TCT 2025:

Prognostic Impact of Procedural Urgency Status in TAVR

An Ischemic Physiology Score (IPS) Stratifies Patient Risk in Acute Valve Syndrome

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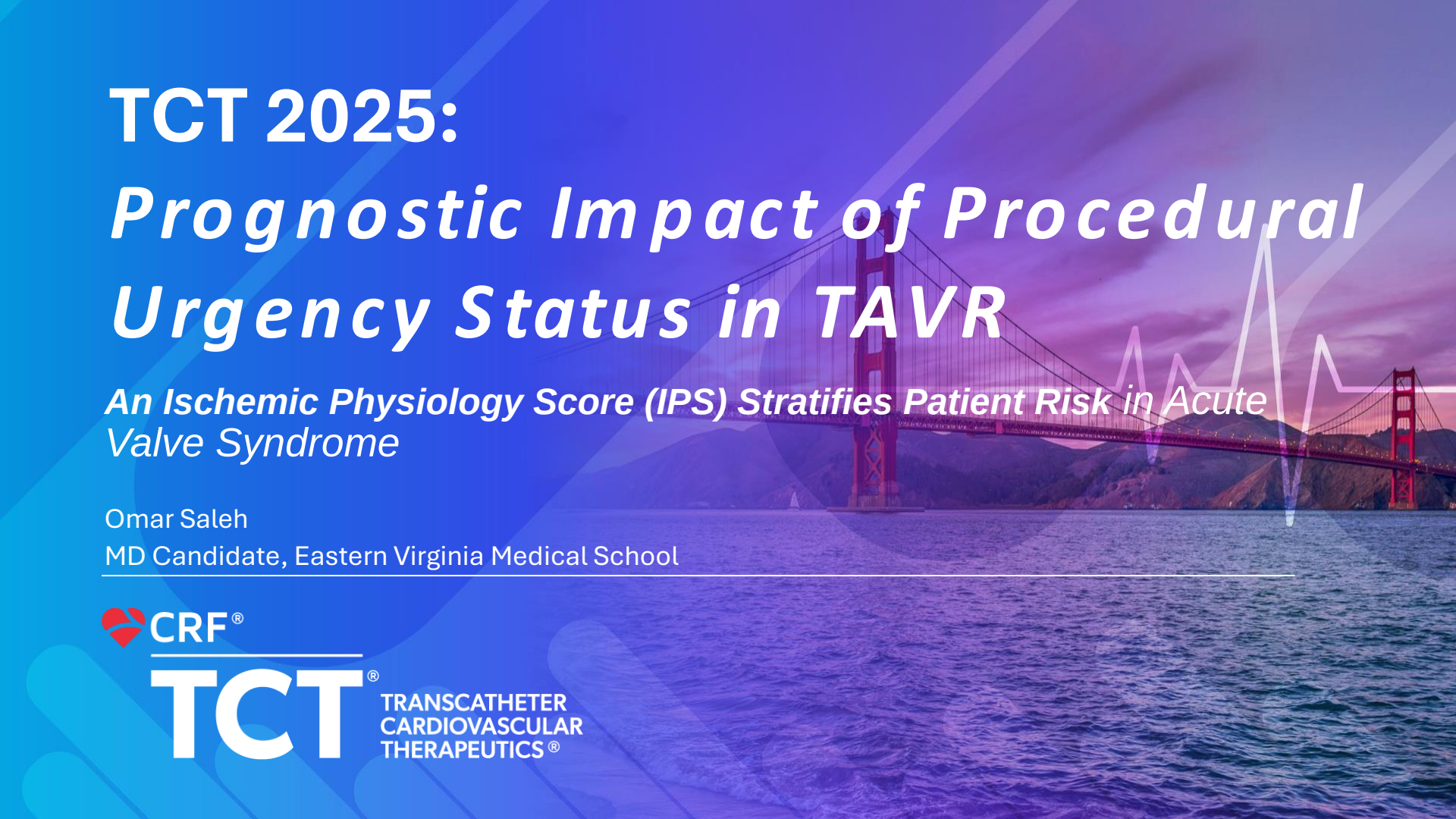

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Disclosure of Relevant Financial Relationships

I, Omar Saleh DO NOT have any financial relationships to disclose.

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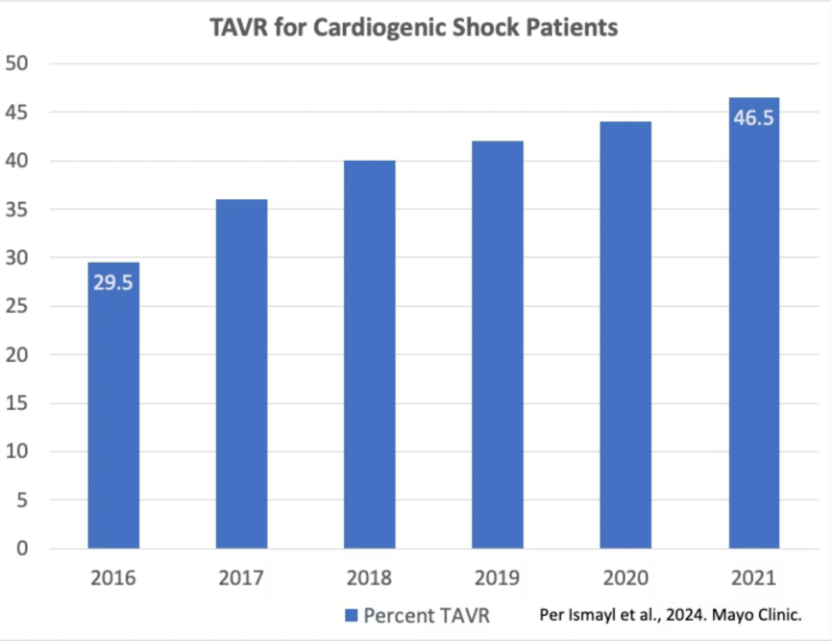
Background & Rationale

An understanding of real-world outcomes for TAVR patients is crucial, given TAVR's expanded use ca

- TAVR use has increasingly expanded to cover a broader spectrum of surgical risk.
- Emergent TAVR for AS with cardiogenic shock rose significantly from **29.5%** in 2016 to **46.5%** in 2021.



Ismayl M, Ahmed H, Goldsweig AM, Eleid MF, Guerrero M, Rihal CS. Transcatheter vs. surgical aortic valve replacement in patients with aortic stenosis and cardiogenic shock. *Eur Heart J Acute Cardiovasc Care*. 2024;13(10):685-698. doi:10.1093/ehjacc/zuae103

Study Objectives and Methods

- **Evaluate Prognostic Impact**
  - Assessment and quantification of the impact of elective status on TAVR outcomes in a historical cohort.
- **Develop Novel Patient Risk Modeling**
  - Our aim was to develop and validate a model that incorporates patient physiologic markers to stratify risk.

In-Hospital and Post-Procedural Outcomes

Non-elective patients show a 5-fold increased rate of MI and a 2-fold increased rate of in-hospital death. However, admission status is a non-specific label.

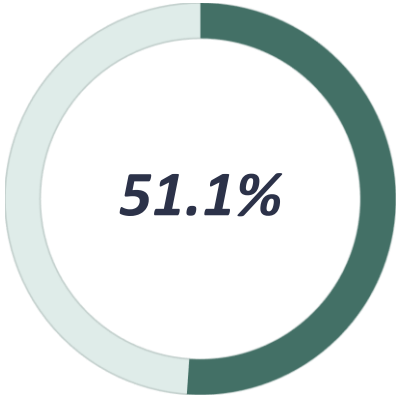
Outcome	Elective Cohort (n=882)	Non-Elective Cohort (n=334)	*P-value*
In-Hospital Outcomes			
Death	*1.7% (15)*	*5.1% (17)*	*0.002*
Myocardial Infarction	*2.5% (22)*	*12.3% (41)*	*<0.001*
Stroke	*7.5% (66)*	*9.9% (33)*	*0.212*
MACE	*10.9% (96)*	*23.7% (79)*	*<0.001*
Additional Short-Term Outcomes			
Needed ICU	*38.5% (340)*	*66.8% (223)*	*<0.001*
Length of Stay	*4.8 ± 7.8 days*	*10.9 ± 8.6 days*	*<0.001*

Acute Valve Syndrome: High Risk AVR Definition

- Acute Valve Syndrome (AVS) per Généreux et al. (2024, Structural Heart) includes:
  - NYHA Class III-IV
  - Endocarditis
  - Systolic heart failure
  - Cardiogenic Shock
  - High NT-proBNP (≥1500 pg/mL)
  - Cardiac Arrest Resuscitation
  - Hypotension
- Novel Modified Criteria
  - Pre-Operative Vasopressors or Inotropes
  - Elevated Serum Lactate (≥4 mmol/L)
  - Pre-Operative Swan-Ganz Catheterization

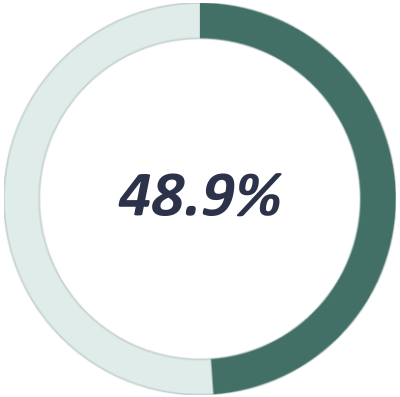
Source: Généreux P, Pellikka PA, Lindman BR, Pibarot P, Garcia S, Koulogiannis KP, Rodriguez E, Thourani VH, Dobbles M, Giustino G, Sharma RP, Cohen DJ, Schwartz A, Leon MB, Gillam LD. Schwartz A, Leon MB, Gillam LD. Acute Valve Syndrome in Aortic Stenosis. Struct Heart. 2024 Oct 28;9(4):100377. doi: 10.1016/j.shj.2024.100377. PMID: 40321310; PMCID: PMC12047511.

AVS Study Population



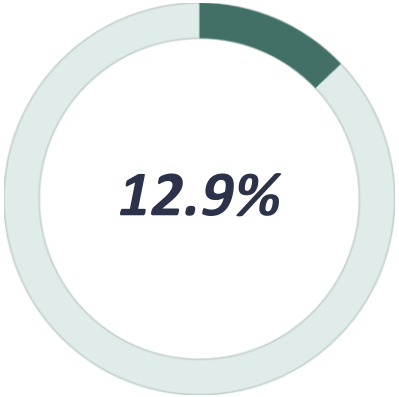
High Risk AVR Patients

1,216 patients met modified AVS criteria.



PVD Patients

1,164 patients had Progressive Valvular



High Risk AVR Mortality

1-year mortality for High Risk AVR patients 12.9%, significantly higher than PVD (5.4%, p<0.001).

Model Development

Comprehensive Threshold

Tested 2,500 different combinations thresholds for:

- *Charlson Comorbidity Index (CCI)*
- *Lactate levels*
- *Creatinine levels*
- *Liver enzymes (AST/ALT)*
- *Pre-operative vasopressor/inotrope*

Algorithm Evaluation

Evaluated three supervised learning algorithms: algorithms:

- *XGBoost*
- *Random Forest*
- *Logistic Regression*

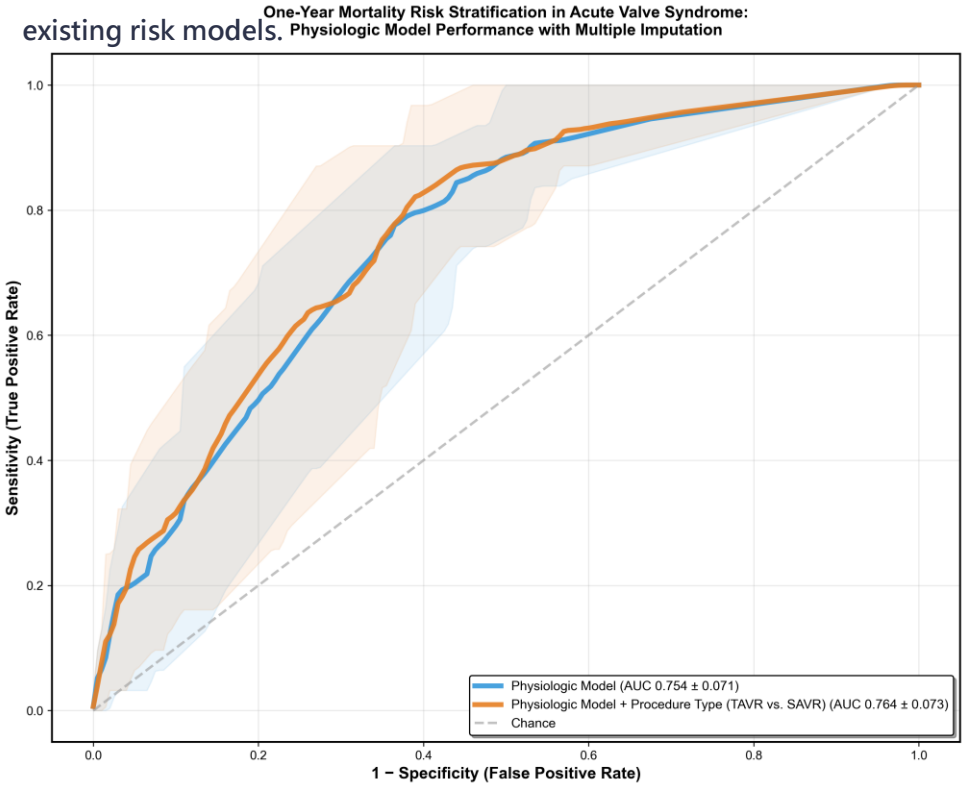
Final Model Selection

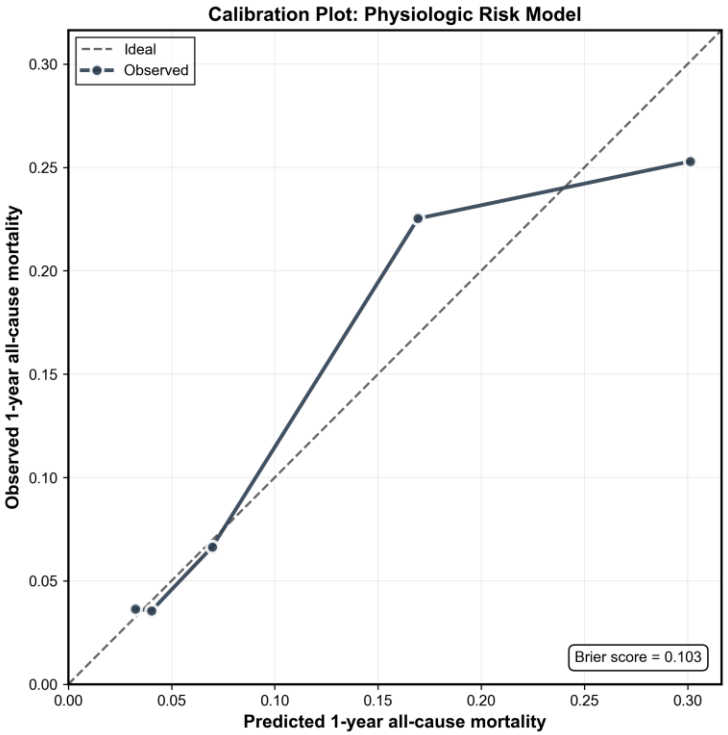
Logistic regression performed the best was selected as the final model

Model Development

The model performed excellent, with an AUC of 0.75 on internal validation. Inclusion of physiologic patient markers shows improvement from existing risk models.

existing risk models.





Physiologic Risk Stratification Model Parameters

Renal Dysfunction

Creatinine ≥2.0 mg/dL (HR 1.62, p= 0.024)

High Lactate

Lactate ≥5.0 mmol/L (HR 1.83, p=0.025)

Liver Damage

Elevated AST/ALT ≥100 IU/L (HR 2.12, p= 0.006)

Heart Strain

High NT-proBNP ≥1500 pg/mL (HR 1.71, p<0.006)

Charlson Comorbidity Index

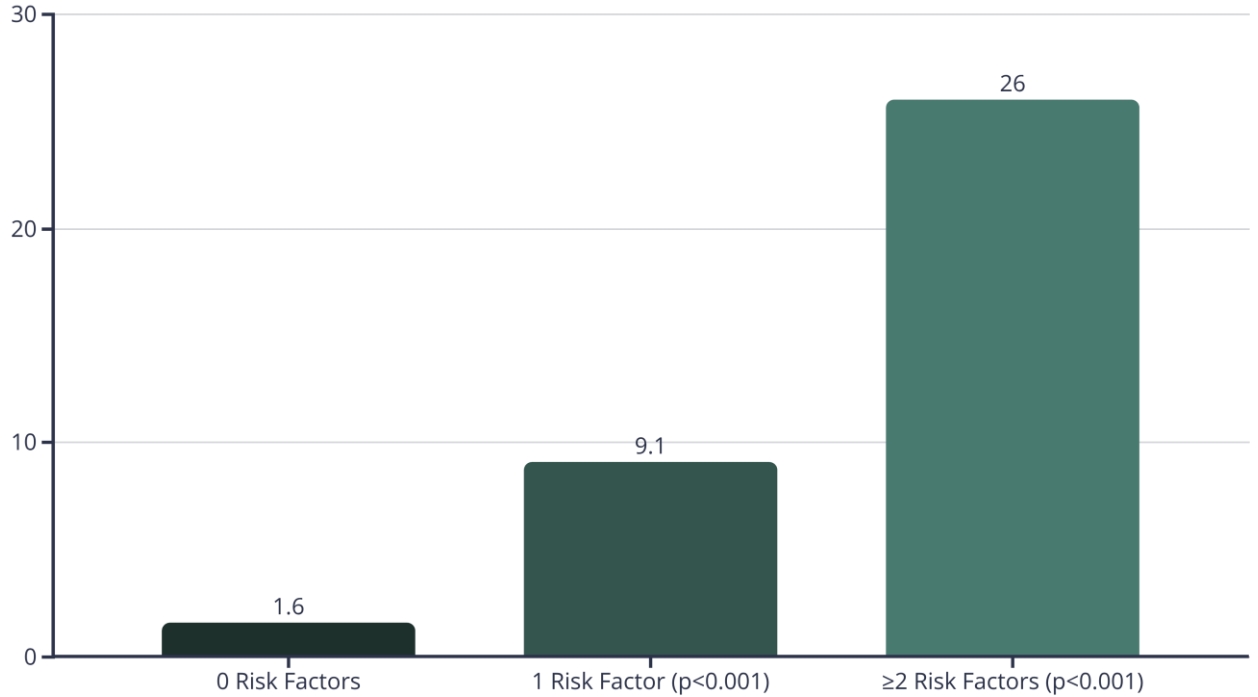
Charlson Index ≥6 (HR 2.21, p< 0.001)

Vasoactive Drug Support

Need for pressors or inotropes pre-AVR (HR 1.35, p=0.21)

Stepwise Mortality Risk in AVS

One risk factor increases mortality risk 5.7-fold (9.1% vs 1.6%, p<0.001). ≥2 Risk Factors showed a 16-fold increase in mortality (26% vs 1.



Group 1: AVS (0 Risk Factors)	*429*	*7*	*1.6*	-	-
Group 2: AVS 1 Risk Factor	*326*	*30*	*9.2*	*p<0.001*	-
Group 3: AVS ≥2 Risk Factors	*461*	*120*	*26.0*	*p<0.001*	*p<0.001*

Conclusion

- An Ischemic Physiology Score (IPS) effectively stratifies patient risk in Acute Valve Syndrome based on markers of multi-organ dysfunction.
  - Integration of a physiology-based framework into clinical practice may lead to improved patient outcomes.
- **Future Research**
  - Further development of the IPS.
  - Evaluation of AI-based pre-procedural simulation in optimizing valve selection for high-risk (ViV/re-do TAVR) patients.

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