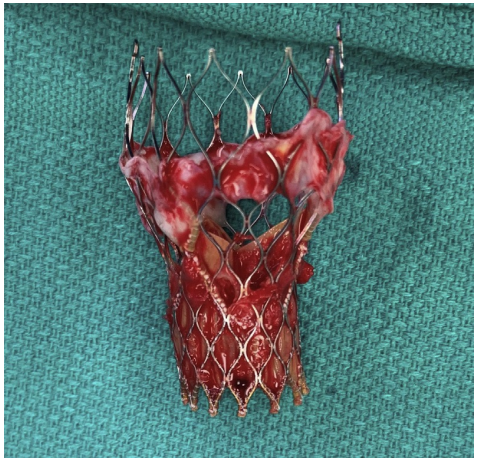






3. Optimize implantation techniques: local anesthesia, commissural alignment, cusp overlap

Life-time management in young AS patients



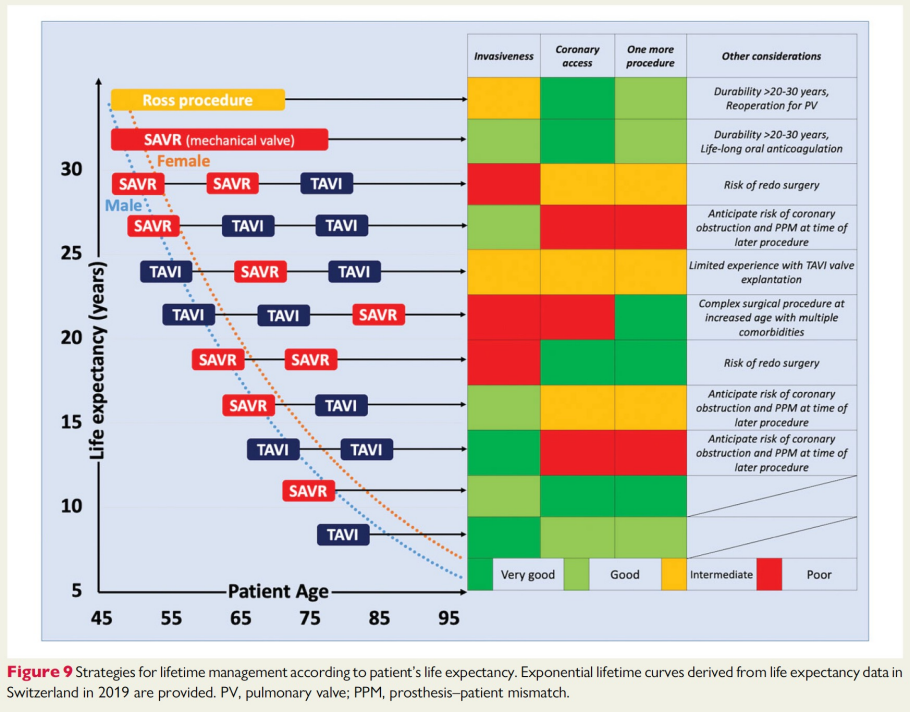


Figure 9 Strategies for lifetime management according to patient's life expectancy. Exponential lifetime curves derived from life expectancy data in Switzerland in 2019 are provided. PV, pulmonary valve; PPM, prosthesis–patient mismatch.

Lifetime management plan in patients < 65 years old with severe aortic stenosis

- SAVR → TAVI → TAVI
- SAVR → SAVR → TAVI
- TAVI → SAVR → TAVI

Associated considerations

- **TAVI Valve in Valve**
  - Risk for coronary obstruction
  - Prosthesis-patient mismatch
- **Redo SAVR**
  - Higher mortality and morbidity
  - Prolonged recovery and longer in-hospital stay
- **Surgical explantation of TAVI prosthesis**
  - Minimal experience
  - Additional surgical procedures
  - Higher mortality

The Interventional Cardiovascular Surgeons

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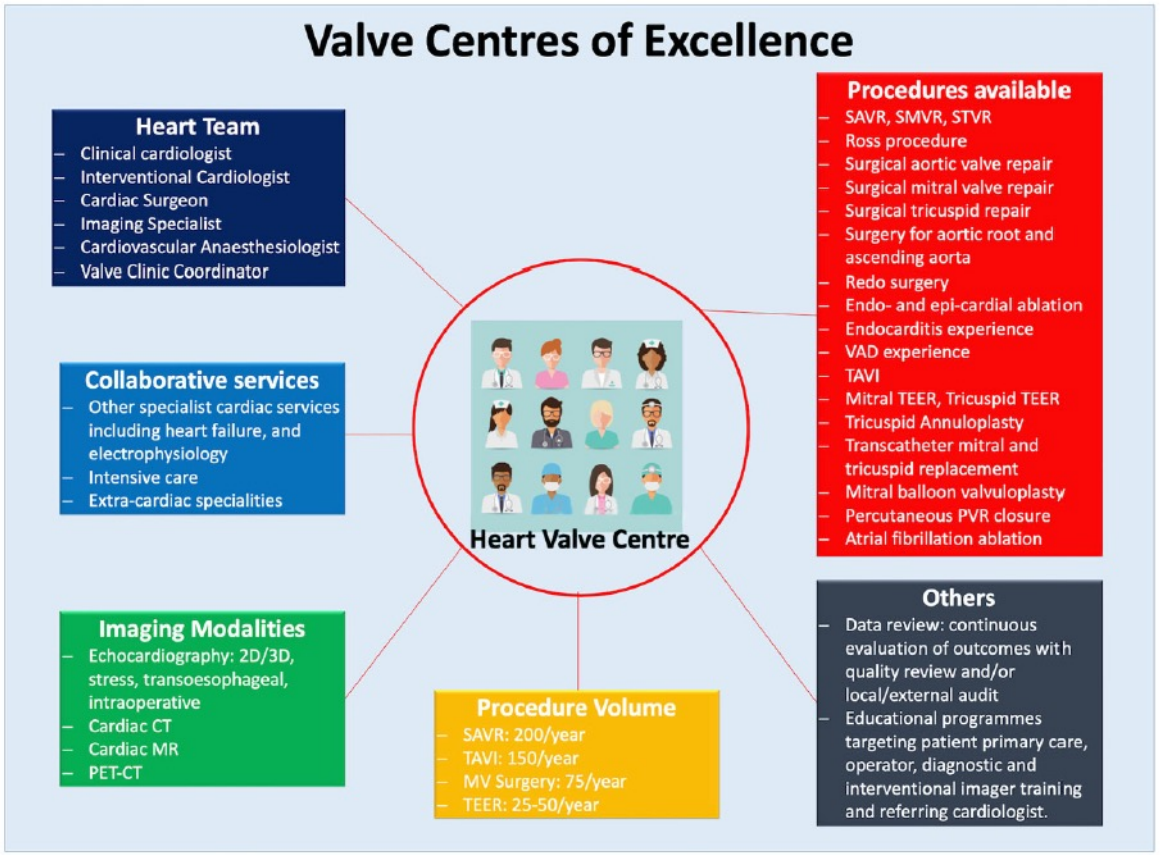

Take home message:

The TAVR train has left the station for multiple new stops

"If you are a cardiothoracic surgeon and you are not involved with TAVR, your aortic valve treatment operations are going to declined. TAVR will be the mainstay treatment for aortic stenosis. Period."

Courtesy Dr. Tom C. Nguyen

Conclusions

- TAVR is safe with a low complication rate and is effective despite high rate of BAV
- TAVI in Vietnam may witness rapid adoption in the following years, surgeons and interventional cardiologists and other members of Heart Team need to be ready to collaborate
- Heart Team is the common ground of the modern practice, requires high professional standards and administrative supports


Thank you!