

## **SM1: Supplemental Material S1**

### **Variables tested in the forward/backward selection in both pre-operative and post-operative models**

#### *Demographics*

Age

Sex

#### *Comorbidities*

Diabetes

COPD

Moderate/severe renal disease

End-stage renal disease

NYHA II-III-IV

Previous myocardial infarction

Arrhythmia

Cerebrovascular disease

Drug-induced coagulopathy

Peripheral vascular disease

#### *Clinical conditions*

Asymptomatic Coronary Artery Disease

Non-traumatic pericardial effusion

Pulmonary hypertension

Right heart failure

Left heart failure

Acute ischemia

Acute myocardial infarction

Coronary artery disease

Aortic pathology

Aortic valve insufficiency

Aortic valve stenosis

Mitral valve insufficiency

Mitral valve stenosis

Tricuspid valve insufficiency

Left coronary artery disease

Non-ruptured aneurysm

Ruptured aneurysm

Infections

Endocarditis

#### *Type of surgery*

Aortic Arch Replacement

Ascending aorta replacement

CABG

Mitral valve plastic

Mitral valve replacement

Tricuspid valve plastic

Tricuspid valve replacement  
Thoracic aortic surgery  
Other cardiac surgery  
Surgery complexity (Isolated CABG, non-CABG isolated procedure, two procedures, three procedures)  
Timing of surgery (elective, emergent, urgent, deferred, urgent, salvage)  
Redo

*Other variables*

Body Mass Index  
Body Surface Area  
Pre-operative hospital length of stay  
Dialysis  
Renal damage  
Creatinine Clearance  
Serum creatinine  
Ejection fraction  
IV Vasoactive Drugs  
Anticoagulant therapy  
Antiplatelet therapy  
Preoperative IABP  
Critical pre-operative conditions  
Number of pathological coronary arteries

**Variables tested in the forward/backward selection only in the post-operative model**

*Intra-operative devices/treatment/variables*

PRBC transfusion (yes/no, amount)  
FFP transfusion (yes/no, amount)  
Platelet transfusion (yes/no, amount)  
Fibrinogen transfusion (yes/no, amount)  
BCFC transfusion (yes/no, amount)  
Transesophageal echocardiography  
Platelet function test  
Thromboelastometry/Thromboelastography  
Aortic cross-clamp (yes/no, length)  
Length of ECC  
Deep hypothermic circulatory arrest (yes/no, length)  
Cerebral perfusion  
Serum lactate  
Bleeding  
Sternal diastasis at ICU admission

*Clinical parameters in the first 24 hours of ICU stay*

Systolic blood pressure  
Mean arterial pressure

Serum creatinine  
Platelets  
PaO<sub>2</sub>/FiO<sub>2</sub>  
Heart rate  
Serum potassium  
Serum sodium  
Serum HCO<sub>3</sub>  
Serum bilirubin  
Serum creatinine  
Urine output  
White blood cell count  
Platelet count  
Blood urea nitrogen  
Pupil reactivity - first day of ICU stay

*Organ failures*

Number of organ failures  
Renal failure (mild, moderate, severe)  
Cardiovascular failure (none, without shock, cardiogenic shock, hemorrhagic shock)  
Respiratory failure (none, hypoxic, hypercapnic)  
Metabolic failure  
Neurological failure

*Other variables*

Source ward  
Intervention time  
Duration of intervention

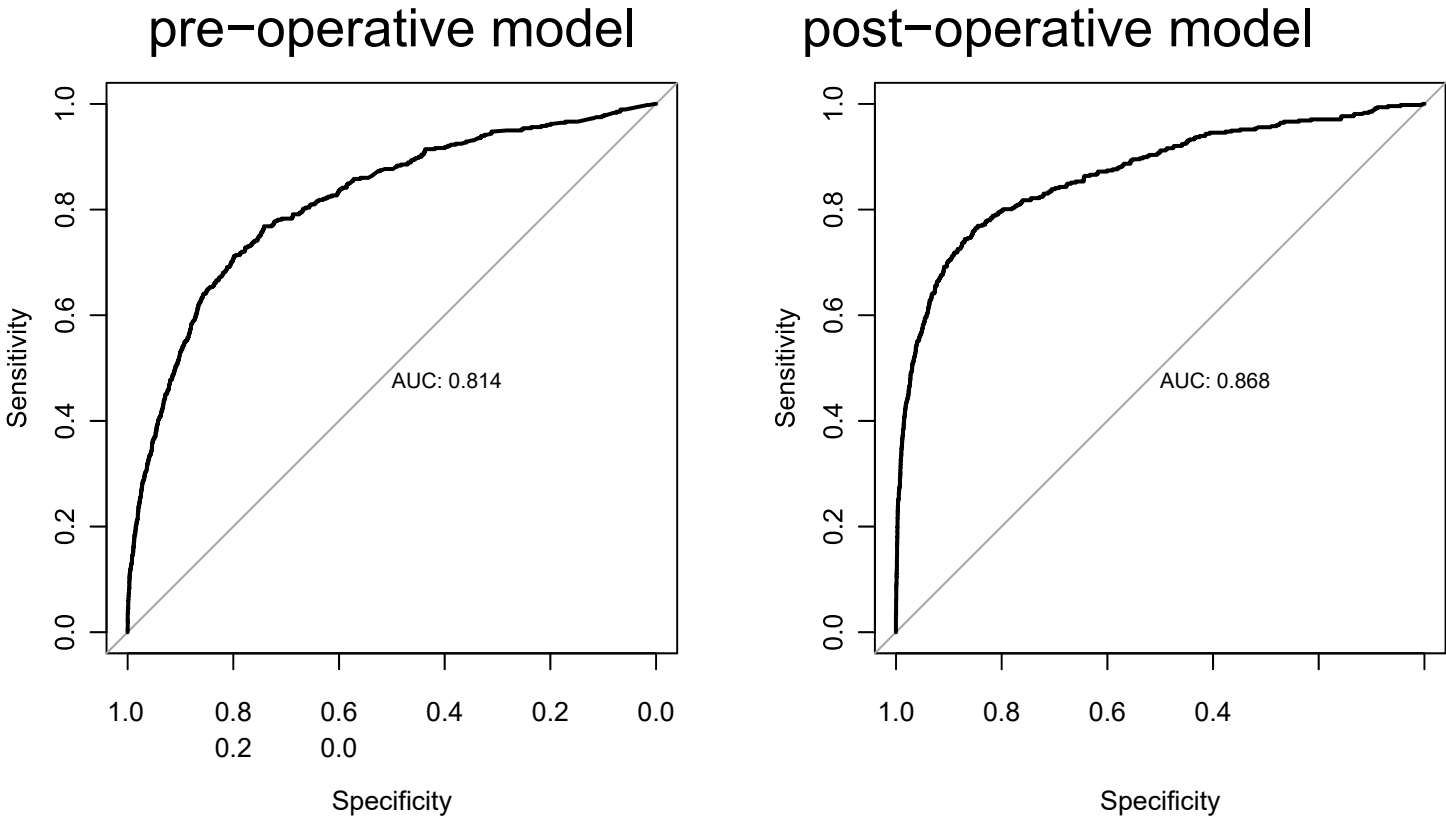
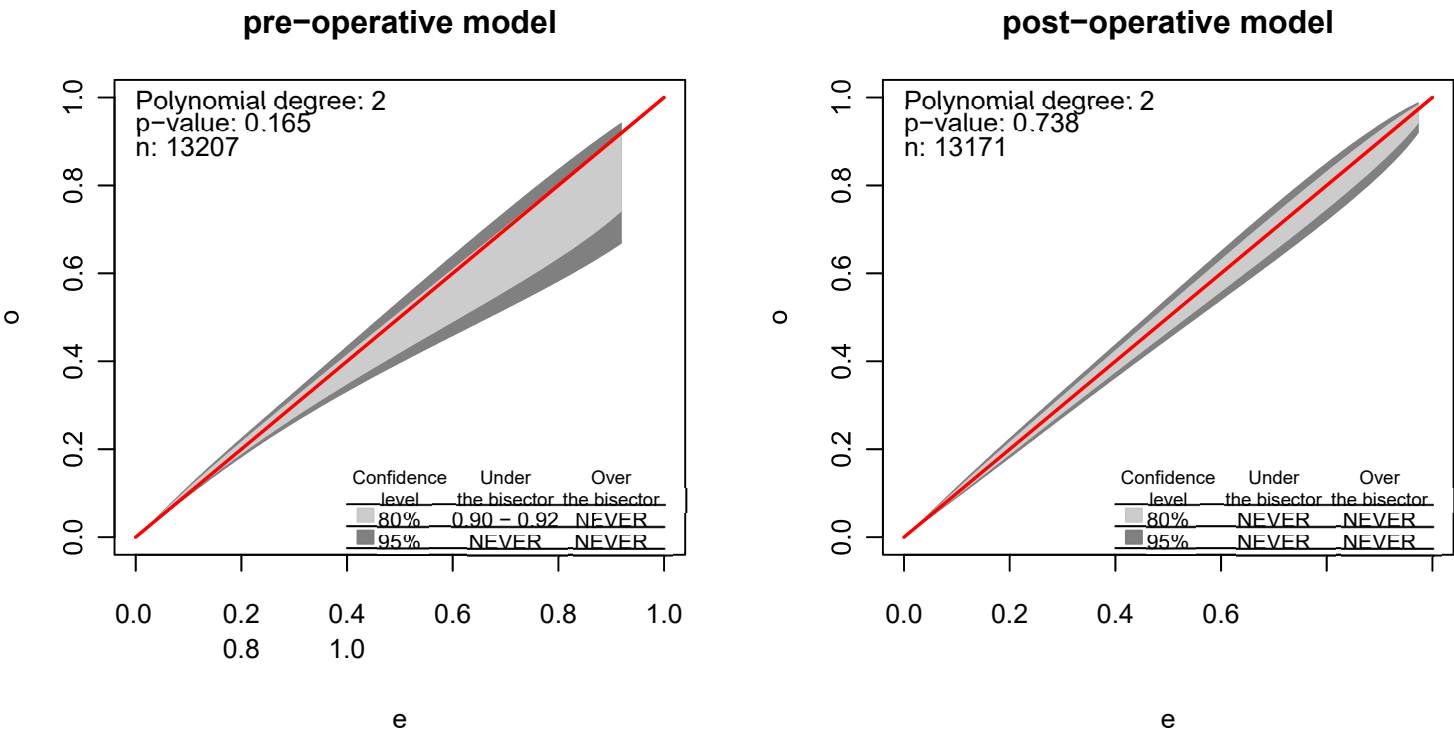
**Supplemental material S2: Other patients' features included in the model and not present in manuscript Table 1**

	Total (N=15533)	Alive (N=14971)	Dead (N=562)	p value
<b>Renal disease</b>				< 0.001
None	14505 (93.4%)	14055 (93.9%)	450 (80.1%)	
Moderate/severe	874 (5.6%)	791 (5.3%)	83 (14.8%)	
End-stage	154 (1.0%)	125 (0.8%)	29 (5.2%)	
<b>Non-ruptured aneurysm</b>	1433 (9.2%)	1386 (9.3%)	47 (8.4%)	0.472
<b>Right heart failure</b>	159 (1.0%)	125 (0.8%)	34 (6.0%)	< 0.001
<b>Infection</b>	544 (3.5%)	493 (3.3%)	51 (9.1%)	< 0.001
<b>Surgery complexity</b>				< 0.001
Isolated CABG	5233 (33.7%)	5128 (34.3%)	105 (18.7%)	
non-CABG isolated procedure	6359 (40.9%)	6120 (40.9%)	239 (42.5%)	
two procedures	3461 (22.3%)	3282 (21.9%)	179 (31.9%)	
three procedures	480 (3.1%)	441 (2.9%)	39 (6.9%)	
<b>IV Vasoactive Drugs</b>	1148 (7.4%)	1056 (7.1%)	92 (16.4%)	< 0.001
<b>Dialysis</b>	277 (1.8%)	239 (1.6%)	38 (6.8%)	< 0.001
<b>Preoperative IABP</b>	315 (2.0%)	273 (1.8%)	42 (7.5%)	< 0.001
<b>Systolic arterial pressure (&lt; 70 mmHg)</b>	521 (3.4%)	393 (2.6%)	128 (22.8%)	< 0.001
<b>PaO2/FiO2 [mmHg] (&lt; 200)</b>	3559 (22.9%)	3312 (22.1%)	247 (44.0%)	< 0.001
<b>Serum creatinine [mg/dl]</b>				< 0.001
< 1.2	11755 (75.7%)	11581 (77.4%)	174 (31.0%)	
1.2 - 4.9	3444 (22.2%)	3164 (21.1%)	280 (49.8%)	
> 5	334 (2.2%)	226 (1.5%)	108 (19.2%)	
<b>Platelets (&lt; 100x10<sup>3</sup>/mm<sup>3</sup>)</b>	2122 (13.7%)	1910 (12.8%)	212 (37.7%)	< 0.001
<b>Sodium (&gt;=145 mEq/l)</b>	399 (2.6%)	342 (2.3%)	57 (10.1%)	< 0.001
<b>Pupils - first day of ICU stay (non-reactive/non-evaluable/not-available)</b>	2968 (19.1%)	2677 (17.9%)	291 (51.8%)	< 0.001
<b>Renal failure</b>				< 0.001
Mild/None	14675 (94.5%)	14344 (95.8%)	331 (58.9%)	
Moderate	439 (2.8%)	348 (2.3%)	91 (16.2%)	
Severe	419 (2.7%)	279 (1.9%)	140 (24.9%)	
<b>Cardiovascular failure</b>				< 0.001

Mild/None	13233 (85.2%)	12836 (85.7%)	397 (70.6%)	
Moderate	2185 (14.1%)	2070 (13.8%)	115 (20.5%)	
Severe	115 (0.7%)	65 (0.4%)	50 (8.9%)	
<b>Number of organ failures</b>				< 0.001
Median (Q1, Q3)	0 (0, 1)	0 (0, 1)	2 (1, 4)	
<b>PRBC transfusion</b>				< 0.001
No	10426 (67.3%)	10227 (68.5%)	199 (35.5%)	
Yes	5068 (32.7%)	4707 (31.5%)	361 (64.5%)	
Missing	39	37	2	
<b>Hospital outcome</b>	562 (3.6%)	0 (0.0%)	562 (100.0%)	< 0.001

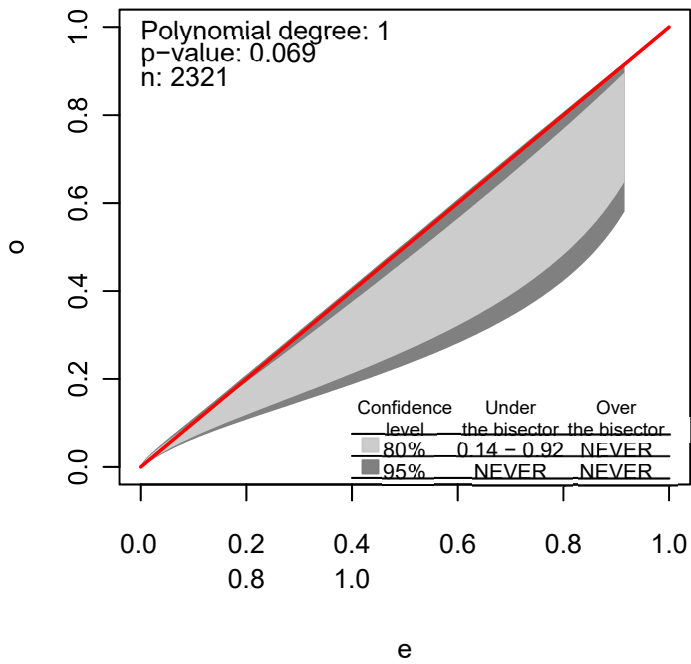
Supplemental Material S3: Discrimination and calibration analysis for training and validation datasets

Training set

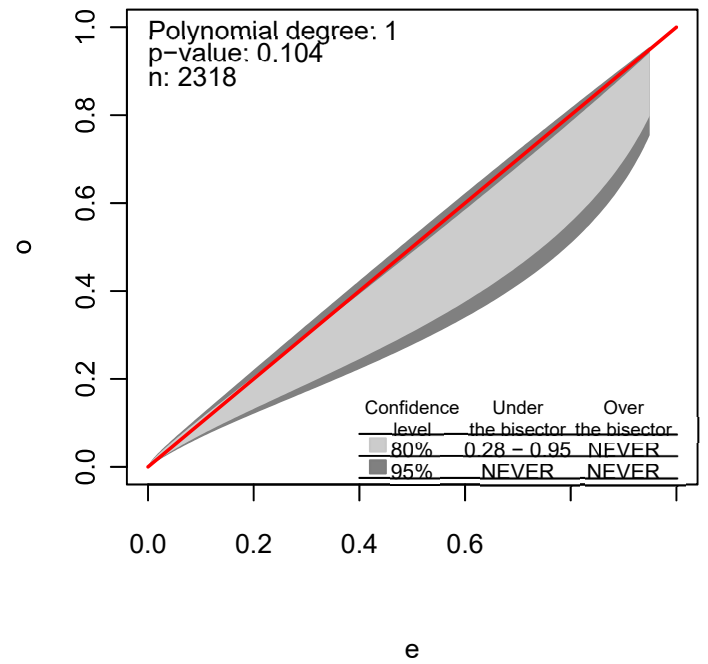


# Validation set

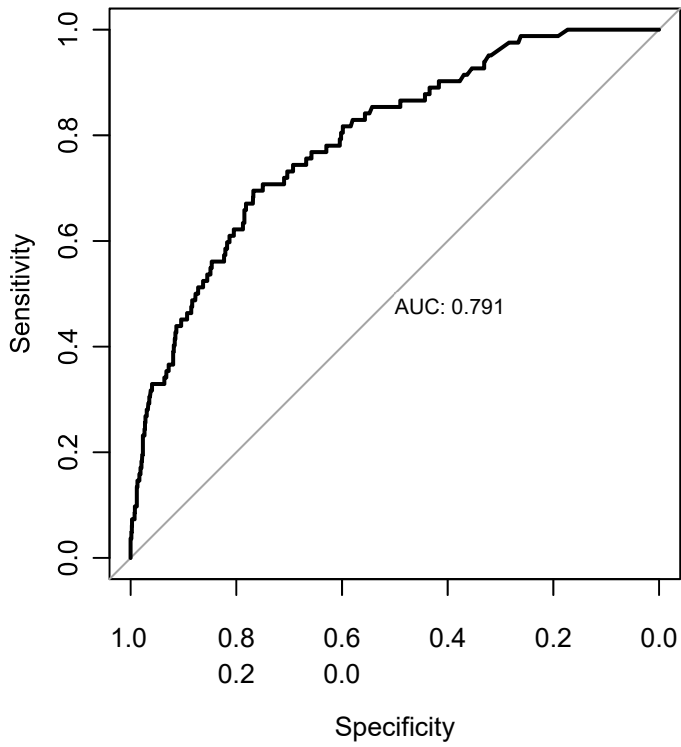
## pre-operative model



## post-operative model



## pre-operative model



## post-operative model

