Review of SAVR vs TAVI for low-, intermediate- and high risk patients

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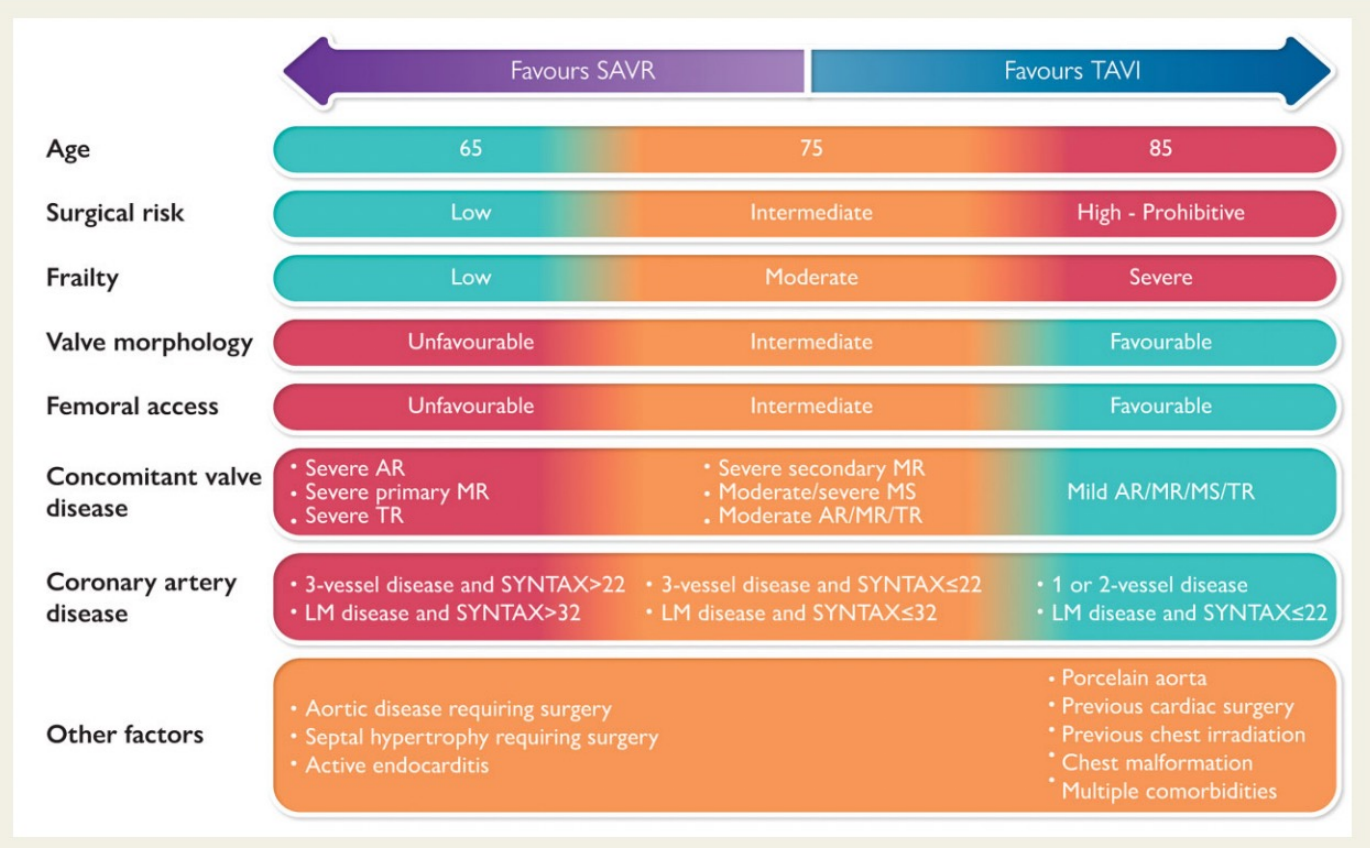
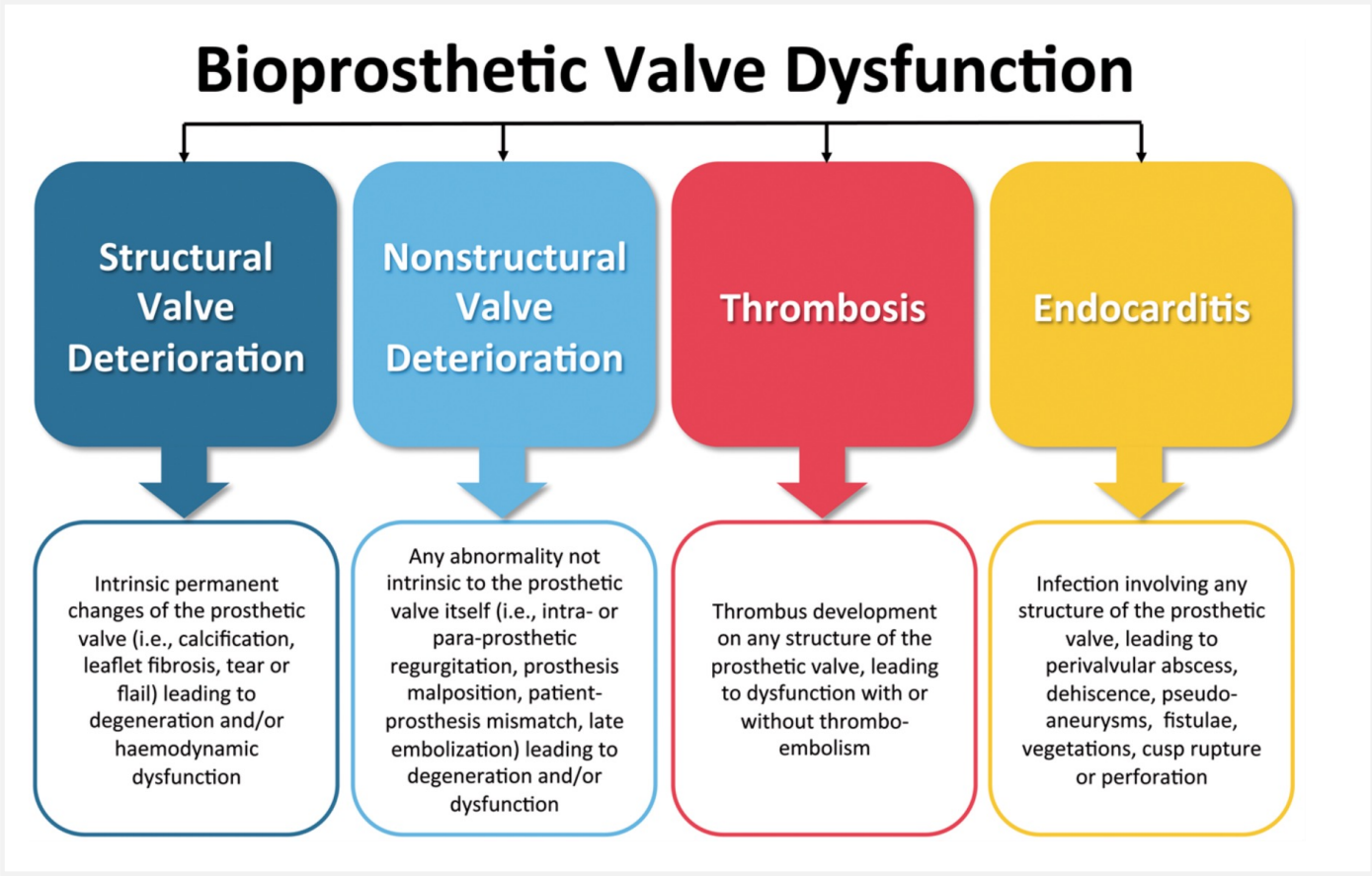
VIETNAM

Decision making SAVR vs TAVI

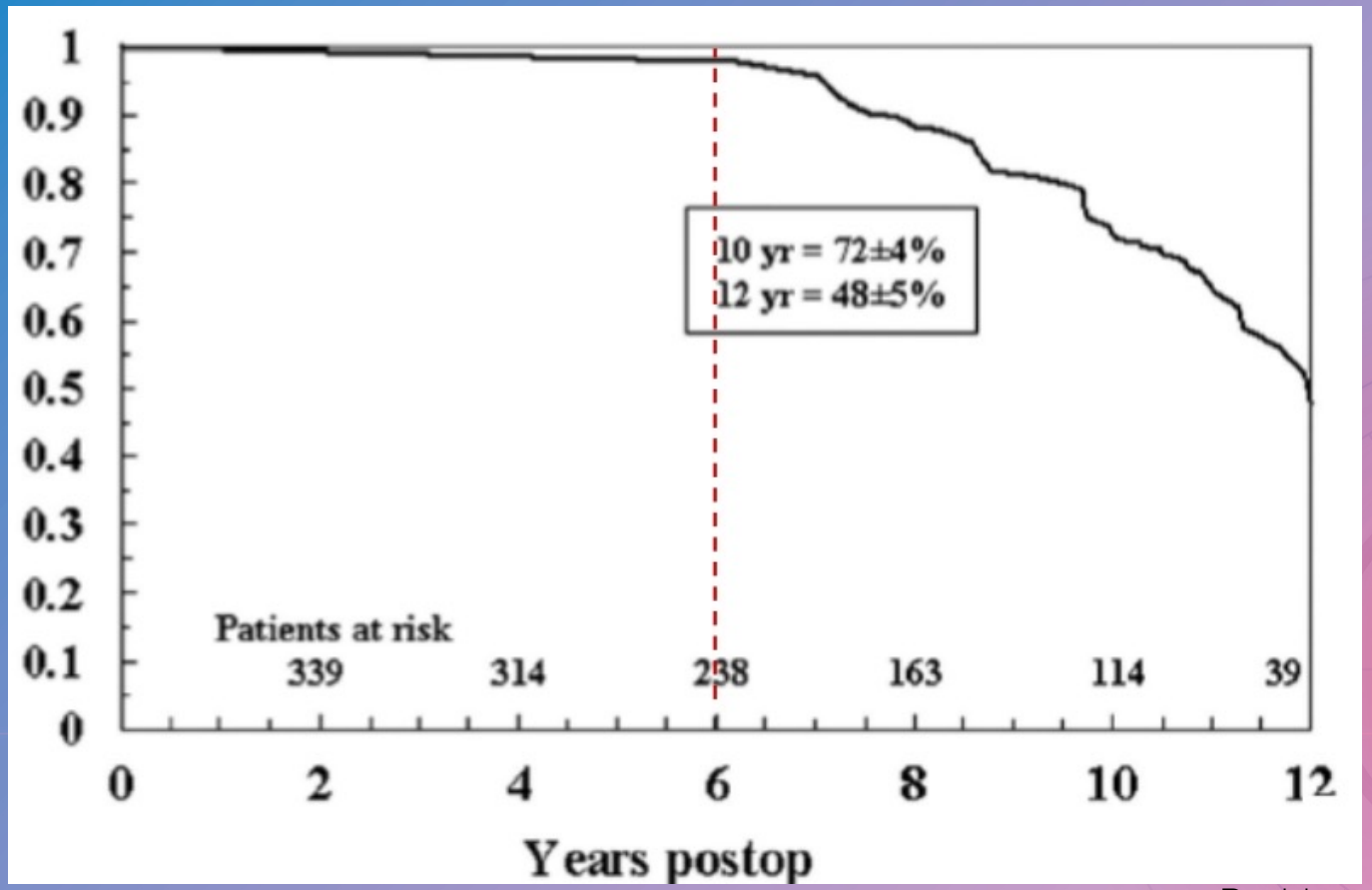


Windecker et al, 2022, https://doi.org/10.1093/eurheartj/ehac105



Capodanno D. et al. Eur J Cardiothorac Surg. 2017;52(3):408-417.

Durability: Toronto stent-less valve



David et al. JTSC. 2008; 135:19-24

Low risk patients

#

Younger patiens

Low risk and young patient

Low risk patient

- Male 83 years
- 180 cm, 75 kg
- Hypertension
- SR
- AS (tricuspid valve)
- No other co-morbidities

Young patient

- Female, 60 years
- 165 cm, 80 kg
- Previous CABG
- Peripheral vessel disease
- Renal failure

Expected survival in Norway

Forventet gjenstående levetid for menn og kvinner på utvalgte alderstrinn.

	0 år	1 år	5 år	10 år	20 år	30 år	40 år	50 år	60 år	70 år	80 år
Menn											
2014	80,03	79,24	75,29	70,33	60,44	50,80	41,20	31,74	22,81	14,79	8,19
Kvinner											
2014	84,10	83,28	79,31	74,33	64,39	54,51	44,70	35,08	25,92	17,39	9,89

Statistikkbanken kildetabell 05375

12-15 years in difference in expected survival
A 60 year old live longer than the valve

Review of the Partner trials
-High risk
-Intermediate risk
-Low risk

Markham et Sharma, Intervent Cardiol Clin 9 (2020)461-467

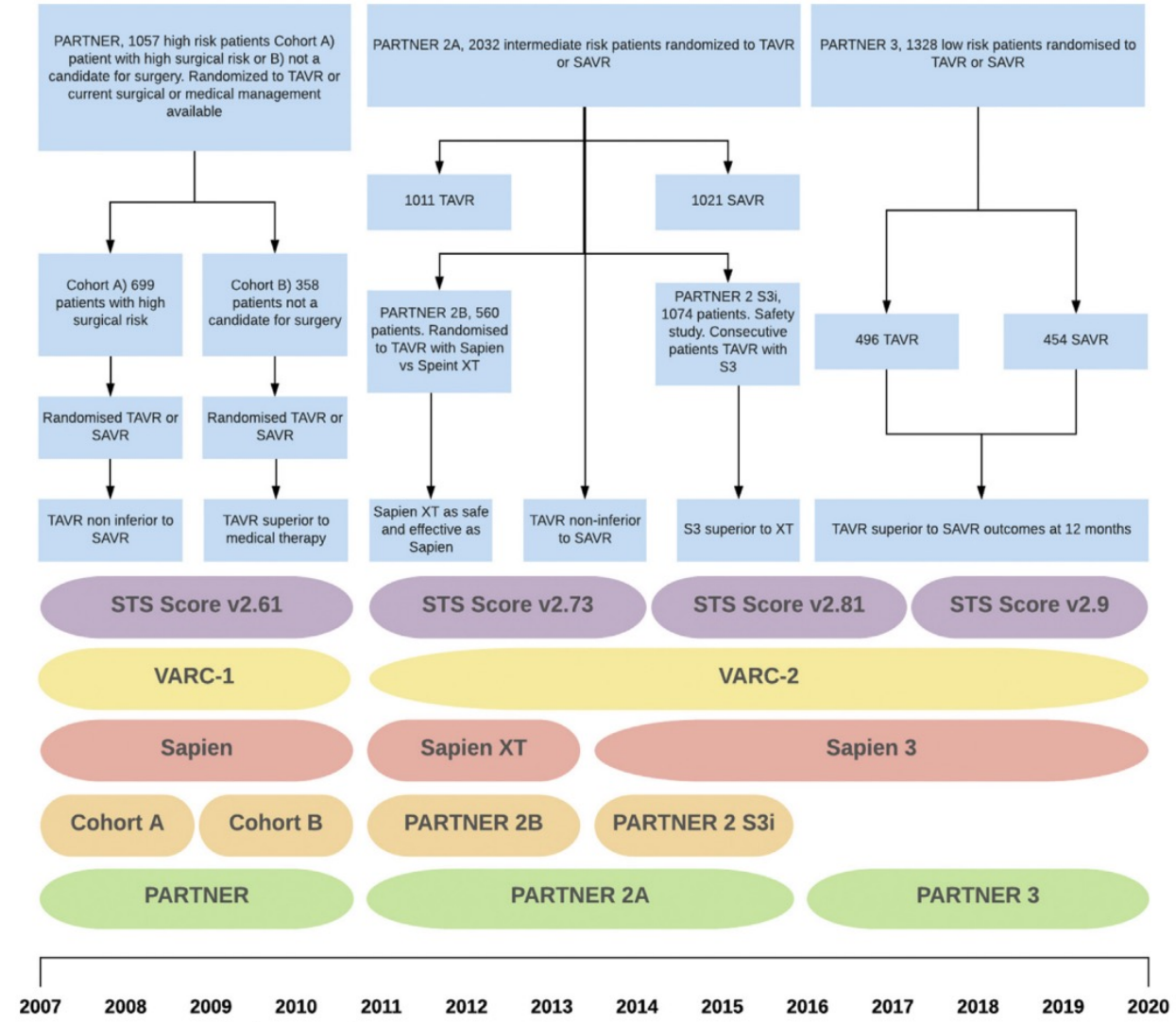


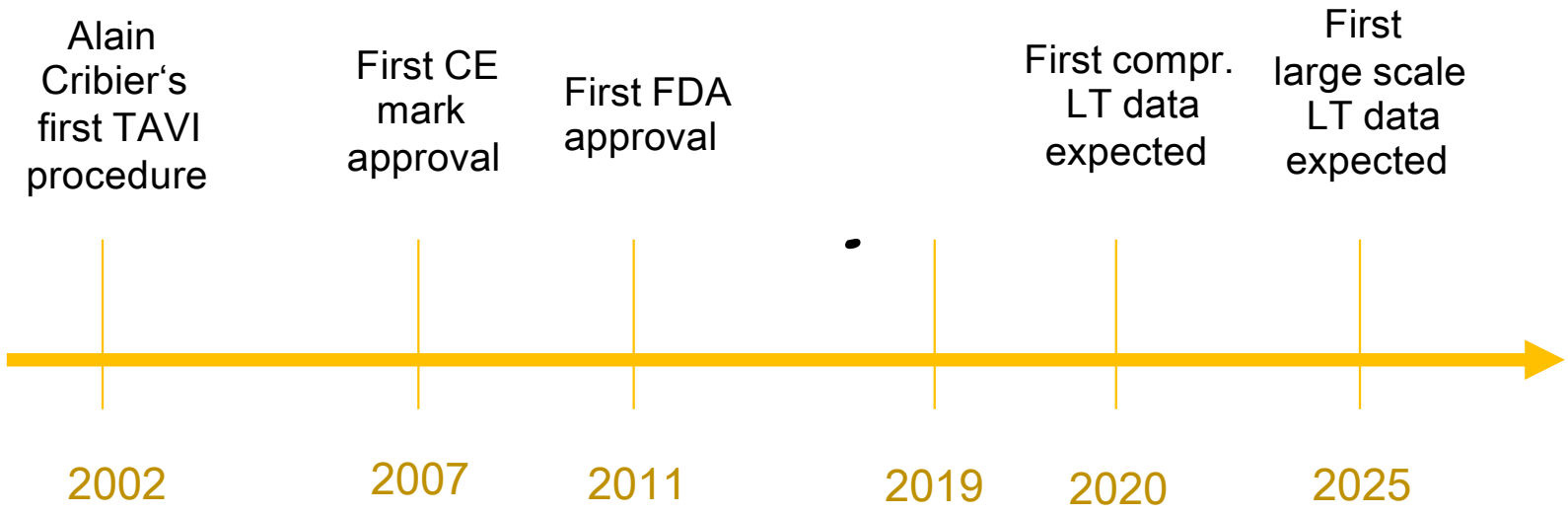
Fig. 1. PARTNER trial design, valve type, patient characteristics, and scoring systems.

High risk trials

- These are no longer an issue, these have been done
- The old and high risk patients become TAVI, even though an old patient can be low risk
- The question for high risk patients are now, who should **not** have TAVI
- For low risk patients it is should all have TAVI?

Do we already have long-term durability data on TAVI?

No, but we shold expect some comprehensive data



Intermediate risk: PARTNER 2

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 FEBRUARY 27, 2020 VOL. 382 NO. 9

Five-Year Outcomes of Transcatheter or Surgical Aortic-Valve Replacement

R.R. Makkar, V.H. Thourani, M.J. Mack, S.K. Kodali, S. Kapadia, J.G. Webb, S.-H. Yoon, A. Trento, L.G. Svensson, H.C. Herrmann, W.Y. Szeto, D.C. Miller, L. Satler, D.J. Cohen, T.M. Dewey, V. Babaliaros, M.R. Williams, D.J. Kereiakes, A. Zajarias, K.L. Greason, B.K. Whisenant, R.W. Hodson, D.L. Brown, W.F. Fearon, M.J. Russo, P. Pibarot, R.T. Hahn, W.A. Jaber, E. Rogers, K. Xu, J. Wheeler, M.C. Alu, C.R. Smith, and M.B. Leon, for the PARTNER 2 Investigators*

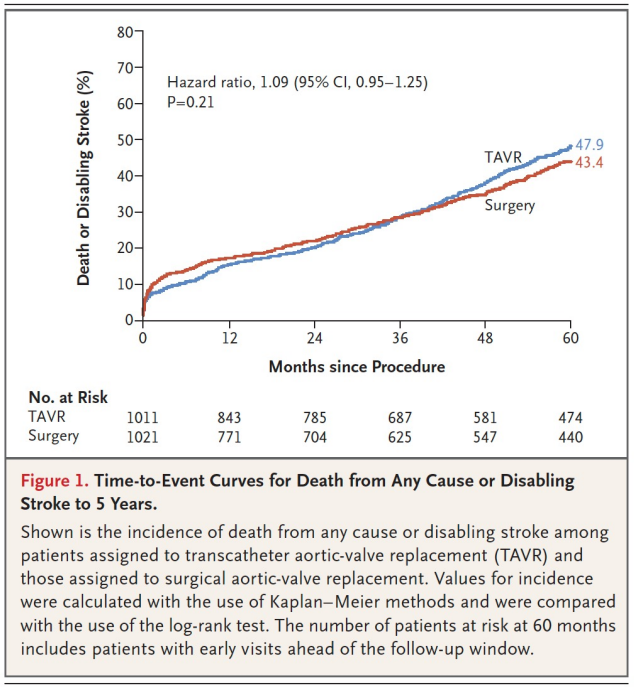
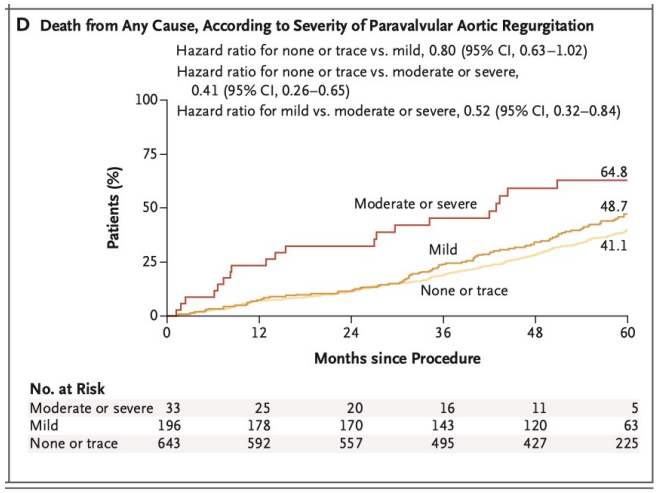
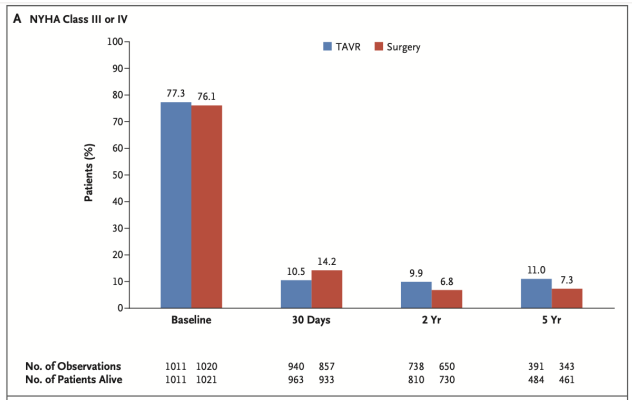


Figure 1. Time-to-Event Curves for Death from Any Cause or Disabling Stroke to 5 Years.

Shown is the incidence of death from any cause or disabling stroke among patients assigned to transcatheter aortic-valve replacement (TAVR) and those assigned to surgical aortic-valve replacement. Values for incidence were calculated with the use of Kaplan–Meier methods and were compared with the use of the log-rank test. The number of patients at risk at 60 months includes patients with early visits ahead of the follow-up window.





PVL @ 2years : severe 8.5% vs 0.4% TAVI vs SAVR

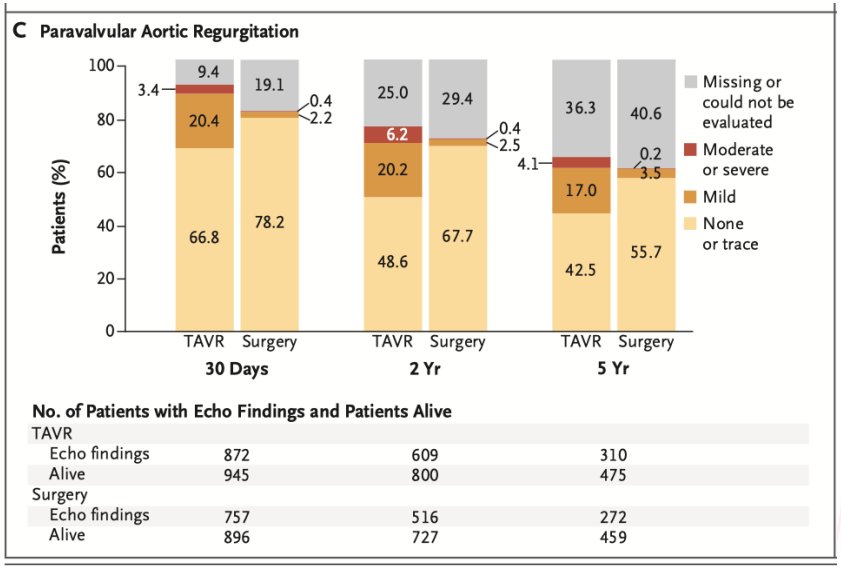
mild 25.2% vs 3.5*%

Concomittant CABG/PCI 14.5% vs 3.9%,

Valve SAVR vs TAVI 23.6% vs 3.9%

Gradient almost equal

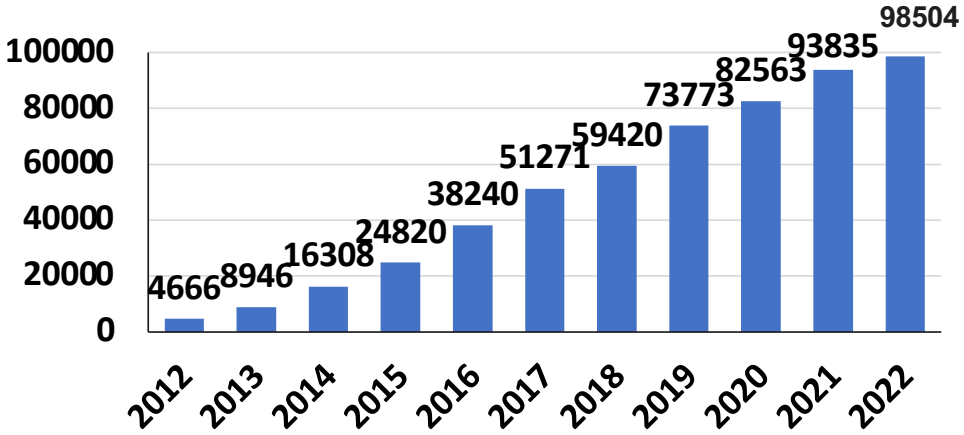
Valve related rehospitalization x3 for TAVI



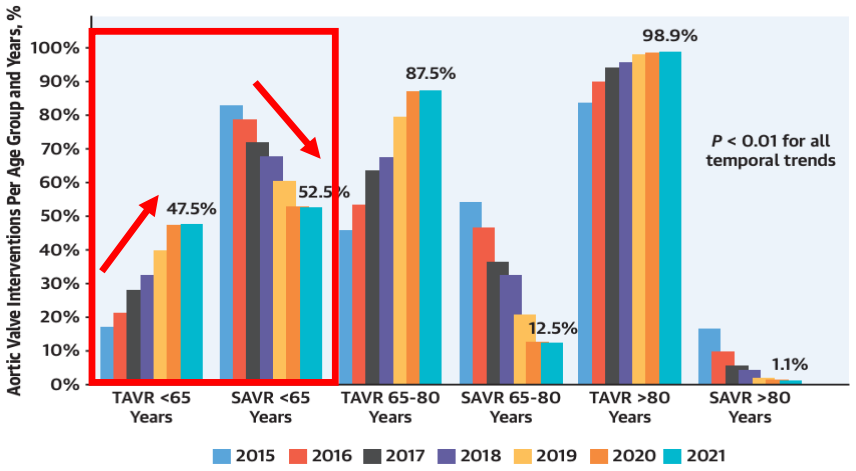
Increasing Number of TAVR Procedures in Younger Lower Risk Patients

- Trends in transcatheter and surgical aortic valve replacement (TAVR and SAVR) in the U.S. show yearly increases in the overall number of TAVR procedures and significant growth in TAVR utilization among younger adults with aortic stenosis.[1,2]

Commercial TAVR procedures in the U.S.



TAVR and SAVR procedures by age group in the U.S.



[1]STS/ACC TVT Registry database.

[2]Sharma T, et al., *J Am Coll Cardiol*. 2023;80(2):2054-2056. Republished with permission from Elsevier Inc.

Studies for low risk

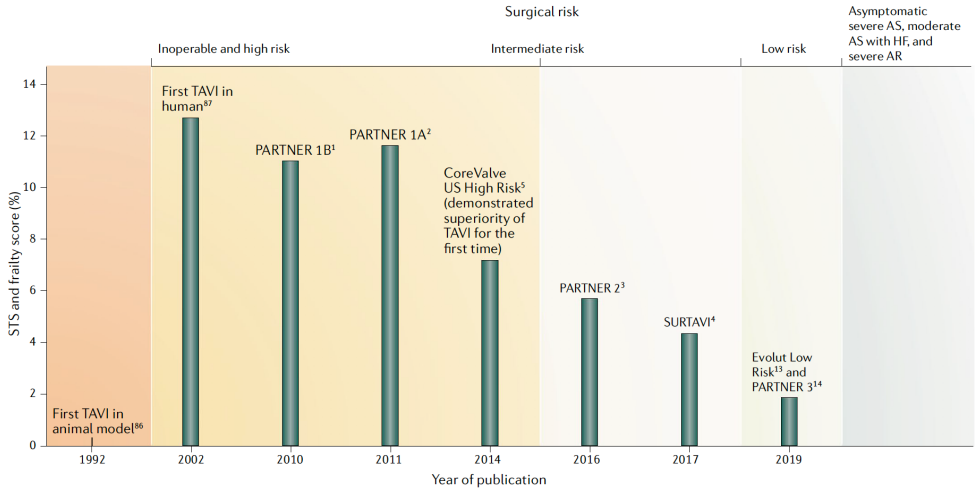


Fig. 1 | **Evolution of TAVI indications.** Over time, the indications for transcatheter aortic valve implantation (TAVI) have expanded to include patients at a lower operative risk (that is, a lower Society of Thoracic Surgeons (STS) score) and with less frailty. Several ongoing studies are exploring the indications for TAVI in asymptomatic severe aortic stenosis (AS), moderate AS with heart failure (HF), and severe aortic regurgitation (AR). The graph shows the STS and frailty score and the surgical risk classification of the patient cohort in each study plotted according to the year of study publication[86,87].

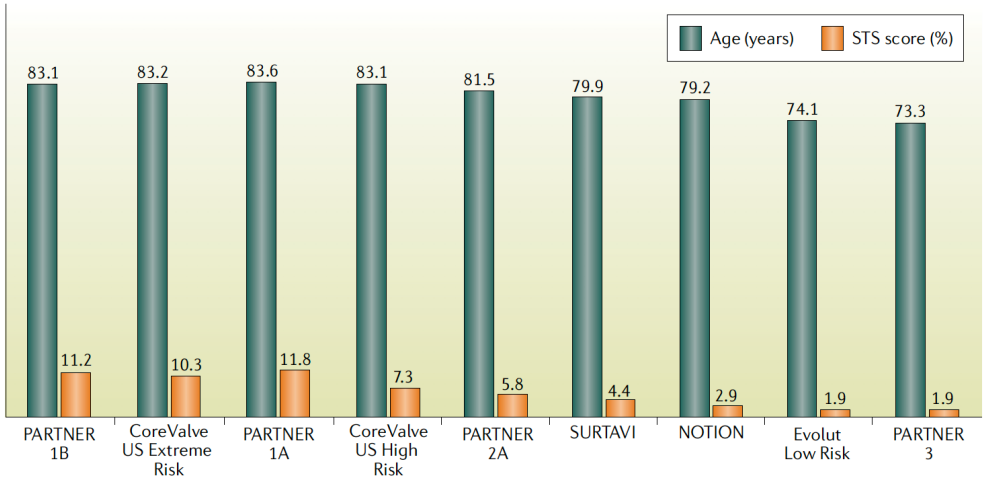


Fig. 2 | **Studies on TAVI versus SAVR in patients at different surgical risk and of similar age.** As shown in the graph, the decrease in the surgical risk of death, as assessed by the Society of Thoracic Surgeons (STS) risk score, in the successive trials on transcatheter aortic valve implantation (TAVI) versus surgical aortic valve replacement (SAVR) is driven by fewer comorbidities in the study cohort rather than by younger age.

PARTNER 3 and Evolut Low Risk PICO(T) analysis

PARTNER 3

P = Low risk (<4%)
I = Sapien 3
C = SAVR
O = D/stroke/re-H
T = 12 months

Superiority

Mack MJ, et al. N Engl J Med. 2019;380:1695-1705

The NEW ENGLAND JOURNAL of MEDICINE

MAY 2, 2019

Transcatheter Aortic-Valve Replacement with a Balloon-Expandable Valve in Low-Risk Patients

ABSTRACT

EVOLUT R LR

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Transcatheter Aortic-Valve Replacement with a Self-Expanding Valve in Low-Risk Patients

ABSTRACT

P = Low risk (≤3%)
I = Evolut R or Pro
C = SAVR
O = Death/stroke
T = 24 months

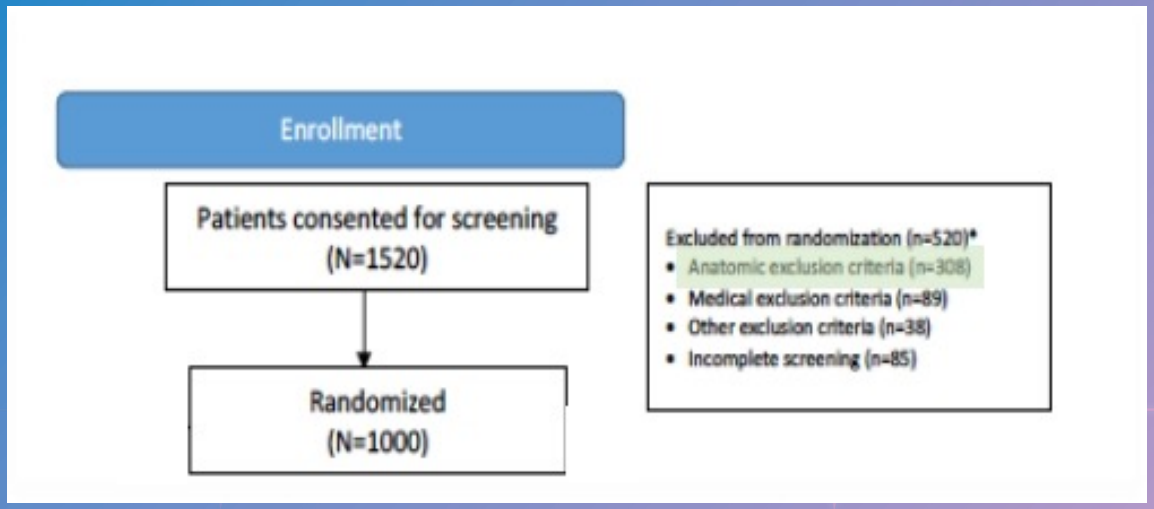
Non-inferiority

Popma JJ, et al. N Engl J Med. 2019;380:1706-1715

Case Selection

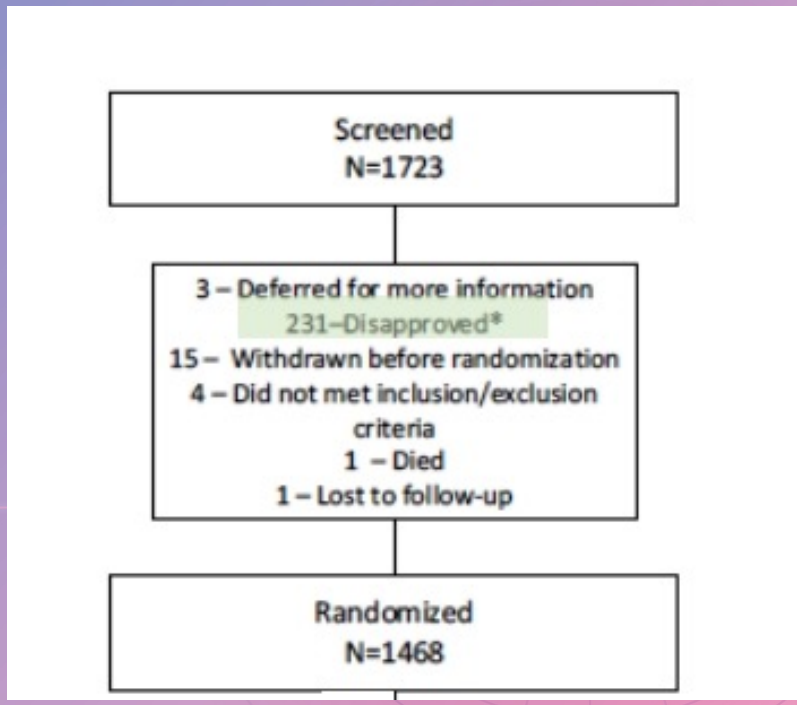
PARTNER 3

52% Excluded



MDT Low Risk

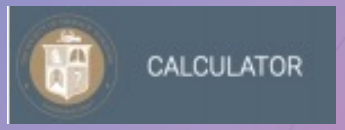
16% Excluded



PARTNER 3: Finally, Who's in……

Table 1. Characteristics of the Patients at Baseline.*

Characteristic	As-Treated Analysis		Intention-To-Treat Analysis	
	TAVR (N=725)	Surgery (N=678)	TAVR (N=734)	Surgery (N=734)
Age — yr	74.1±5.8	73.6±5.9	74.0±5.9	73.8±6.0
Female sex — no. (%)	261 (36.0)	229 (33.8)	266 (36.2)	246 (33.5)
NYHA class — no. (%)				
I	76 (10.5)	63 (9.3)	77 (10.5)	73 (9.9)
II	467 (64.4)	422 (62.2)	476 (64.9)	456 (62.1)
III	181 (25.0)	190 (28.0)	180 (24.5)	202 (27.5)
IV	1 (0.1)	3 (0.4)	1 (0.1)	3 (0.4)
STS-PROM — %†	1.9±0.7	1.9±0.7	1.9±0.7	1.9±0.7
Diabetes mellitus — no. (%)	228 (31.4)	207 (30.5)	228 (31.1)	224 (30.5)
Serum creatinine >2 mg/dl — no. (%)	3 (0.4)	1 (0.1)	3 (0.4)	1 (0.1)
Dialysis — no. (%)	0	1 (0.1)	0	1 (0.1)
Hypertension — no./total no. (%)	614/724 (84.8)	559/677 (82.6)	622/733 (84.9)	608/733 (82.9)
Peripheral arterial disease — no./total no. (%)	54/718 (7.5)	56/678 (8.3)	55/727 (7.6)	62/733 (8.5)
Cerebrovascular disease — no. (%)	74 (10.2)	80 (11.8)	74 (10.1)	84 (11.4)
Chronic obstructive pulmonary disease — no./total no. (%)	104/695 (15.0)	117/649 (18.0)	106/703 (15.1)	121/703 (17.2)
Cardiac risk factors				
SYNTAX score‡	1.9±3.7	2.1±3.9	1.9±3.7	2.1±3.8
Previous coronary-artery bypass surgery — no. (%)	18 (2.5)	14 (2.1)	18 (2.5)	17 (2.3)
Previous percutaneous coronary intervention — no. (%)	103 (14.2)	87 (12.8)	102 (13.9)	93 (12.7)
Preexisting pacemaker or defibrillator — no. (%)	23 (3.2)	26 (3.8)	25 (3.4)	28 (3.8)
Previous myocardial infarction — no. (%)	48 (6.6)	33 (4.9)	49 (6.7)	39 (5.3)
Previous atrial fibrillation or atrial flutter — no./total no. (%)	111/722 (15.4)	98/678 (14.5)	113/731 (15.5)	109/734 (14.9)
Aortic-valve gradient — mm Hg§	47.0±12.1	46.6±12.2	47.2±12.3	46.7±12.2
Aortic-valve area — cm^2§	0.8±0.2	0.8±0.2	0.8±0.2	0.8±0.2
Left ventricular ejection fraction — %§	61.7±7.9	61.9±7.7	61.7±7.9	61.9±7.7



74 years

34%

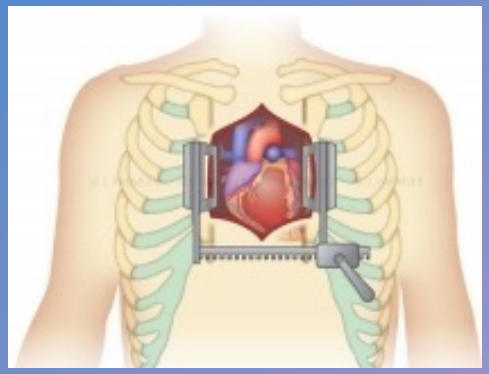
STS PROM 1.9%

Syntax Score 2.0

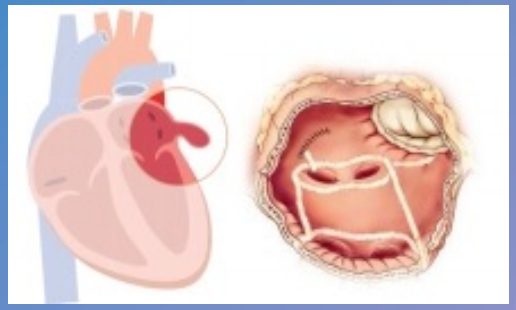
LVEF 62%

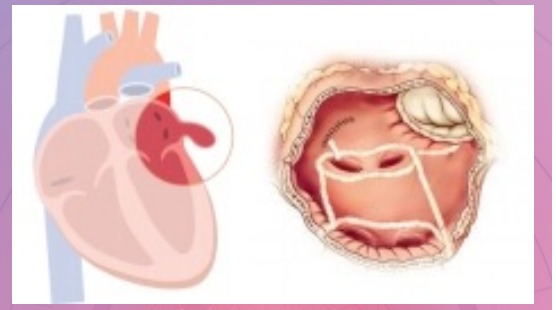
Courtesy of D Mylotte

PARTNER 3



MDT Low Risk

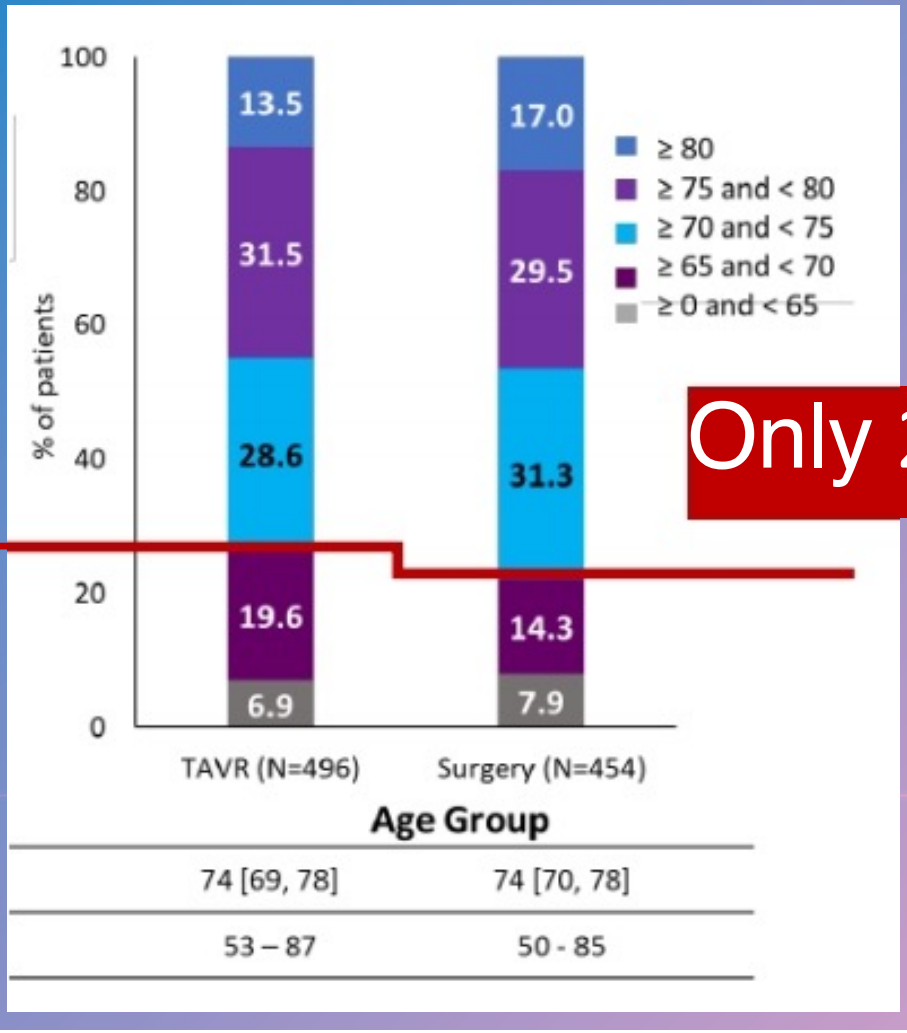
CABG	LAAL	MAZE
		
12.8%	9.5%	4.8%

CABG	LAAL	MAZE
		
13.6%	6.2%	3.5%

Courtesy of D Mylotte

PARTNER 3: Age Distribution

PARTNER 3



Only 25% <70 years old!

Courtesy of D Mylotte

Low risk trials at TCT 2023
PARTNER 3 and Low risk Evolut

Transcatheter Aortic-Valve Replacement in Low-Risk Patients at Five Years

Michael J. Mack, M.D., Martin B. Leon, M.D., Vinod H. Thourani, M.D., Philippe Pibarot, D.V.M., Ph.D., Rebecca T. Hahn, M.D., Philippe Genereux, M.D., Susheel K. Kodali, M.D., Samir R. Kapadia, M.D., David J. Cohen, M.D., Stuart J. Pocock, Ph.D., Michael Lu, Ph.D., Roseann White, Ph.D., Molly Szerlip, M.D., Julien Ternacle, M.D., S. Chris Malaisrie, M.D., Howard C. Herrmann, M.D., Wilson Y. Szeto, M.D., Mark J. Russo, M.D., Vasilis Babaliaros, M.D., Craig R. Smith, M.D., Philipp Blanke, M.D., John G. Webb, M.D., and Raj Makkar, M.D., for the PARTNER 3 Investigators*

EACTS
European Association For Cardio-Thoracic Surgery

EVENTS CALENDAR > ANNUAL MEETING > MEMBERSHIP >

Joint Statement from STS and EACTS regarding Aortic Valve Replacement in Low-Risk Patients

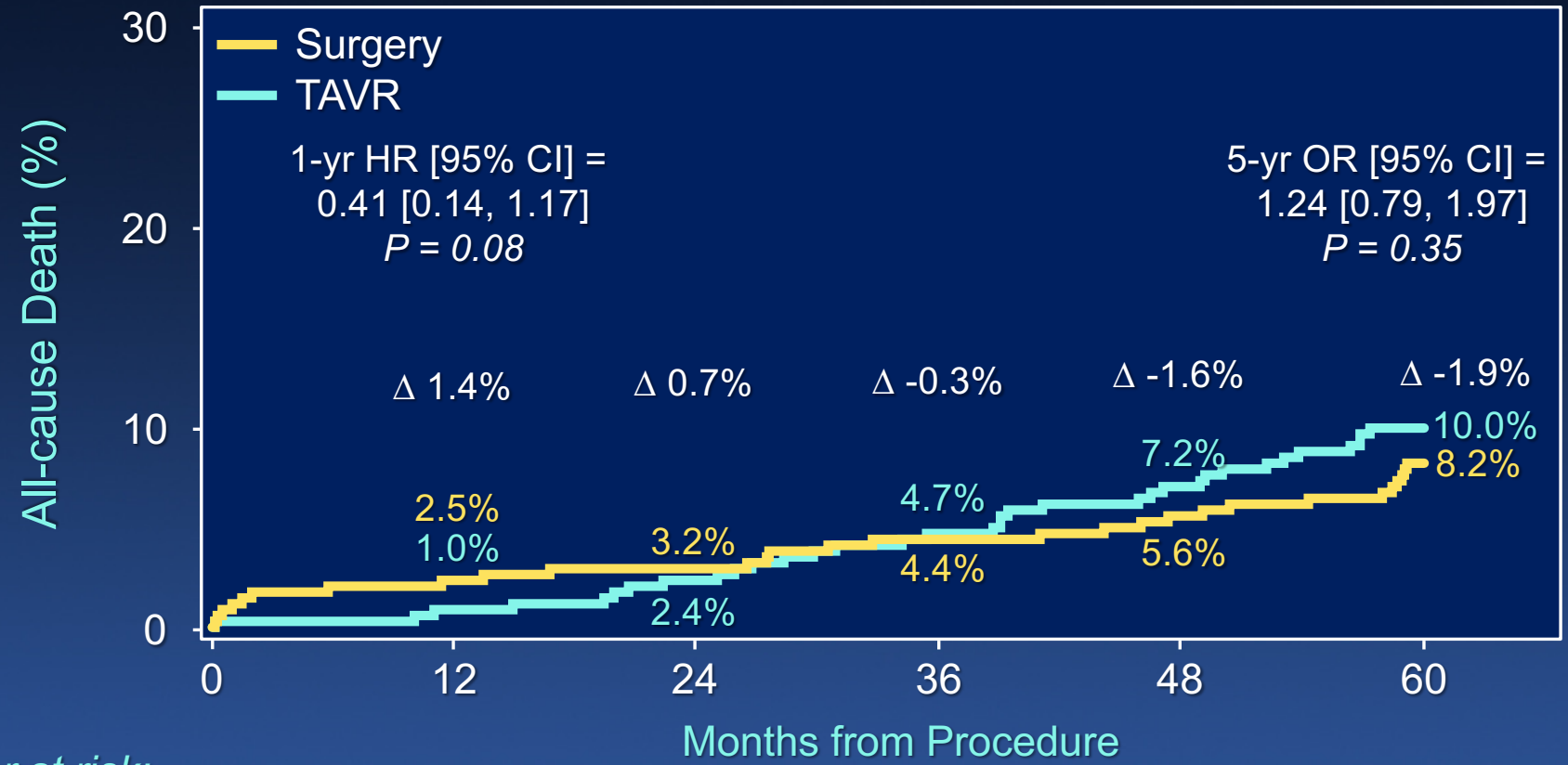
In collaboration with the Society of Thoracic Surgeons, EACTS has published a joint statement in response to new TAVI/SAVR research on low-risk patients.

Statement

The Society of Thoracic Surgeons (STS) and the European Association for Cardio-Thoracic Surgery (EACTS) embrace Transcatheter Aortic Valve Implantation (TAVI) and Surgical Aortic Valve Replacement (SAVR) as outstanding therapeutic options for patients with aortic stenosis. TAVI has proven to be an excellent innovation, particularly for patients of advanced age or risk, that all surgeons and cardiologists unequivocally support through proper functioning multi-disciplinary heart teams.

THE PARTNER 3 TRIAL

All-cause Death



Number at risk:

TAVR	496	490	478	460	438	405
Surgery	454	427	409	394	379	346

THE PARTNER 3 TRIAL

Clinical Implications

The 5-year follow-up findings from the PARTNER 3 trial reaffirm the clinical and echocardiographic benefits of SAPIEN 3 TAVR as a meaningful alternative to surgical therapy for low-risk severe, symptomatic AS patients!

EVOLUT LOW RISK TRIAL | 4 YEAR RESULTS

OBJECTIVE

- To evaluate 4-year clinical and hemodynamic outcomes with TAVR vs SAVR in patients from the Evolut Low Risk trial

EVOLUT LOW RISK TRIAL

4 YEAR RESULTS IN JACC

ARTICLE IN PRESS

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. ■, NO. ■, 2023
ISSN 0735-1097/$36.00

Letters

RESEARCH LETTER

4-Year Outcomes of Patients With Aortic Stenosis in the Evolut Low Risk Trial

A recent 3-year analysis of the Medtronic Evolut Transcatheter Aortic Valve Replacement in Low Ri Patients trial (NCT02701283) demonstrated sust valve performance and durable benefits cor all-cause mortality or disabling stroke expanding transcatheter compared aortic valve replacement (TAVR v surgical-risk patients with sev Close follow-up of the low-r ar- ranted given the limited ir g-term data currently availab ement de- cisions in these patie emain good surgical candidat we report the 4-year outcom ized Evolut Low Risk trial.

Comp Evolut Low Risk study desig dity have been described.[2] En erwent aortic valve replace- anding supra-annular CoreValve/ edtronic) or a surgical bioprosthesis 16 to May 2019 and are being followed s. The primary endpoint of the Evolut Low al is the composite of all-cause mortality or sling stroke through 2 years,[3] with annual porting of this outcome prespecified in the study protocol. Additional endpoints in this 4-year analysis include safety events and as determined by echocardiogr comes were reported as Kaplan- number of patients with an ev compared by log-rank test. Ex atcomes were based on echo aboratory assess- ment. The s approved by the Institutio at each site, and all patien nformed consent.

ients (730 TAVR, 684 SAVR) mpted implantation. Four-year able for 94.7% of TAVR patients ithdrew, 7 were lost to follow-up, 1 d 89.2% of SAVR patients (610/684; 60 w, 14 were lost to follow-up). At baseline, nts had a mean age of 74 years in both eatment arms and mean Society of Thoracic Surgeons Predicted Risk of Mortality scores of 2.0 in the TAVR group and 1.9 in the SAVR group. There were no significant baseline differences between groups.[1]

The primary endpoint of all-cause mortality or disabling stroke at 4 years was 10.7% (76) in the TAVR group and 14.1% (90) in the SAVR group (HR: 0.74; 95% CI: 0.54-1.00; $P = 0.05$), representing a 26% relative reduction in the hazard for death or disabling stroke with TAVR compared with SAVR. The absolute difference between treatment arms for the primary endpoint continued to increase over time: −1.8% at 1 year, −2.0% at 2 years, −2.9% at 3 years, and −3.4% at 4 years (Figure 1). Rates of the primary endpoint components were 9.0% (64) vs 12.1% (76) ($P = 0.07$) for all-cause mortality and 2.9% (20) vs 3.8% (24) ($P = 0.32$) for disabling stroke with TAVR vs SAVR, respectively. The composite of all-cause mortality, disabling stroke, or aortic valve rehospitalization was significantly lower with TAVR compared with SAVR (18.0% [128] vs 22.4% [144]; HR: 0.78; 95% CI 0.61-0.98; $P = 0.04$). Aortic valve rehospitalization was 10.3% (71) with TAVR vs 12.1% (75) with SAVR ($P = 0.27$). New permanent pacemaker implantation was significantly higher in the TAVR group (24.6% [171] vs 9.9% [62]; $P < 0.001$). Indicators of valve performance including aortic valve reintervention (1.3% [9] TAVR vs 1.7% [10] SAVR; $P = 0.63$), clinical or subclinical valve thrombosis (0.7% [5] TAVR vs 0.6% [4] SAVR; $P = 0.84$), and valve endocarditis (0.9% [6]

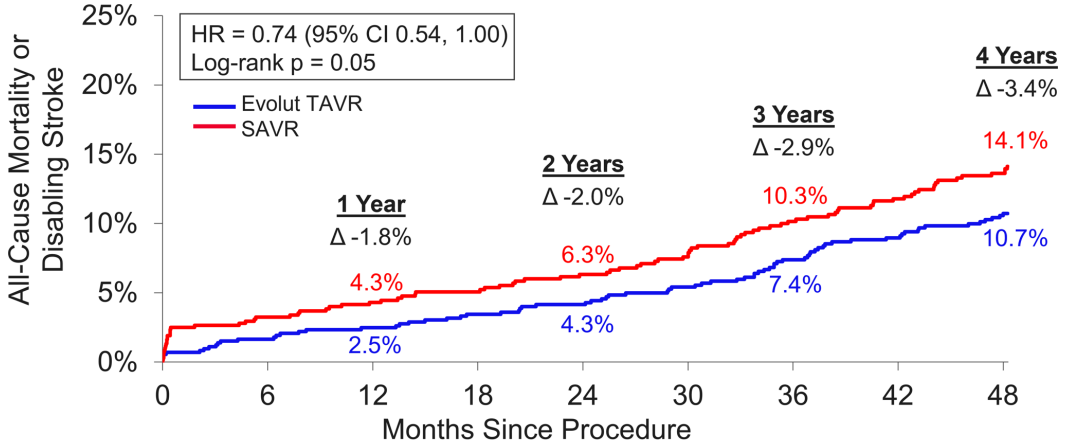
What is the clinical question being addressed?
What are the 4-year outcomes of patients randomized to TAVR vs SAVR in the Evolut Low Risk Trial?

What is the main finding?
There was a 26% reduction ($P = 0.05$) in all-cause mortality or disabling stroke with TAVR vs SAVR, and the difference expanded over time.

Published Today in JACC

Reproduced with Permission from Forrest JK, et al. *J Am Coll Cardiol*. 2023:ePub Oct 24.

Primary Endpoint: All-Cause Mortality or Disabling Stroke



Evolut TAVR	730	715	706	695	685	671	651	627	592
SAVR	684	648	627	616	595	574	556	533	505

How can they be so different?

Low risk trials at TCT 2023

- PARTNER 3 and Evolut Low Risk trials presented
- Highly selected cohorts in industry sponsored trials
- PARTNER 3 : non-inferiority of TAVI, published in NEJ
- Evolut Low Risk Trial : Superiority of TAVI, published as a Research letter in JACC
- The two trials are not comparable, anatomcal screening exclusion higher in PARTNER, hence mortality 14.1% vs 8.2 % in Evolut vs PARTNER trial for SAVR
- In additon concomittant procedures in 26% of procedures in SAVR group in both trials

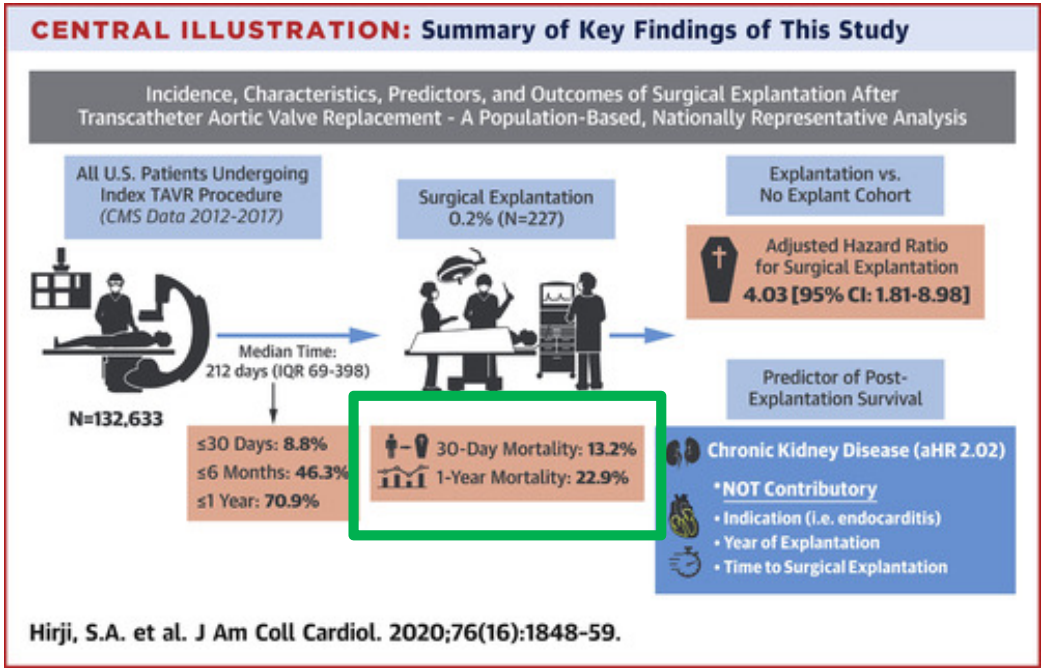
Real world analysis in STS Database: isolated AVR

- 92.9% survival @ 5 years, TAVI in Partner Trial 90%
- 90.0% survival @ 8 years
- Better survival of patients < 75 years and STS-PROM < 1%
- 42000 patients, 19000 at risk at 5 years

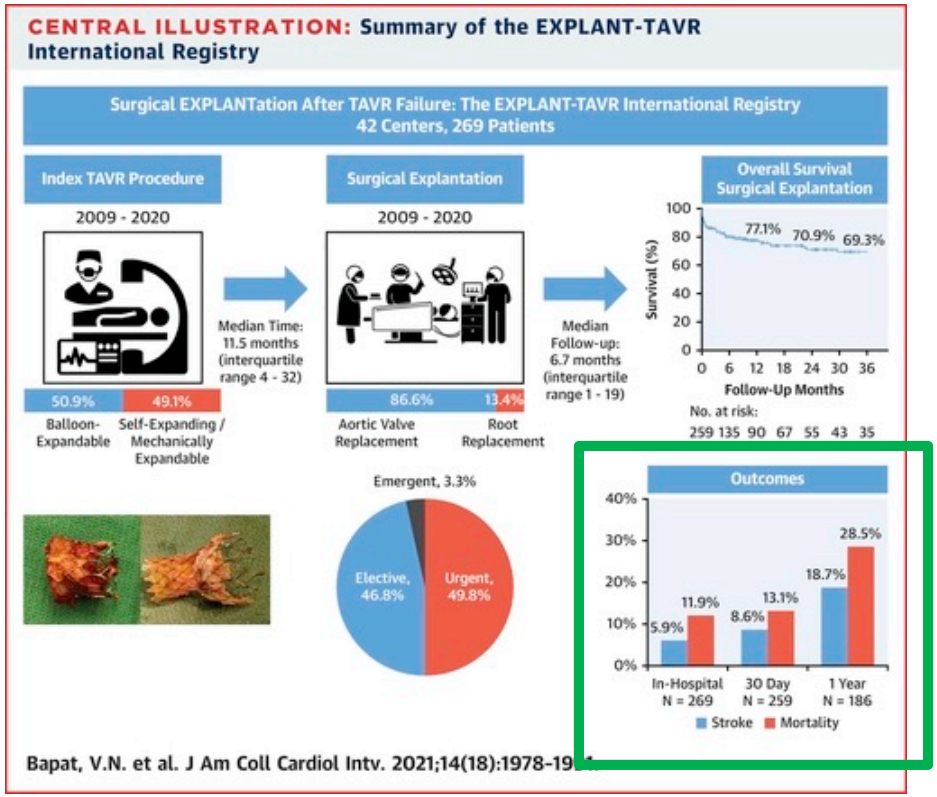
- 26% of surgical patients in the two low risk trials underwent concomittant procedures (CABG, MV surg, ablation), patients with ischemic disease are different than those with isolated arotic valve disease, results are accordingly

SURGICAL EXPLANT DATA

Associated with high 30-day operative mortality 10-13%



Hirji et al. J Am Coll Cardiol. 2020 Oct, 76 (16) 1848–1859



Bapat et al. J Am Coll Cardiol Intv. 2021;14(18):1978-1991

Summary

- It is now >20 years since first TAVI
- First there were trials for high risk patients, now trials are in low risk patients
- Though, the patients were quite old in all the low risk studies
- For now we should focus more on the age of the patient for lifetime management and risk
- Still we need long term follow up, especially regarding durability