PLACE 2026
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

CONGRESSO
ROMA, 25 - 27 Giugno 2026

Cardiologia Interventistica

Valutazione Multidimensionale Geriatrica nei pazienti candidati a TAVR

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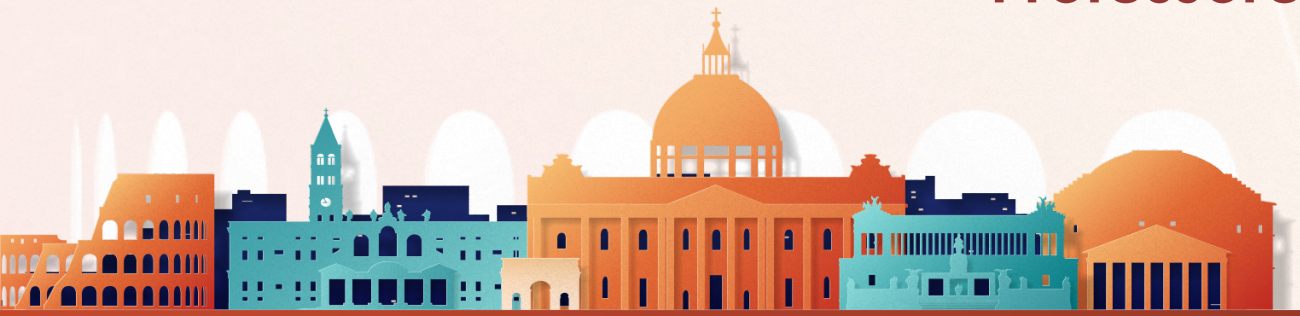
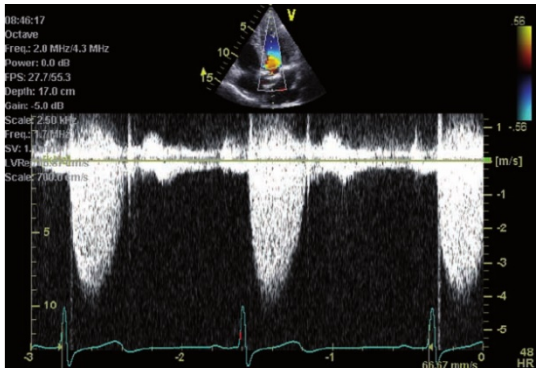


Introduction

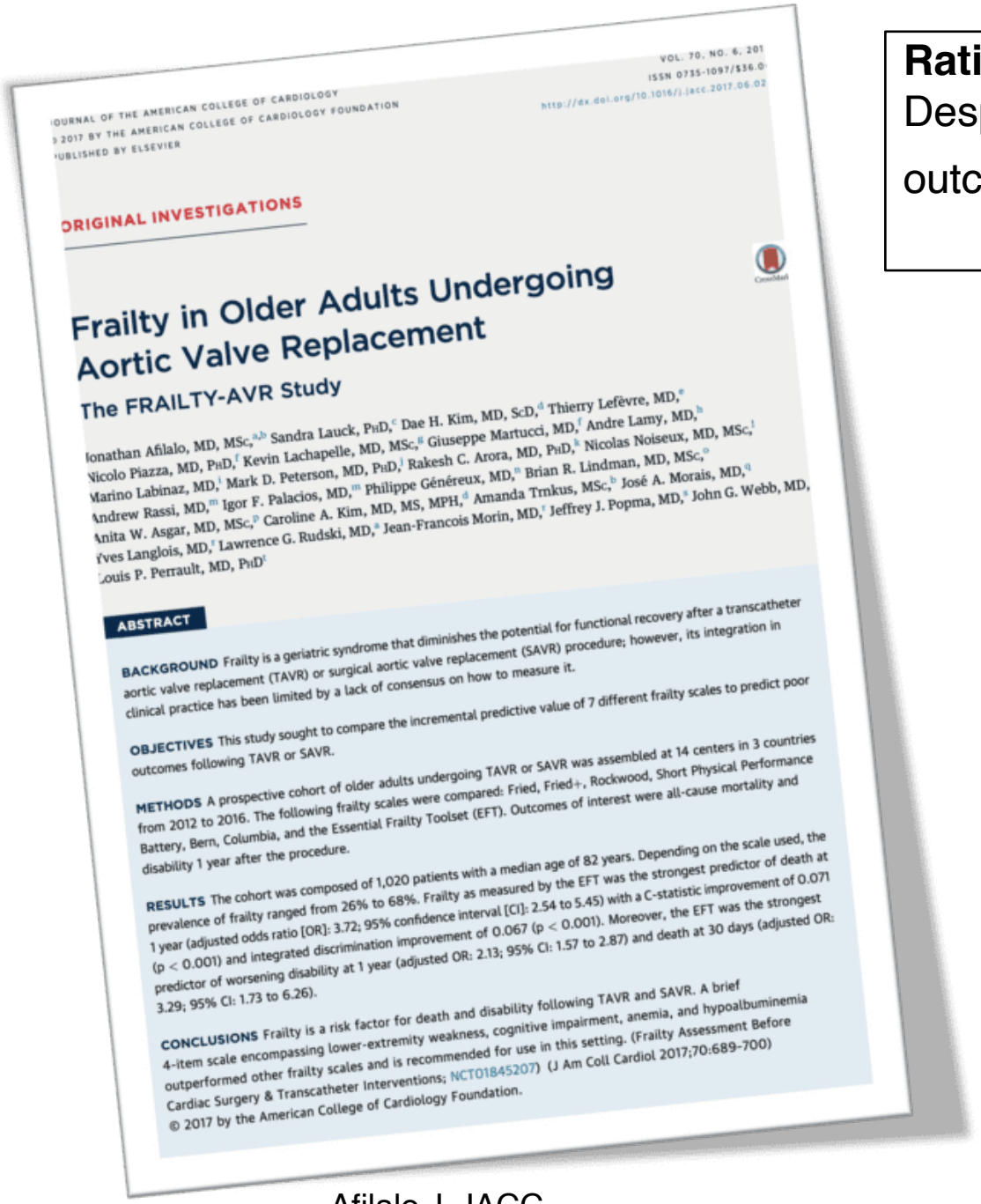
- **Degenerative, severe aortic stenosis** (AoS) is the **most common VHD** in developed countries, and its prevalence **increases with age**
- **TAVR** is strongly recommended (**cclass I-Bc**) in any patient aged ≥75 years with symptomatic AoS (ESC Guidelines 2025)



However,

underscoring the need for improved risk stratification beyond conventional surgical scores.

Current stratification models may not fully capture older patients' frailty, highlighting the **need for a geriatric assessment-**



JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
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PUBLISHED BY ELSEVIER

VOL. 70, NO. 6, 201
ISSN 0735-1097/$36.0
http://dx.doi.org/10.1016/j.jacc.2017.06.02

ORIGINAL INVESTIGATIONS

Frailty in Older Adults Undergoing Aortic Valve Replacement

The FRAILTY-AVR Study

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ABSTRACT

BACKGROUND Frailty is a geriatric syndrome that diminishes the potential for functional recovery after a transcatheter aortic valve replacement (TAVR) or surgical aortic valve replacement (SAVR) procedure; however, its integration in clinical practice has been limited by a lack of consensus on how to measure it.

OBJECTIVES This study sought to compare the incremental predictive value of 7 different frailty scales to predict poor outcomes following TAVR or SAVR.

METHODS A prospective cohort of older adults undergoing TAVR or SAVR was assembled at 14 centers in 3 countries from 2012 to 2016. The following frailty scales were compared: Fried, Fried+, Rockwood, Short Physical Performance Battery, Bern, Columbia, and the Essential Frailty Toolset (EFT). Outcomes of interest were all-cause mortality and disability 1 year after the procedure.

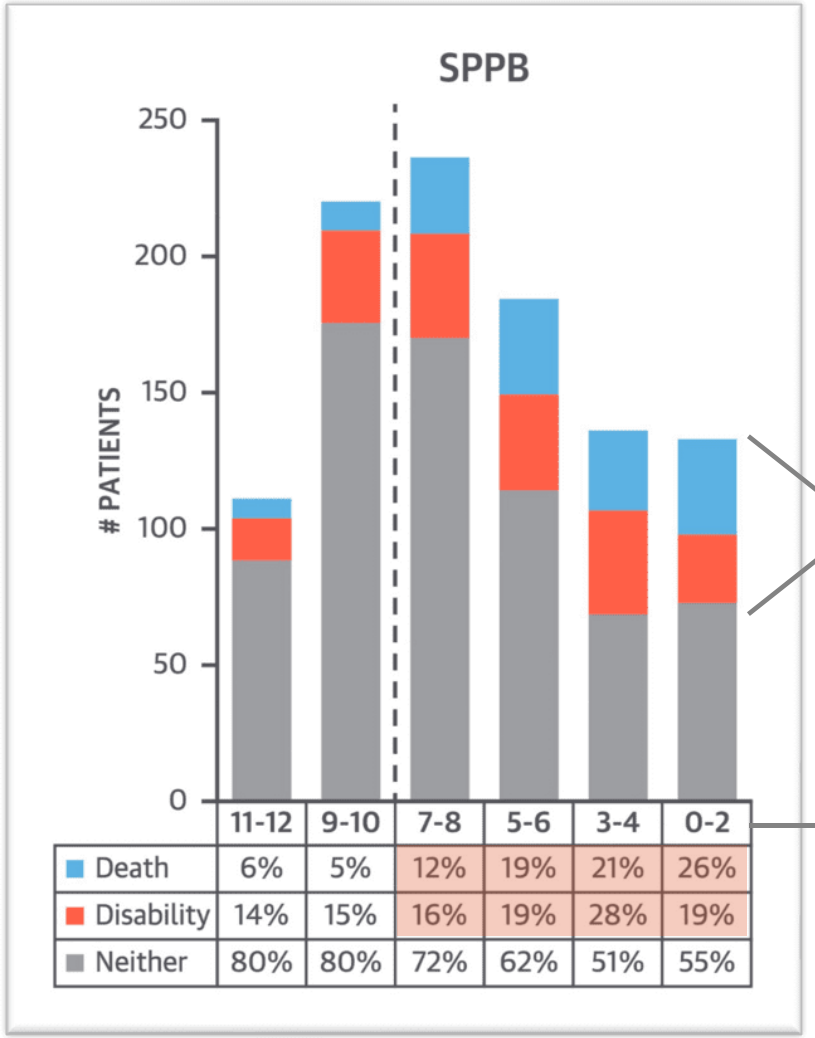
RESULTS The cohort was composed of 1,020 patients with a median age of 82 years. Depending on the scale used, the prevalence of frailty ranged from 26% to 68%. Frailty as measured by the EFT was the strongest predictor of death at 1 year (adjusted odds ratio [OR]: 3.72; 95% confidence interval [CI]: 2.54 to 5.45) with a C-statistic improvement of 0.071 ($p < 0.001$) and integrated discrimination improvement of 0.067 ($p < 0.001$). Moreover, the EFT was the strongest predictor of worsening disability at 1 year (adjusted OR: 2.13; 95% CI: 1.57 to 2.87) and death at 30 days (adjusted OR: 3.29; 95% CI: 1.73 to 6.26).

CONCLUSIONS Frailty is a risk factor for death and disability following TAVR and SAVR. A brief 4-item scale encompassing lower-extremity weakness, cognitive impairment, anemia, and hypoalbuminemia outperformed other frailty scales and is recommended for use in this setting. (Frailty Assessment Before Cardiac Surgery & Transcatheter Interventions; NCT01845207) (J Am Coll Cardiol 2017;70:689-700)

Afilalo J. JACC

Rationale from the FRAILTY-AVR Prospective Cohort Study

Despite 96% technical success … 2 of 5 patients had "poor outcomes"



	11-12	9-10	7-8	5-6	3-4	0-2
Death	6%	5%	12%	19%	21%	26%
Disability	14%	15%	16%	19%	28%	19%
Neither	80%	80%	72%	62%	51%	55%

ESC European Society of Cardiology

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) and the European Association for Cardio-Thoracic Surgery (EACTS)

3.2 Risk stratification

… Patient's life expectancy, expected quality of life and patient preference should be considered … The **futility** of interventions in patients unlikely to benefit from the treatment **has to be taken into consideration**, **particularly for TAVR** … The role of the **Heart Team** is essential to take all of these data into account …

Eur Heart J **2017**; 38:2739–91
doi:10.1093/eurheartj/ehx391

2021 ESC/EACTS Guidelines for the management of valvular heart disease

Developed by the Task Force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

2.1 Why do we need new guidelines on valvular heart disease?

… Risk stratification for the timing of intervention. This applies mostly to (i) the evaluation of progression in asymptomatic patients based on recent longitudinal studies mostly in aortic stenosis, and (ii) interventions in high-risk patients in whom **futility** should be avoided. Regarding this last aspect, the role of **frailty** is outlined …

Eur Heart J **2021**; 00,1-72
doi:10.1093/eurheartj/ehab395

2025 ESC/EACTS Guidelines for the management of valvular heart disease

Developed by the task force for the management of valvular heart disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

ESC European Society of Cardiology

8.4. Indication for intervention

8.4.1. Symptomatic severe aortic stenosis

… Symptomatic severe AS has an unfavourable prognosis if left untreated, and early intervention is strongly recommended in all patients with an **estimated life expectancy exceeding 1 year**…

8.5.1.1. Age and life expectancy

… Although life expectancy may be a theoretically better guide than age alone for treatment decisions, it is **difficult to estimate for an individual patient** owing to …interindividual variability… in combination with cardiac and **extracardiac comorbidities**…

European Heart Journal (**2025**) 00, 1–102
https://doi.org/10.1093/eurheartj/ehaf194

JACC: CARDIOVASCULAR INTERVENTIONS VOL. 19, NO. 7, 2026

JACC Cardiovascular Interventions

ORIGINAL RESEARCH

STRUCTURAL

A Geriatric Assessment Score Predicting 1-Year Mortality and Functional Decline After TAVR

The GASS-TAVR Study

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Fumagalli C et al.
J Am Coll Cardiol Intv **2026**; 19:813-824.

Methods

GASS-TAVR study

Fumagalli C et al.
J Am Coll Cardiol Intv **2026**; 19:813-824.

Design: Prospective multicenter observational study (2019–2022).

Population: 562 consecutive patients aged ≥75 years with severe symptomatic AoS treated with TAVR at three (Florence, Padua, Ferrara) high-volume tertiary referral centers.

Data:
Comprehensive geriatric assessment (CGA) included:

- ✓ Basic Activities of Daily Living (BADL)
- ✓ Mini Nutritional Assessment–Short Form (MNA-SF)
- ✓ Renal function (CKD-EPI eGFR)
- ✓ Cognitive screening

Echocardiographic parameters.

Primary objective: To generate a novel CGA-based score aimed at predicting the risk of 'futility'.

Futility: Composite of 1-year all-cause mortality or new/worsened functional disability (≥2 BADL lost or failure to improve).

Statistical analysis: Logistic regression used to identify predictive factors; novel risk score developed and validated on the basis of weights of the logistic regression analysis.

Cohorts: Patients were randomly divided into a derivation (66%) and validation (34%) cohort.

Results: Baseline Clinical Characteristics (1)

Table 1. Baseline Clinical Characteristics of the study population by Composite Outcome.

	Composite outcome		
	No N = 484 (86.1%)	Yes N = 78 (13.9%)	p
Age at referral, median [IQR]	83 [80-87]	83 [80-86]	0.766
Sex (women), N (%)	290 (60.1)	38 (48.7)	0.058
NYHA Class, median [IQR]	2 [2-3]	3 [2-3]	0.384
STS, median [IQR]	3.59 [2.46-5.03]	4.12 [2.79-6.50]	0.020
Low Risk, N (%)	299 (61.8)	32 (41.0)	
Intermediate, N (%)	134 (27.7)	36 (46.2)	
High, N (%)	51 (10.5)	10 (12.8)	
BMI, median [IQR]	27.2 [24.8-29.6]	25.5 [23.0-29.4]	0.06
Previous Myocardial Infarction, N (%)	45 (9.3)	14 (17.9)	0.002
Moderate-Severe Liver Disease, N (%)	2 (0.4)	2 (2.5)	0.10
Peripheral Artery Disease, N (%)	79 (16.4)	21 (27.2)	0.04
Cerebrovascular Disease, N (%)	35 (7.2)	8 (10.2)	0.201
COPD, N (%)	38 (7.8)	13 (16.6)	0.001
Diabetes Mellitus, N (%)	78 (16.1)	17 (21.8)	0 .068
CKD-EPI eGFR, median [IQR]	68 [51-80]	47 [37-63]	<0.001
CKD Stage≥IIIb KDIGO, N (%)	91 (18.8)	35 (44.9)	<0.001
Atrial Fibrillation, N (%)	58 (12.0)	16 (20.5)	0.07
LVEF, median [IQR]	57 [48-62]	54 [44-59]	0.09
Aortic Valve Area, median [IQR]	0.46 [0.37-0.57]	0.50 [0.38-0.61]	0.051
Mean Aortic Gradient, median [IQR]	45 [31-59]	46 [37-65]	0.199
PASP, median [IQR]	35 [30-41]	46 [38-57]	<0.001
Hemoglobin, median [IQR]	12.0 [10.8-13.0]	11.1 [9.6-12.5]	0.010

Fumagalli C et al.
J Am Coll Cardiol Intv **2026**; 19:813-824.

Results: Baseline Clinical Characteristics (2)

Table 2. Comprehensive Geriatric Assessment at baseline			
	Composite Outcome		
	No N=484 (86.1%)	Yes N=78 (13.9)	
Preserved BADL	6 [5-6]	4 [1-6]	<0.001
Preserved IADL	6 [5-8]	5 [4-7]	0.08
MNA-SF	12 [10-13]	9 [9-10]	<0.001
Pfeiffer Test ≥3	79 (16.4)	33 (42.3)	<0.001
Exton Smith	19 [17-20]	18 [16-20]	0.587
Number of drugs	7 [5-9]	8 [6-9]	0.133
MPI	0.31 [0.25-0.38]	0.43 [0.31-0.50]	<0.001
Low risk	399 (70.0)	24 (30.8)	<0.001
Intermediate risk	141 (29.1)	50 (64.1)	
High Risk	4 (0.9)	4 (5.1)	

Abbreviations: BADL: Basic Activities of Daily Living; IADL: Instrumental Activities of Daily Living; MNA-SF: Mini Nutritional Assessment – Short Form; MPI: Multidimensional Prognositc Index.

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Results: Deriving the score

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Multivariable logistic regression analysis model for the derivation of a score to predict the composite outcome

Derivation Cohort (N=372, 66%)				
Variable	Logistic regression	OR (95%	Coefficient, scaled	P
Age				
Sex				
NYH				
Rhy				
MN				
BADL	-0.505	0.60 (0.47- 0.77)	-5.00	<0.001
CKD-EPI eGFR	-0.036	0.96 (0.95-0.98)	-0.35	0.003
PASP	0.124	1.13 (1.08-1.18)	1.20	<0.001
Intercept				0.499

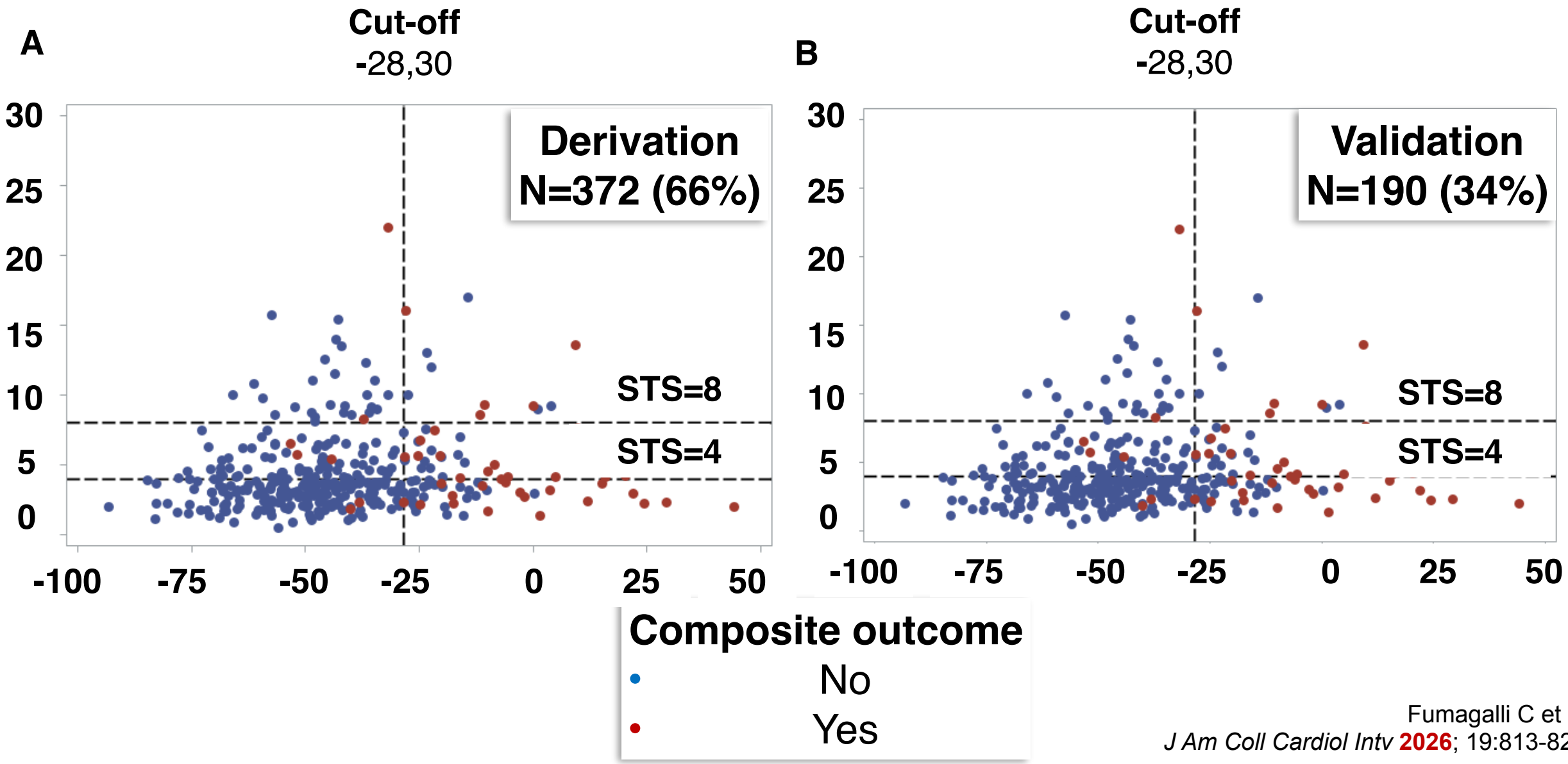
GASS-TAVR Score=

$$-3.40 * MNA_{SF} - 5.00 * BADL - 0.35 * eGFR + 1.20 * PASP$$

Best performance (Youden Index) : -28.30

Abbreviations: BADL: Basic Activities of Daily Living; eGFR: estimated Glomerular Filtration Rate; MNA-SF: Mini Nutritional Assessment – Short Form; NYHA: New York Heart Association; PASP: pulmonary artery systolic pressure; OR: Odds Ratio.

Results: Performance of the GASS-TAVR score



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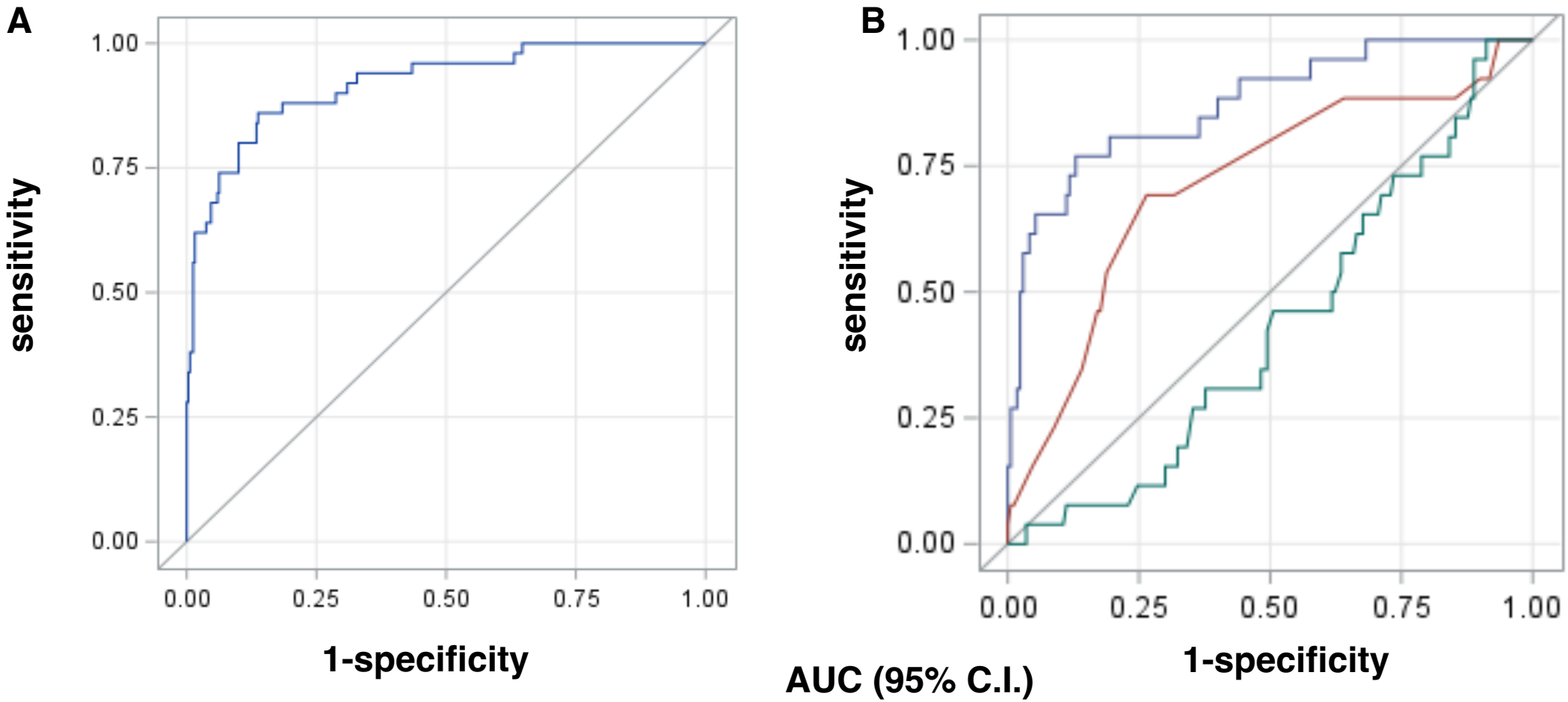
Receiver operating characteristic (ROC) analysis of the GASS-TAVR Score compared to the STS Score and the MPI in the Derivation (Panel A) and Validation (Panel B) cohorts



	AUC (95% C.I.)	
	A. Derivation	B. Validation
GASS-TAVR Score	0.92 (0.88-0.96)	0.87 (0.79-0.95)
MPI	-	0.72 (0.60-0.82)
STS Score	-	0.43 (0.44-0.64)

Fumagalli C et al. *J Am Coll Cardiol Intv* **2026**; 19:813-824.

GASS-TAVR Score for Predicting 1-Year Mortality or Disability in Older Adults Undergoing TAVR

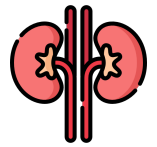
Patients Characteristics

- 562 adults ≥75 years from 3 Italian high-volume TAVR centers
- Median Age 83 [80-86] years
- 58% women
- Median STS 3.78 [2.57-6.12]
- Median follow-up time 11[10-12] months

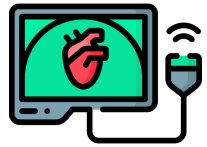
Score components

Malnutrition
Mini Nutritional Assessment–Short Form

Functional Capacity
Basic Activities of Daily Living



Renal Function
CKD-EPI



Pulmonary Pressure
Echocardiography

Study Characteristics

- Prospective registry 2020–2022
- Primary outcome: 1-year mortality or ≥2 BADL decline
- Score development (random sampling) Derivation: n=372; Validation: n=190

Main Results

- Primary outcome in the entire cohort: n=78 patients (13.9%); 1-year mortality: n=52 (9.3%)
- **GASS-TAVR Score = – 3.40∗MNA-SF –5.00∗BADL –0.35∗eGFR +1.20∗PASP**
- **AUC:** Derivation **0.92** (95% CI 0.88–0.96); Validation **0.87** (95% CI 0.79–0.95)
- A cut-off of **–28.3** yielded a sensitivity of **86.0%,** specificity of **86.3%** and **NPV 97.0%** in the derivation cohort. Performance remained robust in validation (**NPV 95.8%)**

Conclusions

- A simple 4-item cardio-geriatric score (MNA-SF, BADL, eGFR, PASP) accurately predicts 1-year mortality or functional decline after TAVR (AUC up to 0.92)
- The score outperforms traditional models and shows a high negative predictive value (>95%)
- By capturing biologic vulnerability, the GASS-TAVR score may support Heart Teams in reducing futility and guiding targeted prehabilitation strategies