

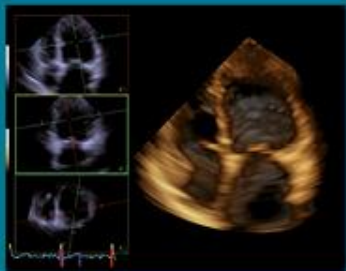
EuroValve

October 24-25, 2014

EuroScore II and STS score:
are they similar?

Julien Magne, PhD
CHU Limoges, France





EuroValve

October 24-25, 2014

Faculty disclosure

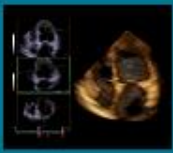
Julien Magne

I have **no financial relationships** to disclose.





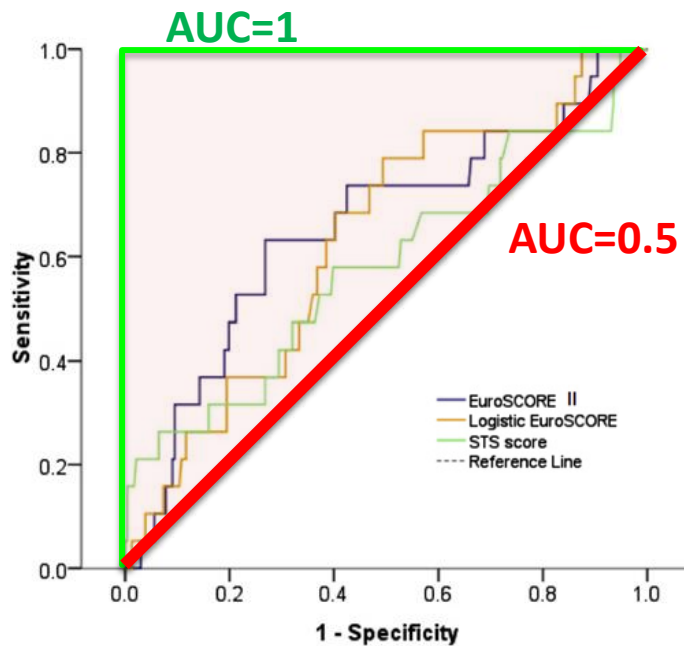
**"You're not allowed to use
the sprinkler system to keep
your audience awake."**



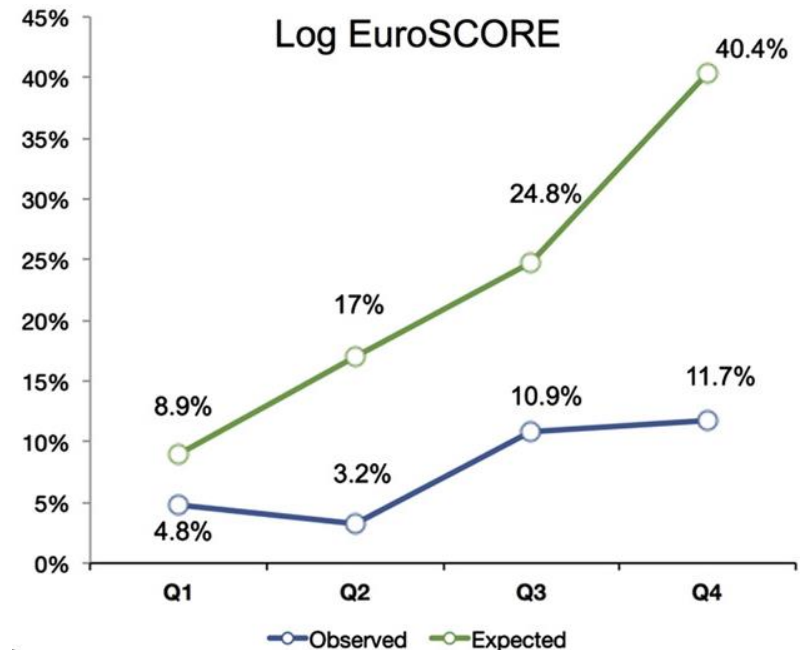
Discrimination vs. Calibration

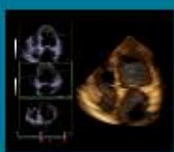
The best predictive score should have both good discrimination and calibration

Discrimination: ability to differentiate between low- and high-risk patients



Calibration: comparison between predicted and observed end-point (e.g. mortality)





EuroValve



European System for Cardiac Operative Risk Evaluation (EuroSCORE) II

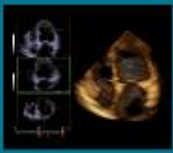
n=22 381 consecutive patients undergoing cardiac surgery in 154 hospitals, 43 countries during 12-week (May-July 2010)

Validation subset: 5 553 patients

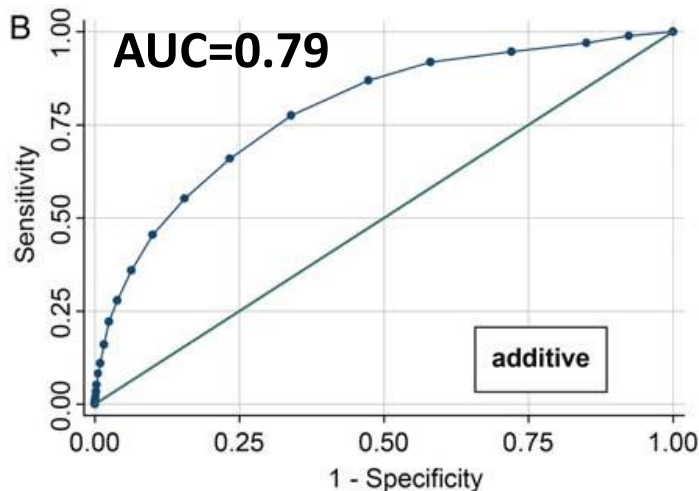
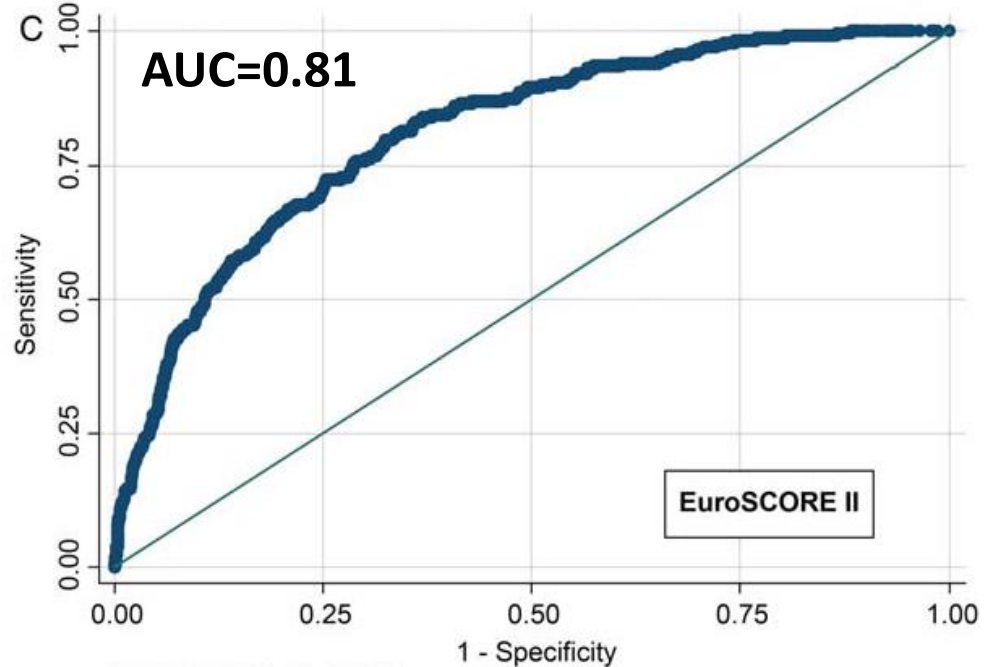
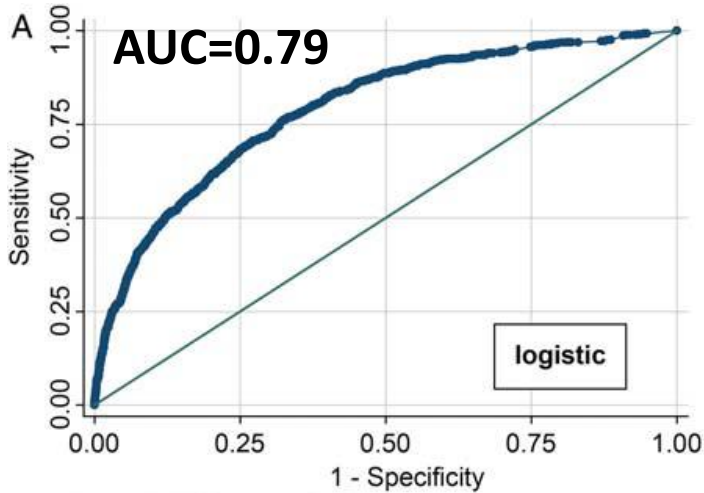
Patient related factors			Cardiac related factors		
Age ¹ (years)	75	0.46	NYHA	II	.1070545
Gender	male	0	CCS class 4 angina ⁸	no	0
Renal impairment ² <small>See calculator below for creatinine clearance</small>	normal (CC >85ml/min)	0	LV function	moderate (LVEF 31%-50%)	.3150652
Extracardiac arteriopathy ³	no	0	Recent MI ⁹	yes	.1528943
Poor mobility ⁴	no	0	Pulmonary hypertension ¹⁰	no	0
Previous cardiac surgery	no	0	Operation related factors		
Chronic lung disease ⁵	no	0	Urgency ¹¹	elective	0
Active endocarditis ⁶	no	0	Weight of the intervention ¹²	2 procedures	.5521478
Critical preoperative state ⁷	no	0	Surgery on thoracic aorta	no	0
Diabetes on insulin	no	0			
EuroSCORE II	EuroSCORE	2.88 %			
<small>Note: This is the 2011 EuroSCORE II</small>			<input type="button" value="Calculate"/> <input type="button" value="Clear"/>		

<http://www.euroscore.org/calc.html>

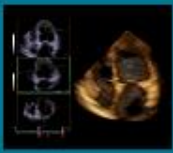
Nashef et al. EJCTS, 2012



Euroscore II

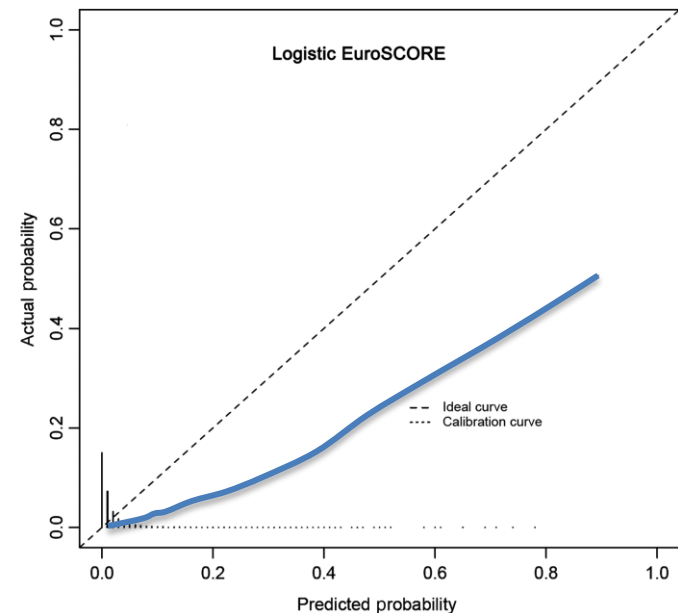
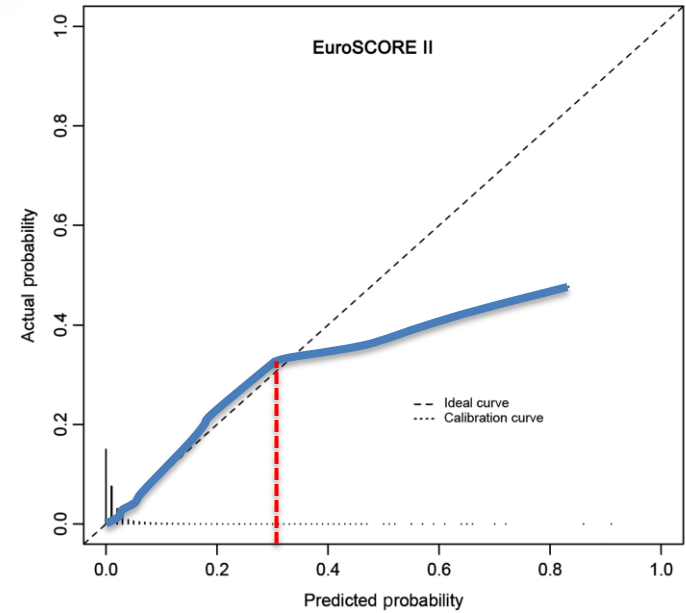
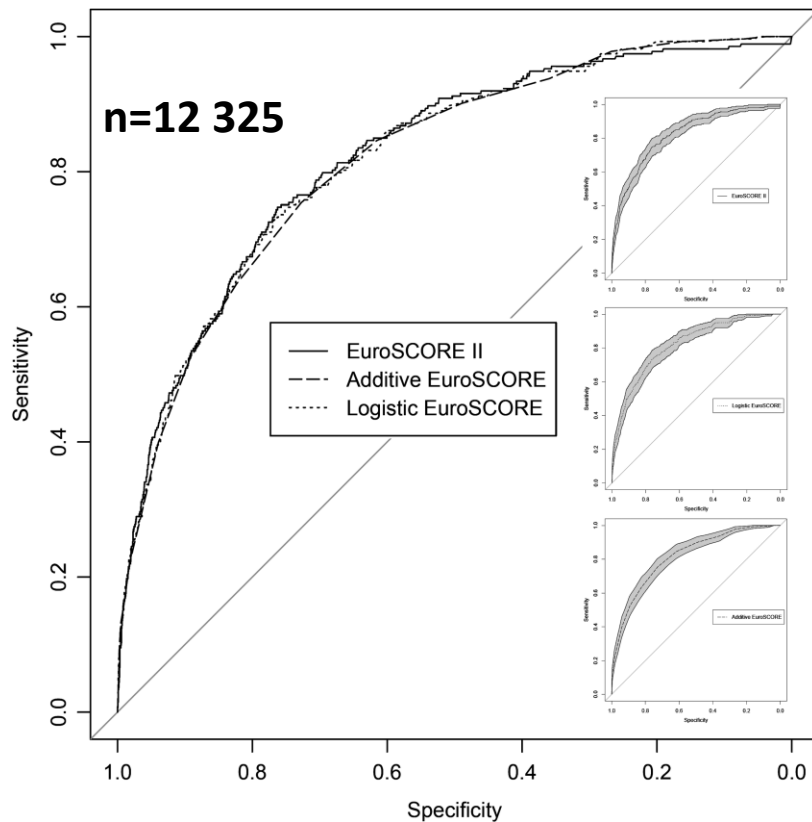


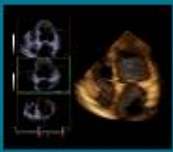
Very good discrimination and calibration
Observed mortality: 4.18%
Expected mortality: 3.95%



External Validation

Good discrimination,
Low calibration in high risk patients





EuroValve



Society of Thoracic Surgeon (STS) Score

Online STS Risk Calculator Dataset: 2.73

Help [More about Risk Calculator](#) New Print Calculations

Today's Date 10/21/2014

Procedure

Coronary Artery Bypass Yes No Missing

Valve Surgery Yes No Missing

Aortic Yes No Missing

Aortic Procedure

- Replacement
- Repair/Reconstruction
- Root Reconstruction with valved conduit
- Replacement and insertion aortic non-valved conduit
- Resuspension Aortic Valve without replacement of ascending Aorta
- Resuspension Aortic Valve with replacement of ascending Aorta
- Apico-aortic conduit (Aortic valve bypass)
- Autograft with pulmonary valve- Ross procedure
- Homograft
- Valve sparing root reimplantation (David)
- Valve sparing root remodeling (Yacoub)
- Missing

Resection of Sub-Aortic Stenosis Yes No Missing

Mitral Yes No Missing

Tricuspid

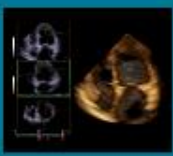
- No
- Annuloplasty Only
- Replacement
- Reconstruction with Annuloplasty
- Reconstruction without Annuloplasty
- Valvectomy

Procedure Name	AVRepl+CABG
Risk of Mortality	1.485%
Morbidity or Mortality	12.008%
Long Length of Stay	4.973%
Short Length of Stay	46.469%
Permanent Stroke	1.198%
Prolonged Ventilation	6.437%
DSW Infection	0.208%
Renal Failure	2.536%
Reoperation	7.592%

the main difference between Europe and USA

0.001 km =
1 m =
100 cm =
1000 mm =
1000000 μm =
1000000000 nm

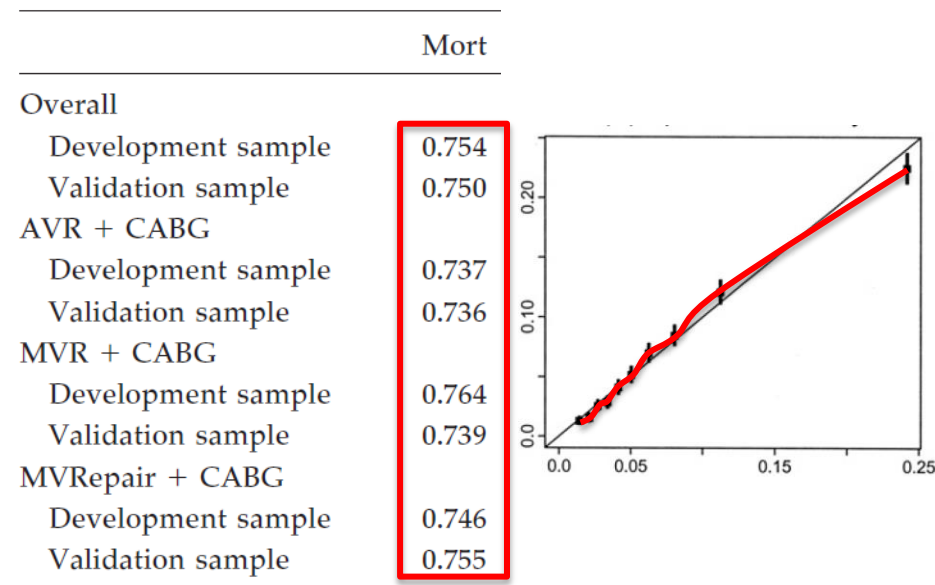
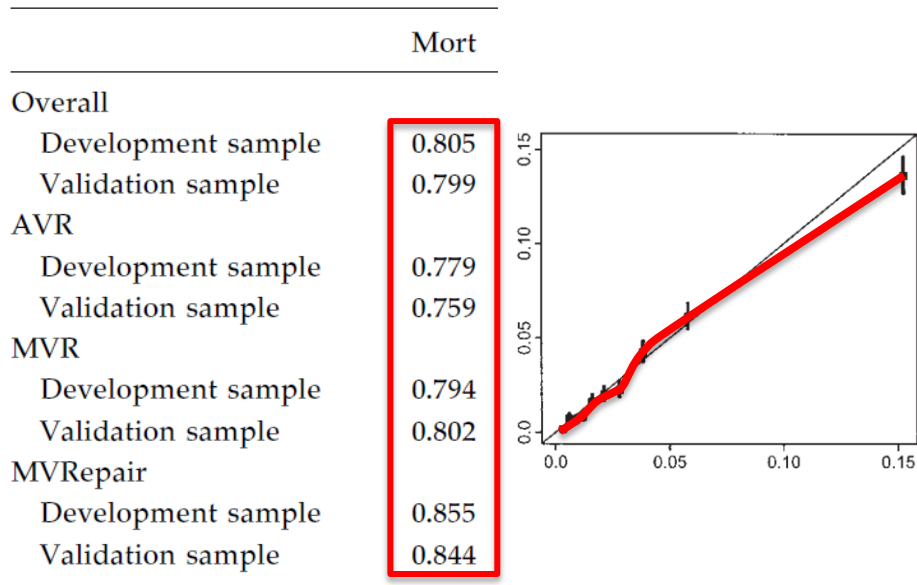




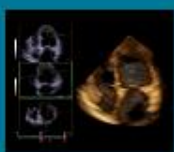
STS Score

STS isolated valve surgery (n= 109 759)

STS valve + CABG (n=101 661)



Good discrimination but limited calibration in high risk patients



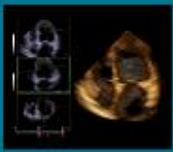
EuroValve



EuroSCORE II Vs. STS Score

Variable	EuroSCORE	EuroSCORE II	STS Score
Age	X	X	X
Gender	X	X	X
Height			X
Weight			X
Body mass index			X
Diabetes mellitus		X	X
Chronic lung/pulmonary disease	X	X	X
Mild/moderate/severe			X
Extracardiac arteriopathy	X	X	
Peripheral vascular disease	X		X
Neurologic dysfunction	X		
Cerebrovascular accident			X
Poor mobility		X	
Previous cardiac surgery	X	X	X
Number of previous operations			X
Previous coronary bypass			X
Previous valve surgery			X
Renal failure/impairment	X	X	X
Dialysis-dependent renal failure		X	X
Serum creatinine/clearance		X	X
Hypertension			X
Active endocarditis	X	X	X
Immunosuppressive therapy			X
Arrhythmia			X
Recent myocardial infarction	X	X	X

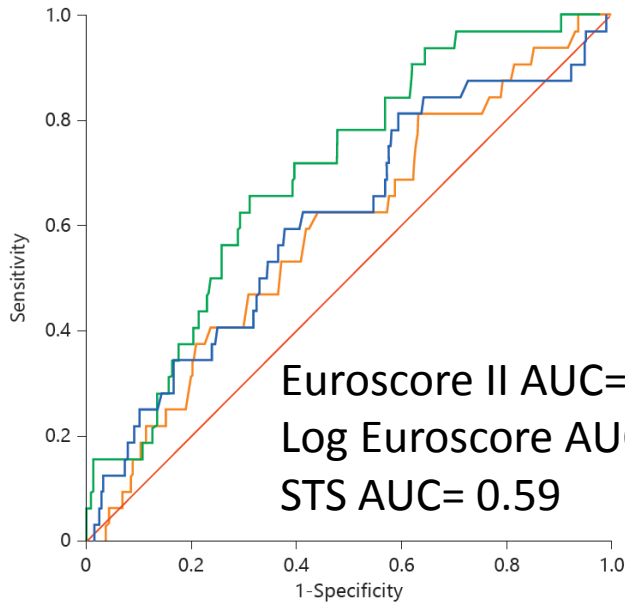
Variable	EuroSCORE	EuroSCORE II	STS Score
Timing			X
Cardiogenic shock			X
Inotropic agents			X
Intra-aortic balloon pump			X
New York Heart Association classification		X	X
Unstable angina/Canadian Cardiovascular Society class IV angina	X	X	X
Critical preoperative state	X	X	
Left ventricular ejection function	X	X	X
Number of diseased coronary vessels			X
Left main coronary artery disease			X
Pulmonary hypertension (>60 mm Hg)	X		
Moderate (31–55 mm Hg), severe (>55 mm Hg)		X	
Procedure status/urgency	X	X	X
Weight of intervention	X	X	X
Single noncoronary bypass/2 or 3 procedures	X	X	



EuroValve

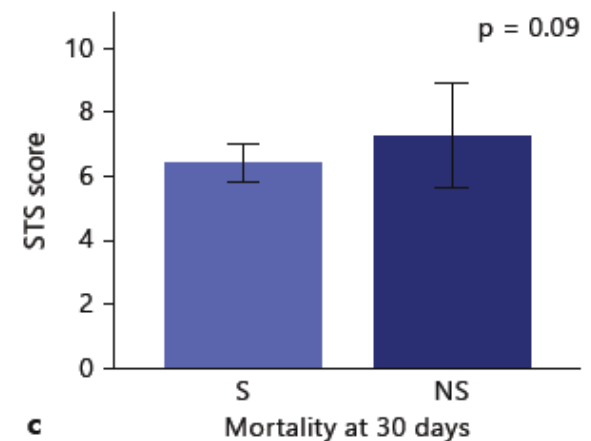
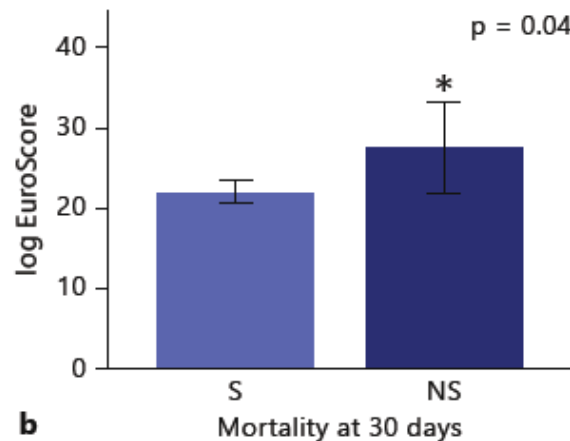
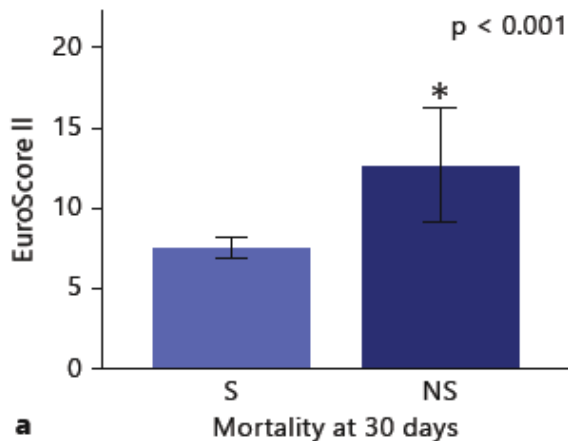


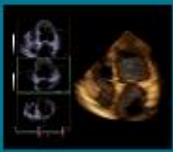
EuroSCORE II Vs. STS Score



- n=350 TAVI patients
- Euroscore II provided better discrimination and calibration
- STS underestimated mortality

Stähli et al., Cardiology, 2013





EuroValve



EuroSCORE II Vs. STS Score

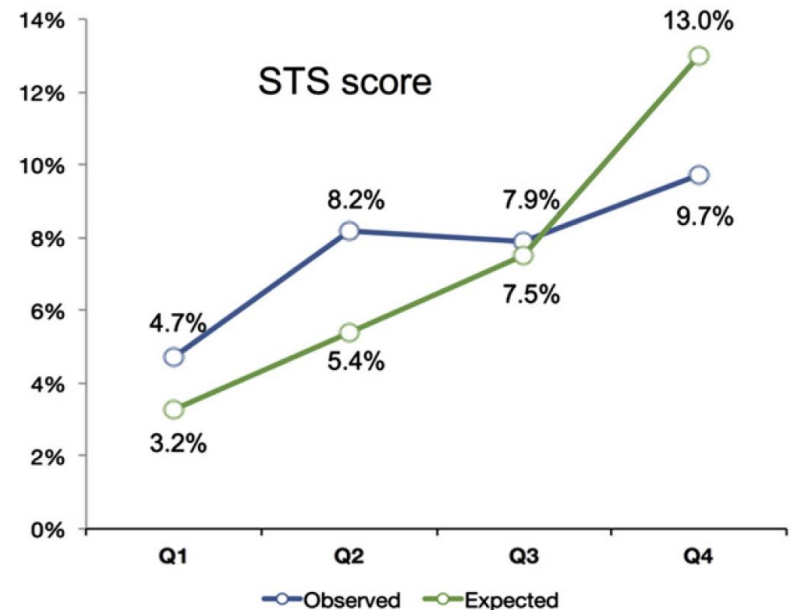
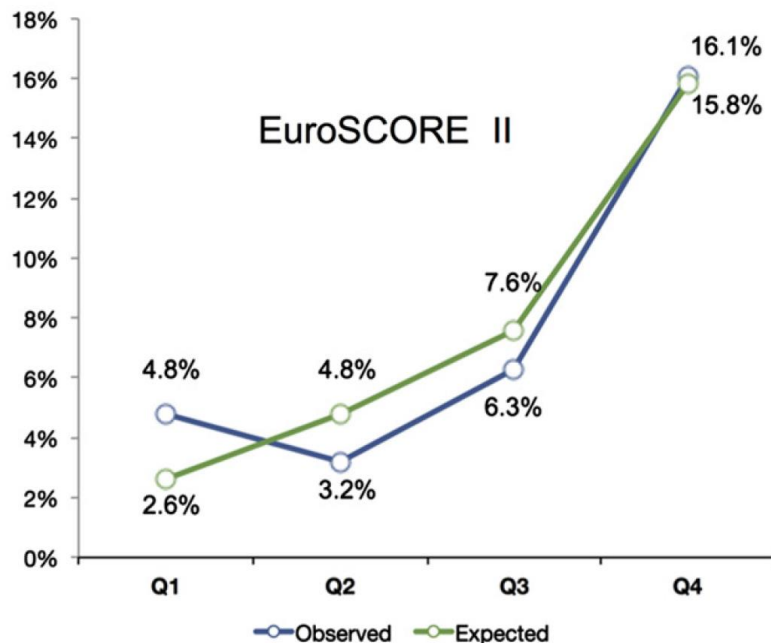
Risk Score	AUC (I-Index)	95% CI	p Value
Log EuroSCORE			
Overall	0.63	0.51–0.76	0.06
TF	0.66	0.53–0.89	0.06
TA	0.55	0.32–0.78	0.68
EuroSCORE II			
Overall	0.66	0.52–0.79	0.02
TF	0.71	0.55–0.88	0.01
TA	0.52	0.29–0.74	0.90
STS score			
Overall	0.58	0.43–0.73	0.24
TF	0.66	0.50–0.82	0.06
TA	0.55	0.17–0.73	0.67

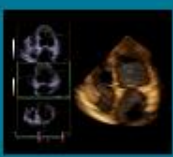
n=250 TAVI patients (TA and TF)

Good calibration but limited discrimination

Euroscore II better than STS ?

Durand et al., AJC, 2013

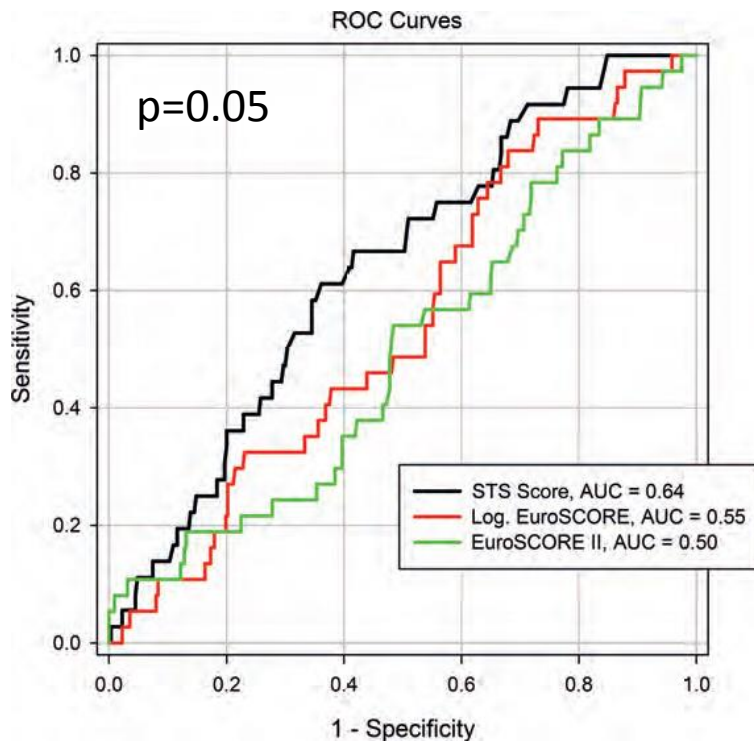




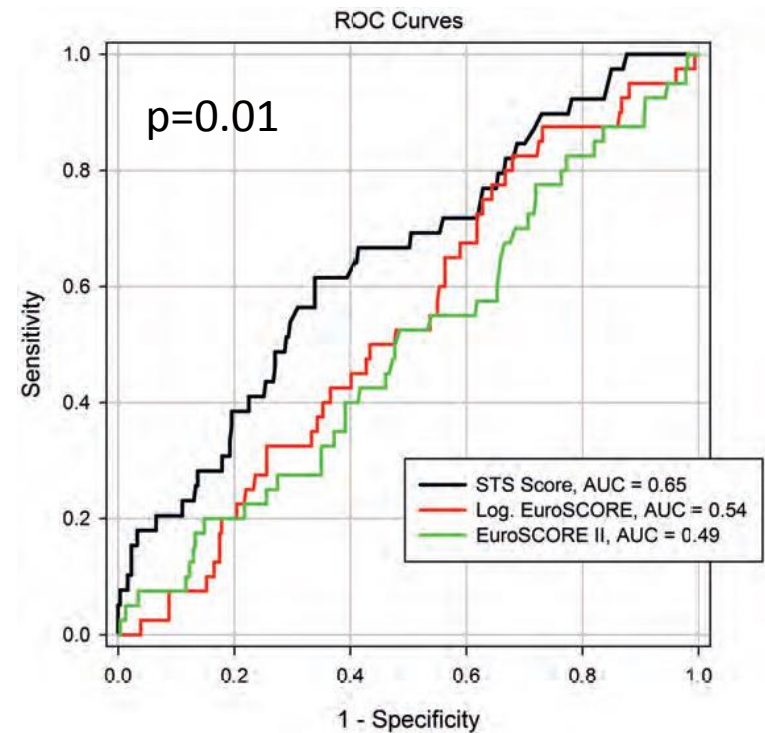
EuroSCORE II Vs. STS Score

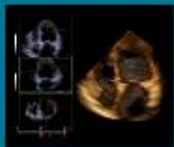
n=360 TAVI patients: Transapical approach only

30-day mortality



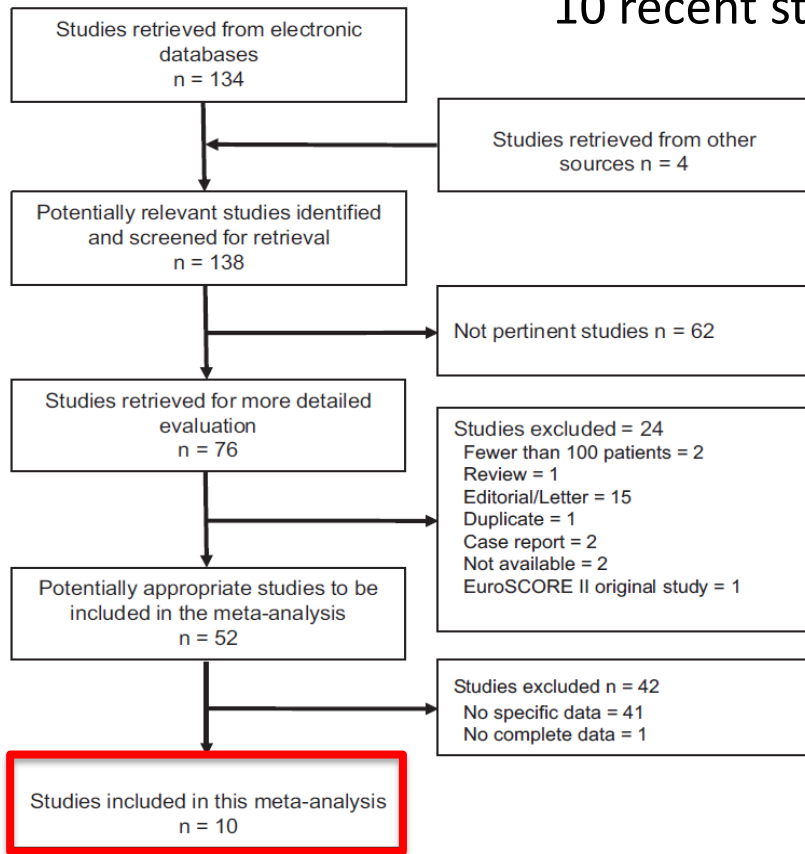
In-hospital mortality





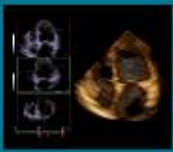
EuroSCORE II Vs. STS Score: Meta-Analysis

10 recent studies (n= 13 856), various types of interventions



Author	Year	Study Interval	Country	Type of Study	Procedure
Barili	2013	2006-2012	Italy	Multicenter	Isolated AVR
Durand	2013	2006-2011	France	Institutional	TAVR
Hadzi					
Lau					
Se					
Stä					
Wa					
Wa					
We					
Wendt	2013	1999-2012	Germany	Institutional	Transapical TAVR
Wendt	2013	1999-2012	Germany	Institutional	Transapical TAVR
Osnabrugge	2014	2003-2012	USA	Multicenter	Isolated AVR
Osnabrugge	2014	2003-2012	USA	Multicenter	AVR+CABG

	Mortality (%)	Mean Predicted Mortality (%)	
		ESII	STS
All aortic valve procedures (10 studies)	6.1	5.1 (4.0-6.2)	6.3 (4.5-7.5)
TAVR (6 studies)	9.6	7.8 (7.2-8.3)	8.5 (7.3-9.6)
SAVR (5 studies)	3.1	3.3 (2.1-4.4)	3.7 (2.4-5.0)

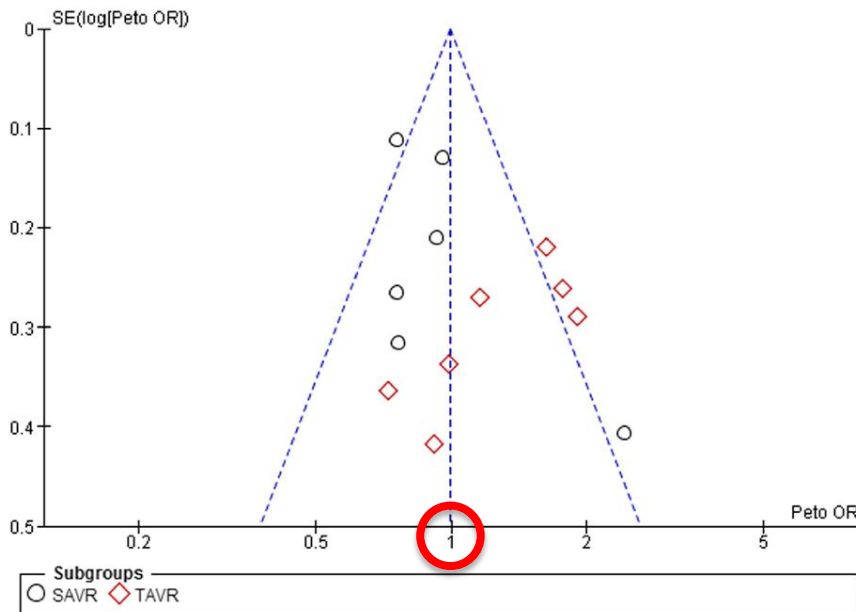


EuroValve



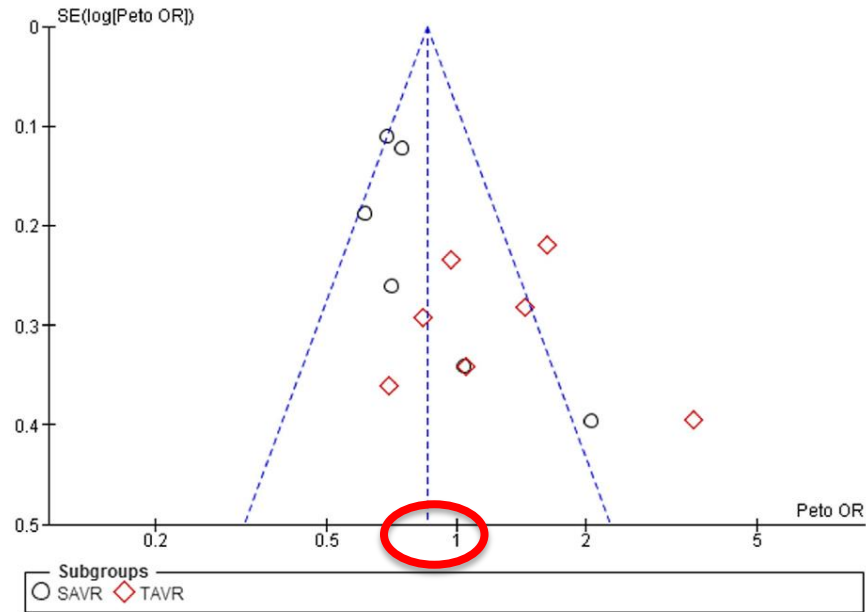
EuroSCORE II Vs. STS Score: Meta-Analysis

EuroScore II



NS difference between Obs. and Exp. Mortality (p=0.88)

STS Score

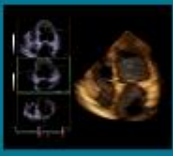


S difference between Obs. and Exp. Mortality (p=0.008)

Obs / Exp ratio

	EuroScore II	STS score
➔ SAVR	0.94	0.84
➡ TAVI	1.23	1.13

Biancari et al., J CTV Anesthesia, in press



Take Home Messages!

- ✓ Risk scores **should be calculated** in order to assess the risk of intervention in patients with VHD, but **limitations** should be acknowledged.
- ✓ Both EuroSCORE II and STS score provide **good discrimination** but **limited calibration in high risk** patients
- ✓ Risk scores progressively improve but need to be **frequently updated**
- ✓ Although not specifically derived from VHD cohort, EuroSCORE II seems **a bit** better than STS score to assess the operative risk in overall **aortic valve** intervention
- ✓ Both scores seem **underpredicted** the risk of TAVI

Join us in Vienna! 3 - 6 December 2014

EuroEcho2014 Imaging

18th Annual Meeting of the European Association of Cardiovascular Imaging, a registered branch of the ESC, in cooperation with the Austrian Working Group of Echocardiography.



VIENNA AUSTRIA 3-6 DECEMBER

www.escardio.org/EACVI



Still time to REGISTER

EuroEcho-Imaging Key Figures

- 4** Days of scientific sessions
- 3 300+** Healthcare professionals from **90+** countries
- 1 300+** Submitted abstracts
- 2 000 m²+** Exhibiting area
- 150+** Scientific sessions
- 30+** Hands-On sessions
- 330+** International faculty, leading experts

EuroEcho-Imaging at your fingertips!

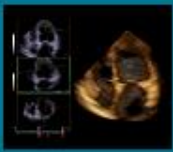
Download the **Mobile App** and stay up to date with the scientific programme!

Search for "EuroEcho2014" in App Store/Google Play



Available on iOS and Android



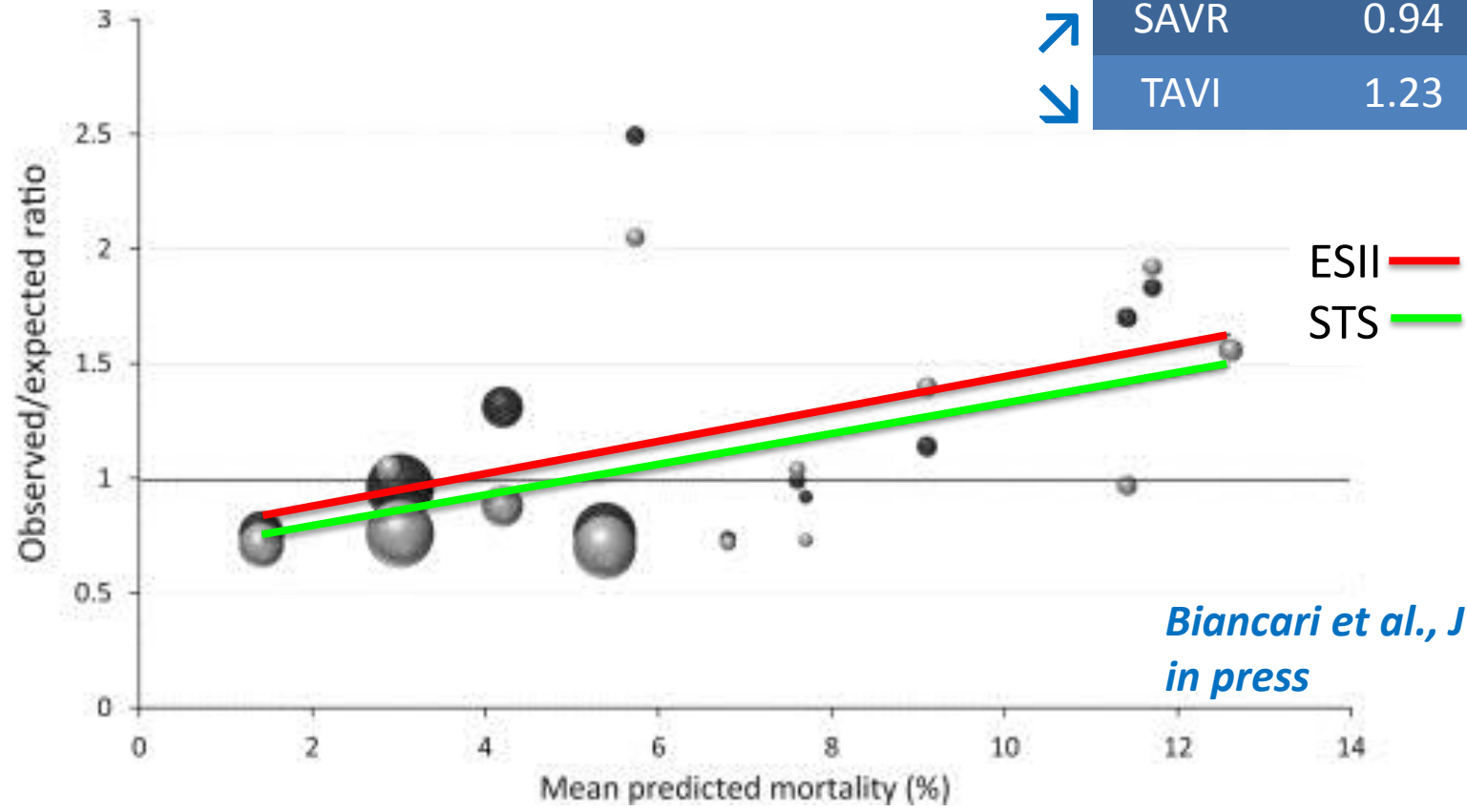


EuroSCORE II Vs. STS Score: Meta-Analysis

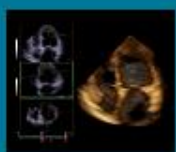
L'Abbé plot: Marked heterogeneity between studies
Good concordance between ESII and STS

Obs / Exp ratio

	EuroScore II	STS score
SAVR	0.94	0.84
TAVI	1.23	1.13



Biancari et al., J CTV Anesthesia, in press



The Place of Scores in Current Guidelines

*“In the absence of evidence from RCT, the decision to intervene in a patient with VHD relies on an individual **risk-benefit analysis** suggesting that improvement of prognosis, as compared with natural history, outweighs the **risk of intervention** and its **potential late consequences**, particularly prosthesis-related complications”*

ESC Guidelines 2012
ACC/AHA Guidelines 2014

	AS	AR	MS	Primary MR	TR
Surgery vs. Percutaneous	“Heart Team” + risk score	...	“Heart Team” + risk score	“Heart Team” + risk score	...
Asymptomatic	Preserved LVEF: Low risk	Preserved LVEF: Low risk	...	Low risk	...
Symptomatic	Low comorbidities	...