

SUPPLEMENTAL MATERIAL

Table S1. Search strategy used to identify all CVD/Cerebrovascular and VHD-specific CPMs.

All CPM Search Terms
((predict\$ adj1 model\$) or (predict\$ adj1 instrument\$) or (predict\$ adj1 score\$) or (predict\$ adj1 index)).mp.
((prognos\$ adj1 model\$) or (prognos\$ adj1 instrument\$) or (prognos\$ adj1 score\$) or (prognos\$ adj1 index)).mp.
((risk adj1 model\$) or (risk adj1 instrument\$) or (risk adj1 score\$) or (risk adj1 index) or (risk assessment model or risk assessment instrument or risk assessment score)).mp.
atrial fib\$.mp. or exp Atrial Fibrillation/ or exp coronary artery disease/ or exp coronary disease/ or exp myocardial infarction/ or Myocardial infarct\$.mp. or exp Heart Failure, Congestive/ or exp myocardial ischemia/ or exp cardiovascular diseases/ or exp Cerebrovascular Accident/ or *heart failure/ or *stroke/ or *acute coronary syndrome/
limit 6 to yr="1990 -Current" **Where current = May 15, 2012 publications
(201205\$ or 201206\$ or 201207\$ or 201208\$ or 201209\$ or 201210\$ or 201211\$ or 201212\$ or 2013\$ or 2014\$ or 201501\$ or 201502\$ or 201503\$).ed.
VHD CPM Search Terms
((predict\$ adj1 model\$) or (predict\$ adj1 instrument\$) or (predict\$ adj1 score\$) or (predict\$ adj1 index)).mp.
((prognos\$ adj1 model\$) or (prognos\$ adj1 instrument\$) or (prognos\$ adj1 score\$) or (prognos\$ adj1 index)).mp.
((risk adj1 model\$) or (risk adj1 instrument\$) or (risk adj1 score\$) or (risk adj1 index) or (risk assessment model or risk assessment instrument or risk assessment score)).mp.
heart valve prosthesis\$.mp. or exp cardiovascular surg\$.mp. or exp valve replacement/ or exp valve intervention/ or exp aortic valve/ or exp mitral valve/ or exp tricuspid valve/ or exp pulmonic valve/
(201504\$ or 201505\$ or 201506\$ or 201507\$ or 201508\$ or 201509\$ or 201510\$ or 201511\$ or 201512\$ or 2016\$ or 2017\$).ed.

Table S2. De Novo Model Unabridged Overview.

Author, Model Name	Year	Valve	Standardized Type of Intervention	Specific Intervention	Outcome	Centers	Sample Size	Number of Events	EP V	Age	Continent	Model Method	C-statistic	Calibration Measure	Externally Validated?
<i>Isolated Valve Intervention (+/- CABG)</i>															
Edwards ¹ , STS (original) -- Isolated Valve	2001	Aortic/Mitral	Surgery	AVR or MVR	30 Day Operative Mortality	Multi-center	49073	2291	121	63.7	North America	Logistic regression	0.766	HL statistic, Calibration plot	Yes
Nowicki ² , NNE Aortic and Mitral Models	2004	Aortic	Surgery	AVR +/- CABG	In-Hospital Mortality	Multi-center	5793	360	40	69.5	North America	Logistic regression, Score	0.75	HL statistic	Yes
		Mitral	Surgery	MVR or MVRrepair	In-Hospital Mortality	Multi-center	3150	296	30	66.7	North America	Logistic regression, Score	0.79	HL statistic	Yes
Kuduvalli ³ , NWQIP	2007	Aortic	Surgery	AVR +/- CABG	In-Hospital Mortality	Multi-center	4550	207	21	69	Europe	Logistic regression, Score	0.78	HL statistic	Yes
Cruz-Gonzalez ⁴ , PMV Score	2009	Mitral	Percutaneous	Percutaneous Mitral Valvuloplasty	Procedural Success	Single center	800	544	91	54.9	North America	Logistic regression, Score	NR	HL statistic	Yes
Monin ⁵	2009	Aortic Stenosis	Natural History	None	Composite (Non-MACE)	Single center	107	62	9	72	Europe	Logistic regression, Score	0.90	HL statistic	Yes
O'Brien ⁶ , STS (new) -- Composite AEs	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRrepair	Composite (Non-MACE)	Multi-center	109759	20074	574	NR	North America	Logistic regression	0.721	None	Yes
O'Brien ⁶ , STS (new) -- DSWI	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRrepair	DSWI	Multi-center	109759	307	26	NR	North America	Logistic regression	0.704	None	Yes

Author, Model Name	Year	Valve	Standardized Type of Intervention	Specific Intervention	Outcome	Centers	Sample Size	Number of Events	EPV	Age	Continent	Model Method	C-statistic	Calibration Measure	Externally Validated?
O'Brien ⁶ , STS (new) -- Mortality	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRRepair	30 Day Mortality	Multi-center	109759	3706	100	NR	North America	Logistic regression	0.805	None	Yes
O'Brien ⁶ , STS (new) – Prolonged LOS	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRRepair	Prolonged LOS	Multi-center	109759	9718	270	NR	North America	Logistic regression	0.77	None	Yes
O'Brien ⁶ , STS (new) – Prolonged Ventilation	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRRepair	Prolonged Ventilation	Multi-center	109759	12892	331	NR	North America	Logistic regression	0.77	None	Yes
O'Brien ⁶ , STS (new) – Renal Failure	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRRepair	Renal Failure	Multi-center	107060	4673	173	NR	North America	Logistic regression	0.782	None	Yes
O'Brien ⁶ , STS (new) -- Reoperation	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRRepair	Reoperation	Multi-center	109759	9164	305	NR	North America	Logistic regression	0.643	None	Yes
O'Brien ⁶ , STS (new) – Short LOS	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRRepair	Prolonged LOS	Multi-center	109759	41214	1178	NR	North America	Logistic regression	0.738	None	No
O'Brien ⁶ , STS (new) -- Stroke	2009	Aortic/Mitral	Surgery	AVR or MVR or MVRRepair	Stroke	Multi-center	109759	1751	92	NR	North America	Logistic regression	0.694	None	Yes
Guaragna ⁷ , GuaragnaSCORE	2010	Aortic/Mitral	Surgery	Isolated Cardiac Valve Surgery +/- CABG	In-Hospital Mortality	Single center	699	128	16	55.5	South America	Logistic regression, Score	0.82	HL statistic, Calibration plot	Yes
Guo ⁸	2010	Aortic	Surgery	AVR	In-Hospital Mortality	Single center	1087	45	6	60.24	Asia	Logistic regression	NR	HL statistic	No
		Mitral	Surgery	MVR	In-Hospital Mortality	Single center	1752	79	16	50.89	Asia	Logistic regression	NR	HL statistic	No
Elmariah ⁹ , CRRAC the AV Score	2011	Aortic	Percutaneous	Balloon Aortic Valvuloplasty	30 Day Mortality	Single center	281	36	9	83	North America	Cox regression, Score	0.754	HL statistic	No

Author, Model Name	Year	Valve	Standardized Type of Intervention	Specific Intervention	Outcome	Centers	Sample Size	Number of Events	EPV	Age	Continent	Model Method	C-statistic	Calibration Measure	Externally Validated?
Bouleti ¹⁰	2012	Mitral	Percutaneous	Percutaneous Mitral Commissurotomy	Composite (MACE)	Single center	609	309	77	49	Europe	Cox regression, Score	0.74	Calibration plot	No
Cioffi ¹¹	2012	Aortic Stenosis	Natural History	None	Composite (MACE)	Multi-center	1566	550	79	67	Europe	Cox regression, Score	NR	None	No
Holme ¹² , SEAS Score	2012	Aortic Stenosis	Natural History	None	5 Year Mortality	Multi-center	772	78	11	67.7	Europe	Cox regression	0.722	HL statistic, Calibration plot, Brier score	No
Kötting ¹³ , German Aortic Valve Score	2013	Aortic	Percutaneous	AVR or TAVR	In-Hospital Mortality	Multi-center	11147	416	28	NR	Europe	Logistic regression, Score	0.808	HL statistic	Yes
Arnold ¹⁴ , 6 Month and 1 Year Models	2014	Aortic Stenosis	Percutaneous	TAVR	Composite (Non-MACE)	Multi-center	2137	704	70	84	North America, Europe	Logistic regression	0.66	HL statistics, Calibration plot	Yes
		Aortic Stenosis	Percutaneous	TAVR	Composite (Non-MACE)	Multi-center	2130	1073	134	84	North America, Europe	Logistic regression	0.66	HL statistics, Calibration plot	Yes
Capodanno ¹⁵ , OBSERVANT Score	2014	Aortic Stenosis	Percutaneous	AVR or TAVR	30 Day Mortality	Multi-center	1256	77	11	81.9	Europe	Logistic regression, Score	0.73	HL statistic, Calibration plot, Brier score	Yes
D'Ascenzo ¹⁶ , Survival Post-TAVI (STT) - 30 Days and 1 Year Models	2014	Aortic	Percutaneous	TAVR	30 Day Mortality	Multi-center	1064	60	20	81.6	Europe	Logistic regression, Score	0.66	HL statistic	Yes
		Aortic	Percutaneous	TAVR	1 Year Mortality	Multi-center	1064	165	55	81.6	Europe	Logistic regression	0.68	HL statistic	Yes

Author, Model Name	Year	Valve	Standardized Type of Intervention	Specific Intervention	Outcome	Centers	Sample Size	Number of Events	EPV	Age	Continent	Model Method	C-statistic	Calibration Measure	Externally Validated?
												on, Score			
Iung ¹⁷	2014	Aortic	Percutaneous	TAVR	30 Day Mortality	Multi-center	2552	253	28	82.9	Europe	Logistic regression, Score	0.67	HL statistic, Calibration in the large, Calibration plot	No
Debonnaire ¹⁸ , TAVI2-SCORE	2015	Aortic	Percutaneous	TAVR	1 Year Mortality	Multi-center	509	80	10	82	Europe	Cox regression, Score	0.715	HL statistic, Calibration in the large	Yes
Edwards ¹⁹	2016	Aortic	Percutaneous	TAVR	In-Hospital Mortality	Multi-center	13672	730	104	82.1	North America	Logistic regression	0.67	HL statistics, Calibration in the large, Calibration plot	Yes
Isolated or Multiple Valve (+/- CABG)															
Koplan ²⁰	2003	All	Surgery	Cardiac Valve Surgery	Pacemaker Placement	Single center	3116	168	24	65	North America	Logistic regression, Score	NR	None	No
Ambler ²¹ , Ambler	2005	Aortic, Mitral	Surgery	AVR and/or MVR	In-Hospital Mortality	Multi-center	16679	1067	76	64.8	Europe	Logistic regression, Score	0.77	HL statistic, Calibration plot	Yes
Xu ²²	2006	All	Surgery	Valve Surgery	Prolonged LOS	Single center	507	75	11	55.5	Asia	Logistic regression	0.81	Calibration in table form	No
Hannan ²³	2007	Aortic, Mitral	Surgery	Isolated Valve Surgery	In-Hospital Mortality	Multi-center	10702	472	43	NR	North America	Logistic regression, Score	0.794	HL statistic, Calibration plot	Yes

Author, Model Name	Year	Valve	Standardized Type of Intervention	Specific Intervention	Outcome	Centers	Sample Size	Number of Events	EPV	Age	Continent	Model Method	C-statistic	Calibration Measure	Externally Validated?
Xu ²⁴ , FUWAI Score	2007	All	Surgery	Valve Surgery +/- CABG	Prolonged LOS	Single center	2193	345	27	53.29	Asia	Logistic regression, Score	0.76	HL statistic, Calibration plot	Yes
Shi ²⁵	2010	Aortic, Mitral	Surgery	AVR and/or MVR	In-Hospital Mortality	Single center	158	8	1	NR	Asia	Logistic regression	0.7358	None	No
Ariyaratne ²⁶ , Aus-AVR Score	2011	Aortic, Mitral	Surgery	AVR +/- CABG +/- MVR	30 Day Mortality	Multi-center	3544	147	16	NR	Australia	Logistic regression, Score	0.78	HL statistic, Calibration in the large	Yes
Nashef ²⁷ , EuroSCORE II	2012	All	Surgery	Major Cardiac Surgery	In-Hospital Mortality	Multi-center	16828	656	36	64.6	International	Logistic regression	0.8095	None	Yes
Hannan ²⁸ , NY Operative Mortality Risk Score	2013	Aortic, Mitral	Surgery	Isolated Valve Surgery	30 Day Mortality	Multi-center	13455	542	49	NR	North America	Logistic regression, Score	0.781	HL statistic	Yes
Wang ²⁹	2013	All	Surgery	Valve Surgery	Prolonged Ventilation	Single center	2400	303	25	NR	Asia	Logistic regression	0.789	HL statistic	No
Zheng ³⁰	2013	Aortic, Mitral	Surgery	AV and/or MV Surgery	In-Hospital Mortality	Multi-center	6677	130	26	48	Asia	Logistic regression, Score	0.76	HL statistic, Chi-square statistic, Calibration plot	No
Multiple Valve															
Guo ⁸	2010	Aortic, Mitral	Surgery	AVR + MVR	In-Hospital Mortality	Single center	818	55	14	58.4	Asia	Logistic regression	NR	HL statistic	No
Rankin ³¹ , AM Preop	2013	Aortic, Mitral	Surgery	AVR + MVR	30 Day Mortality	Multi-center	27035	2541	116	70	North America	Logistic regression	NR	Calibration plot	Yes

Author, Model Name	Year	Valve	Standardized Type of Intervention	Specific Intervention	Outcome	Centers	Sample Size	Number of Events	EPV	Age	Continent	Model Method	C-statistic	Calibration Measure	Externally Validated?
Rankin ³¹ , MT Preop	2013	Mitral, Tricuspid	Surgery	MVR + TVR	30 Day Mortality	Multi-center	18686	1420	71	70	North America	Logistic regression	NR	Calibration plot	Yes
Rankin ³¹ , AMT Preop	2013	Aortic, Mitral, Tricuspid	Surgery	AVR + MVR + TVR	30 Day Mortality	Multi-center	4510	591	74	71	North America	Logistic regression	NR	Calibration plot	Yes
Rankin ³¹ , AM Preop + Intraop	2013	Aortic, Mitral	Surgery	AVR + MVR	30 Day Mortality	Multi-center	27035	2541	110	70	North America	Logistic regression	NR	Calibration plot	Yes
Rankin ³¹ , MT Preop + Intraop	2013	Mitral, Tricuspid	Surgery	MVR + TVR	30 Day Mortality	Multi-center	18686	1420	71	70	North America	Logistic regression	NR	Calibration plot	Yes
Rankin ³¹ , AMT Preop + Intraop	2013	Aortic, Mitral, Tricuspid	Surgery	AVR + MVR + TVR	30 Day Mortality	Multi-center	4510	591	26	71	North America	Logistic regression	NR	Calibration plot	Yes

* 'Isolated Valve' indicates a single valve procedure; 'Multiple Valve' indicates intervention to > 1 valve; AVR indicates aortic valve replacement; MVR, mitral valve replacement; HL, Hosmer-Lemeshow; CABG, coronary artery bypass grafting; NR, not reported; MACE, major adverse cardiovascular events; AEs, adverse events; DSWI, deep sternal wound infections; LOS, length of stay; TAVR, transcatheter aortic valve replacement; TVR, tricuspid valve replacement.

Table S3. External Validations Overview.

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
<i>Isolated Valve</i>										
STS (original) – Isolated Valve ¹	Edwards, 2001 ¹	AVR or MVR	operative mortality	30 days	North America	25640	1231	0.773	Yes	2.631578947
	Brown, 2009 ³²	AVR	mortality	hospitalization period	North America	108,687	3197	NA	Yes	NA
NNE Aortic ²	Jin, 2005 ³³	AVR	operative mortality	until discharge	North America	3324	142	0.75	Yes	0
	Ariyaratne, 2011 ²⁶	AVR	early postop mortality	30 days	Australia	3544	147	0.77	Yes	8
	Wang, 2013 ³⁴	valve surgery	in-hospital mortality	until discharge	Asia	12412	260	0.706	Yes	-17.6
NNE Mitral ²	Jin, 2005 ³³	MVR	operative mortality	until discharge	North America	1596	95	0.81	Yes	6.896551724
NWQIP ³	Kuduvalli, 2007 ³	AVR +/- CABG	in-hospital mortality	hospitalization period	Europe	816	33	0.78	Yes	0
	Ariyaratne, 2011 ²⁶	AVR +/- CABG	in-hospital mortality or mortality within 30 days of surgery	30 days	Australia	3306	120	0.77	Yes	-3.571428571
PMV Score ⁴	Cruz-Gonzalez, 2009 ⁴	percutaneous mitral valvuloplasty	PMV success	1 year	North America	285	213	NR	No	NA
Monin, 2009 ⁵	Monin, 2009 ⁵	valve surgery +/- CABG	morbidity/mortality	mean 21 months	Europe	107	56	0.89	Yes	-2.5
STS (new)– Composite AEs ⁶	Watanabe, 2013 ³⁵	TAVR	composite safety endpoint	30 days	Europe	453	94	0.59	No	-59.2760181
	Wang, 2016 ³⁶	AVR +/- CABG	composite morbidity	30 days	Australia	450	152	0.627	No	-42.53393665
	Wang, 2017 ³⁷	MVR or MVRepair	composite morbidity	30 days	Australia	407	77	0.732	No	4.977375566
STS (new)– DSWI ⁶	Wang, 2016 ³⁶	AVR +/- CABG	DSWI	30 days	Australia	450	6	0.631	No	-35.78431373
	Wang, 2017 ³⁷	MVR or MVRepair	mediastinitis	30 days	Australia	407	4	0.721	No	8.333333333

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
STS (new) – Mortality ⁶	Piazza, 2010 ³⁸	TAVR	periprocedural mortality	30 days	Europe	168	19	0.69	Yes	- 37.70491803
	Basraon, 2011 ³⁹	AVR	perioperative mortality	30 days	North America	537	32	0.73	Yes	- 24.59016393
	Zhang, 2011 ⁴⁰	valve surgery	prolonged postop ICU stay	mean LOS 79.44 +/- 59.76 hrs	Asia	1333	187	0.70	Yes	- 34.42622951
	Durand, 2013 ⁴¹	TAVR	mortality	30 days	Europe	250	19	0.58	Yes	-73.7704918
	Durand, 2013 ⁴¹	TAVR (transapical access)	mortality	30 days	Europe	60	7	0.55	Yes	- 83.60655738
	Durand, 2013 ⁴¹	TAVR (transfemoral access)	mortality	30 days	Europe	190	12	0.66	Yes	- 47.54098361
	Haensig, 2013 ⁴²	TA-AVI	mortality	30 days	Europe	360	38	0.64	Yes	- 54.09836066
	Haensig, 2013 ⁴²	TA-AVI	in-hospital mortality	until discharge	Europe	360	41	0.65	Yes	- 50.81967213
	Laurent, 2013 ⁴³	AVR	operative mortality	30 days	Europe	314	18	0.77	Yes	- 11.47540984
	Wang, 2013 ³⁴	valve surgery	in-hospital mortality	until discharge	Asia	12412	260	0.735	Yes	- 22.95081967
	Watanabe, 2013 ³⁵	TAVR	mortality	30 days	Europe	453	57	0.6	Yes	- 67.21311475
	Watanabe, 2013 ³⁵	TAVR (transfemoral)	mortality	30 days	Europe	249	28	0.6	Yes	- 67.21311475
	Watanabe, 2013 ³⁵	TAVR (transfemoral approach, without early experience)	mortality	30 days	Europe	NR	NR	0.65	Yes	- 50.81967213
	Watanabe, 2013 ³⁵	TAVR (transapical/transaortic)	mortality	30 days	Europe	330	27	0.61	Yes	- 63.93442623
	Barili, 2014 ⁴⁴	MV surgery	in-hospital mortality	until discharge	Europe	1239	NR	0.82	Yes	4.918032787
Barili, 2014 ⁴⁴	MV surgery +/- CABG	in-hospital mortality	until discharge	Europe	2202	NR	0.76	Yes	- 14.75409836	

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
	Beohar, 2014 ⁴⁵	TAVR	mortality	30 days	North America	2552	165	0.6	Yes	- 67.21311475
	Chan, 2014 ⁴⁶	MVR or MVRepair	perioperative mortality	30 days	North America	1154	11	0.74	Yes	- 21.31147541
	Osnabrugge, 2014 ⁴⁷	AVR	in-hospital mortality	until discharge	North America	4107	119	0.74	Yes	- 21.31147541
	Osnabrugge, 2014 ⁴⁷	AVR +/- CABG	in-hospital mortality	until discharge	North America	3480	143	0.74	Yes	- 21.31147541
	Osnabrugge, 2014 ⁴⁷	MVRepair	in-hospital mortality	until discharge	North America	1059	13	0.86	Yes	18.03278689
	Osnabrugge, 2014 ⁴⁷	MVR	in-hospital mortality	until discharge	North America	1071	59	0.79	Yes	- 4.918032787
	Rabbani, 2014 ⁴⁸	valve replacement surgery	mortality	30 days	Asia	576	28	0.812	Yes	2.295081967
	Wendt, 2014 ⁴⁹	AVR or TAVR	mortality	30 days	Europe	1512	95	0.708	Yes	- 31.80327869
	Wang, 2014 ⁵⁰	isolated or multiple valve surgery	in-hospital mortality	until discharge	Asia	9846	176	0.712	Yes	- 30.49180328
	Adamo, 2015 ⁵¹	percutaneous MVRepair	mortality	30 days	Europe	304	10	0.62	Yes	-60.6557377
	Debonnaire, 2015 ¹⁸	TAVR	all-cause mortality	1 year	Europe	471	80	0.5	Yes	-100
	Holinski, 2015 ⁵²	repeat AVR	mortality	30 days	Europe	78	8	0.64	Yes	- 54.09836066
	Silaschi, 2015 ⁵³	TAVR (transfemoral or transapical)	mortality	30 days	Europe	457	44	0.57	Yes	- 77.04918033
	Silva, 2015 ⁵⁴	TAVR	mortality	30 days	South America	418	38	0.54	Yes	-86.8852459
	Sinning, 2015 ⁵⁵	TAVR	all-cause mortality	1 year	Europe	310	80	0.685	No	-39.3442623
	Tralhao, 2015 ⁵⁶	AVR	operative mortality	30 days	Europe	106	6	0.702	Yes	-33.7704918
	Vassileva, 2015 ⁵⁷	repeat AVR after prior CABG	operative mortality	median LOS 6 days (IQR 5-9)	North America	6534	236	NR	Yes	NA

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
	Wang, 2015 ⁵⁸	AVR	operative mortality	30 days	Australia	620	18	0.716	Yes	- 29.18032787
	Wang, 2015 ⁵⁹	AVR	post-operative complications	14 days	Australia	620	115	0.666	Yes	- 45.57377049
	Barili, 2016 ⁶⁰	AVR	mortality	30 days	Europe	1444	NR	0.79	Yes	- 4.918032787
	Collas, 2016 ⁶¹	TAVR	mortality	1 year	Europe	225	38	NR	No	NA
	Halkin, 2016 ⁶²	TAVR	all-cause mortality	30 days	Asia	1327	45	0.68	No	- 40.98360656
	Kortlandt, 2016 ⁶³	percutaneous MVRepair	periprocedural mortality	30 days	Europe	136	5	0.65	Yes	- 50.81967213
	Peguero, 2016 ⁶⁴	cardiac surgery	operative mortality	30 days	North America	2263	48	0.77	Yes	- 11.47540984
	Rosa, 2016 ⁶⁵	TAVR	in-hospital mortality	until discharge	South America	59	6	NR	Yes	NA
	Rosa, 2016 ⁶⁵	TAVR	30-day mortality	30 days	South America	59	8	0.81	Yes	1.639344262
	Wang, 2016 ³⁶	AVR +/- CABG	operative mortality	30 days	Australia	450	29	0.699	Yes	- 34.75409836
	Wang, 2016 ⁶⁶	valve surgery	in-hospital mortality	until discharge	Asia	12412	260	0.735	Yes	- 22.95081967
	Yamaoka, 2016 ⁶⁷	AVR +/- CABG	operative mortality	30 days	Asia	406	14	0.781	Yes	- 7.868852459
	Zbroński, 2016 ⁶⁸	TAVR	mortality	30 days	Europe	156	15	0.55	Yes	- 83.60655738
	Balan, 2017 ⁶⁹	TAVR	mortality	30 days	North America	426	18	0.674	No	- 42.95081967
	Balan, 2017 ⁶⁹	SAVR	mortality	30 days	North America	297	14	0.791	No	- 4.590163934
	Balan, 2017 ⁶⁹	TAVR (transfemoral)	mortality	30 days	North America	NR	NR	0.789	No	- 5.245901639
	Balan, 2017 ⁶⁹	TAVR (transapical)	mortality	30 days	North America	NR	NR	0.583	No	- 72.78688525
	Schmid, 2017 ⁷⁰	TAVR	all-cause mortality	1 year	Europe	74	10	0.734	No	- 23.27868852
	Schmid, 2017 ⁷⁰	TAVR	all-cause mortality	2 years	Europe	74	18	0.646	No	- 52.13114754
	Wang, 2017 ³⁷	MVR or MVRepair	operative mortality	30 days	Australia	407	10	0.850	Yes	14.75409836

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
STS (new)– Prolonged LOS ⁶	Wang, 2016 ³⁶	AVR +/- CABG	LOS > 14 days	14 days	Australia	450	86	0.638	No	- 48.88888889
	Wang, 2017 ³⁷	MVR or MVRepair	prolonged LOS	14 days	Australia	407	56	0.696	No	- 27.40740741
STS (new)– Prolonged Ventilation ⁶	Wang, 2016 ³⁶	AVR/CABG	ventilation > 24 hours	30 days	Australia	450	124	0.642	No	- 47.40740741
	Wang, 2017 ³⁷	MVR or MVRepair	ventilation > 24 hours	30 days	Australia	407	54	0.789	No	- 7.037037037
STS (new)– Renal Failure ⁶	Peguero, 2016 ⁶⁴	valve surgery +/- CABG	operative mortality	30 days	North America	2263	48	0.76	Yes	-7.80141844
	Wang, 2016 ³⁶	AVR +/- CABG	renal failure	30 days	Australia	450	6	0.682	No	- 35.46099291
	Wang, 2017 ³⁷	MVR or MVRepair	renal failure	30 days	Australia	407	12	0.828	No	- 16.31205674
STS (new)– Reoperation ⁶	Wang, 2016 ³⁶	AVR/CABG	reoperation	30 days	Australia	450	54	0.612	No	- 21.67832168
	Wang, 2017 ³⁷	MVR or MVRepair	return to theater	30 days	Australia	407	33	0.668	No	- 17.48251748
STS (new)– Stroke ⁶	Peguero, 2016 ⁶⁴	valve surgery +/- CABG	operative mortality	30 days	North America	2263	48	0.69	Yes	-2.06185567
	Wang, 2016 ³⁶	AVR/CABG	stroke	30 days	Australia	450	15	0.642	No	- 26.80412371
	Wang, 2017 ³⁷	MVR or MVRepair	stroke	30 days	Australia	407	7	0.665	No	- 14.94845361
GuaragnaSCORE ⁷	Sa, 2012 ⁷¹	valve surgery +/- CABG	perioperative mortality	until discharge	South America	491	74	0.781	Yes	-12.1875
	Silva, 2015 ⁵⁴	TAVR	mortality	30 days	South America	418	38	0.52	Yes	-93.75
German Aortic Valve Score ¹³	Sinning, 2015 ⁵⁵	TAVR	all-cause mortality	1 year	Europe	310	80	0.661	No	- 47.72727273
	Sinning, 2015 ⁵⁵	TAVR	all-cause mortality or rehospitalization	1 year	Europe	310	132	0.618	No	- 61.68831169
	Halkin, 2016 ⁶²	TAVR	all-cause mortality	30 days	Asia	1327	45	0.52	No	- 93.50649351
	Kalendar, 2017 ⁷²	AVR	mortality	until discharge	Asia	35	6	0.647	Yes	- 52.27272727
	Martin, 2017 ⁷³	TAVR	mortality	30 days	Europe	6676	360	0.59	Yes	- 70.77922078

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
	Schmid, 2017 ⁷⁰	TAVR	all-cause mortality	1 year	Europe	74	10	0.703	No	- 34.09090909
	Schmid, 2017 ⁷⁰	TAVR	all-cause mortality	2 years	Europe	74	18	0.554	No	- 82.46753247
Arnold – 6 Month Model ¹⁴	Arnold, 2016 ⁷⁴	TAVR	poor outcome	6 months	North America	2830	882	0.646	Yes	-8.75
Arnold – 1 Year Model ¹⁴	Arnold, 2016 ⁷⁴	TAVR	poor outcome	1 year	North America	2325	1181	0.653	Yes	-4.375
OBSERVANT Score ¹⁵	Collas, 2016 ⁶¹	TAVR	mortality	1 year	Europe	225	38	NR	No	NA
	Halkin, 2016 ⁶²	TAVR	all-cause mortality	30 days	Asia	1327	45	0.63	No	- 43.47826087
	Zbroński, 2016 ⁶⁸	TAVR	mortality	30 days	Europe	156	15	0.597	Yes	- 57.82608696
	Martin, 2017 ⁷³	TAVR	mortality	30 days	Europe	6676	360	0.57	Yes	- 69.56521739
Survival Post-TAVI (STT) – 30 days ¹⁶	D’Ascenzo, 2014 ¹⁶	TAVR	mortality	30 days	Europe	180	13	0.66	Yes	0
	Collas, 2016 ⁶¹	TAVR	mortality	1 year	Europe	225	38	NR	No	NA
Survival Post-TAVI (STT) – 1 year ¹⁶	D’Ascenzo, 2014 ¹⁶	TAVR	mortality	1 year	Europe	180	63	0.67	Yes	- 5.555555556
TAVI2-SCORE ¹⁸	Collas, 2016 ⁶¹	TAVR	mortality	1 year	Europe	225	38	NR	No	NA
Edwards, 2016 ¹⁹	Edwards, 2016 ¹⁹	TAVR	in-hospital mortality	until discharge	North America	6868	300	0.66	Yes	- 5.882352941
<i>Isolated or Multiple Valve</i>										
Ambler ²¹	De Bacco, 2008 ⁷⁵	implantation of bovine pericardial bioprosthesis	in-hospital mortality	until discharge	South America	703	101	0.729	Yes	- 15.18518519
	Dewey, 2008 ⁷⁶	AVR	mortality	mean 4.2 +/- 2.7 years	North America	97	39	NR	Yes	NA
	Tran, 2010 ⁷⁷	AVR	mortality	1 year	North America	394	23	0.799	Yes	10.74074074
	Laurent, 2013 ⁴³	AVR	operative mortality	30 days	Europe	314	18	0.70	Yes	- 25.92592593
	Wang, 2013 ³⁴	valve surgery	in-hospital mortality	until discharge	Asia	3479	112	0.677	Yes	- 34.44444444

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
	Silaschi, 2015 ⁵³	TAVR (transfemoral or transapical)	mortality	30 days	Europe	457	44	0.52	Yes	- 92.59259259
	Silva, 2015 ⁵⁴	TAVR	mortality	30 days	South America	418	38	0.57	Yes	- 74.07407407
	Wang, 2016 ⁶⁶	valve surgery	in-hospital mortality	until discharge	Asia	12412	260	0.674	Yes	- 35.55555556
	Yamaoka, 2016 ⁶⁷	AVR +/- CABG	operative mortality	30 days	Asia	406	14	0.709	Yes	- 22.59259259
	Zbroński, 2016 ⁶⁸	TAVR	mortality	30 days	Europe	156	15	0.54	Yes	- 85.18518519
Hannan, 2007 ²³	Hannan, 2007 ²³	isolated valve surgery	in-hospital mortality		North America	9662	504	NR	No	NA
	van Gameren, 2008 ⁷⁸	isolated valve surgery	hospital mortality	hospitalization period	Europe	904	25	0.86	Yes	22.44897959
	Wang, 2013 ³⁴	valve surgery +/- CABG	in-hospital mortality	hospitalization period	Asia	3479	112	0.682	Yes	-38.0952381
FUWAI Score ²⁴	Zhang, 2011 ⁴⁰	valve surgery	prolonged postop ICU stay	mean LOS 79.44 +/- 59.76 hrs	Asia	1333	187	0.81	Yes	19.23076923
Aus-AVR Score ²⁶	Ariyaratne, 2011 ²⁶	AVR	early postoperative mortality	30 days	Australia	3544	147	0.73	Yes	- 17.85714286
	Wang, 2015 ⁵⁸	AVR	operative mortality	30 days	Australia	620	18	0.716	Yes	- 22.85714286
	Wang, 2015 ⁵⁹	AVR	post-operative complications	14 days	Australia	620	115	0.618	Yes	- 57.85714286
EuroSCORE II ²⁷	Barili, 2013 ⁷⁹	MV surgery	in-hospital mortality	until discharge	Europe	NR	NR	0.79	No	- 6.300484653
	Barili, 2013 ⁷⁹	AV, MV, or TV surgery	in-hospital mortality	until discharge	Europe	NR	NR	0.8	No	- 3.069466882
	Carnero-Alcazar, 2013 ⁸⁰	cardiac surgery	post-operative mortality	30 days	Europe	3798	215	0.85	Yes	13.08562197
	Chalmers, 2013 ⁸¹	AVR	in-hospital mortality	until discharge	Europe	814	19	0.69	Yes	- 38.61066236
	Chalmers, 2013 ⁸¹	AVR +/- CABG	in-hospital mortality	until discharge	Europe	517	23	0.74	Yes	- 22.45557351
	Chalmers, 2013 ⁸¹	MV surgery	in-hospital mortality	until discharge	Europe	340	5	0.87	Yes	19.54765751

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
	Durand, 2013 ⁴¹	TAVR (all)	mortality	30 days	Europe	250	19	0.66	Yes	- 48.30371567
	Durand, 2013 ⁴¹	TAVR (transapical)	mortality	30 days	Europe	60	7	0.52	Yes	- 93.53796446
	Durand, 2013 ⁴¹	TAVR (transfemoral)	mortality	30 days	Europe	190	12	0.71	Yes	- 32.14862682
	Haensig, 2013 ⁴²	TA-AVI	in-hospital mortality	until discharge	Europe	360	38	0.51	Yes	- 96.76898223
	Haensig, 2013 ⁴²	TA-AVI	mortality	30 days	Europe	360	41	0.50	Yes	-100
	Howell, 2013 ⁸²	valve surgery +/- CABG	in-hospital mortality	until discharge	Europe	933	90	0.67	Yes	-45.0726979
	Sedaghat, 2013 ⁸³	TAVR (transfemoral)	mortality	30 days	Europe	206	14	0.71	Yes	- 32.14862682
	Sedaghat, 2013 ⁸³	TAVR (transfemoral)	mortality	1 year	Europe	206	56	0.70	Yes	- 35.37964459
	Wang, 2013 ³⁴	valve surgery	in-hospital mortality	until discharge	Asia	12412	260	0.693	Yes	- 37.64135703
	Watanabe, 2013 ³⁵	TAVR	mortality	30 days	Europe	453	57	0.68	Yes	- 41.84168013
	Watanabe, 2013 ³⁵	TAVR (transfemoral)	mortality	30 days	Europe	249	28	0.74	Yes	- 22.45557351
	Watanabe, 2013 ³⁵	TAVR (transfemoral approach, without early experience)	mortality	30 days	Europe	NR	NR	0.75	Yes	- 19.22455574
	Watanabe, 2013 ³⁵	TAVR (transapical/tra nsao rtic)	mortality	30 days	Europe	330	27	0.61	Yes	- 64.45880452
	Zhang, 2013 ⁸⁴	isolated or multiple valve surgery	in-hospital mortality	until discharge	Asia	3479	112	0.69	Yes	- 40.22617124
	Zhang, 2013 ⁸⁴	isolated valve surgery	in-hospital mortality	until discharge	Asia	1106	26	0.792	Yes	- 5.654281099
	Zhang, 2013 ⁸⁴	multiple valve surgery	in-hospital mortality	until discharge	Asia	2373	86	0.605	Yes	- 66.07431341
	Barili, 2014 ⁴⁴	isolated MV surgery	in-hospital mortality	until discharge	Europe	1239	NR	0.81	Yes	0.161550889

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
	Barili, 2014 ⁴⁴	associated MV surgery	in-hospital mortality	until discharge	Europe	NR	NR	0.75	Yes	- 19.22455574
	Barili, 2014 ⁴⁴	MV surgery +/- CABG	in-hospital mortality	until discharge	Europe	NR	NR	0.74	Yes	- 22.45557351
	Barili, 2014 ⁸⁵	elective major cardiac surgery	in-hospital mortality	until discharge	Europe	12201	210	0.80	Yes	- 3.069466882
	Kosztka, 2014 ⁸⁶	major cardiac surgery	mortality	30 days	Europe	2287	123	0.8177	Yes	2.649434572
	Osnabrugge, 2014 ⁴⁷	AVR	in-hospital mortality	until discharge	North America	4107	119	0.71	Yes	- 32.14862682
	Osnabrugge, 2014 ⁴⁷	AVR +/- CABG	in-hospital mortality	until discharge	North America	3480	143	0.72	Yes	- 28.91760905
	Osnabrugge, 2014 ⁴⁷	MVRepair	in-hospital mortality	until discharge	North America	1059	13	0.82	Yes	3.392568659
	Osnabrugge, 2014 ⁴⁷	MVR	in-hospital mortality	until discharge	North America	1071	59	0.78	Yes	- 9.531502423
	Rabbani, 2014 ⁴⁸	valve replacement surgery	mortality	30 days	Asia	576	28	0.816	Yes	2.100161551
	Rabbani, 2014 ⁴⁸	MVR	mortality	30 days	Asia	247	7	0.898	Yes	28.59450727
	Rabbani, 2014 ⁴⁸	AVR	mortality	30 days	Asia	137	4	0.747	Yes	- 20.19386107
	Rabbani, 2014 ⁴⁸	DVR	mortality	30 days	Asia	86	2	0.637	Yes	- 55.73505654
	Rabbani, 2014 ⁴⁸	MVR +/- CABG	mortality	30 days	Asia	57	11	0.773	Yes	- 11.79321486
	Rabbani, 2014 ⁴⁸	AVR +/- CABG	mortality	30 days	Asia	49	4	0.521	Yes	- 93.21486268
	Spiliopoulos, 2014 ⁸⁷	AVR +/- CABG	perioperative mortality	30 days	Europe	222	14	0.77	Yes	- 12.76252019
	Spiliopoulos, 2014 ⁸⁷	AVR +/- CABG	late mortality	beyond 30 days	Europe	202	21	0.718	Yes	-29.5638126
	Wang, 2014 ⁸⁸	valve surgery	in-hospital mortality	until discharge	Asia	11170	226	0.72	Yes	- 28.91760905
	Wang, 2014 ⁸⁸	isolated non-CABG surgery	in-hospital mortality	until discharge	Asia	3696	NR	0.76	Yes	- 15.99353796
	Wang, 2014 ⁸⁸	2 procedures	in-hospital mortality	until discharge	Asia	5006	NR	0.67	Yes	-45.0726979

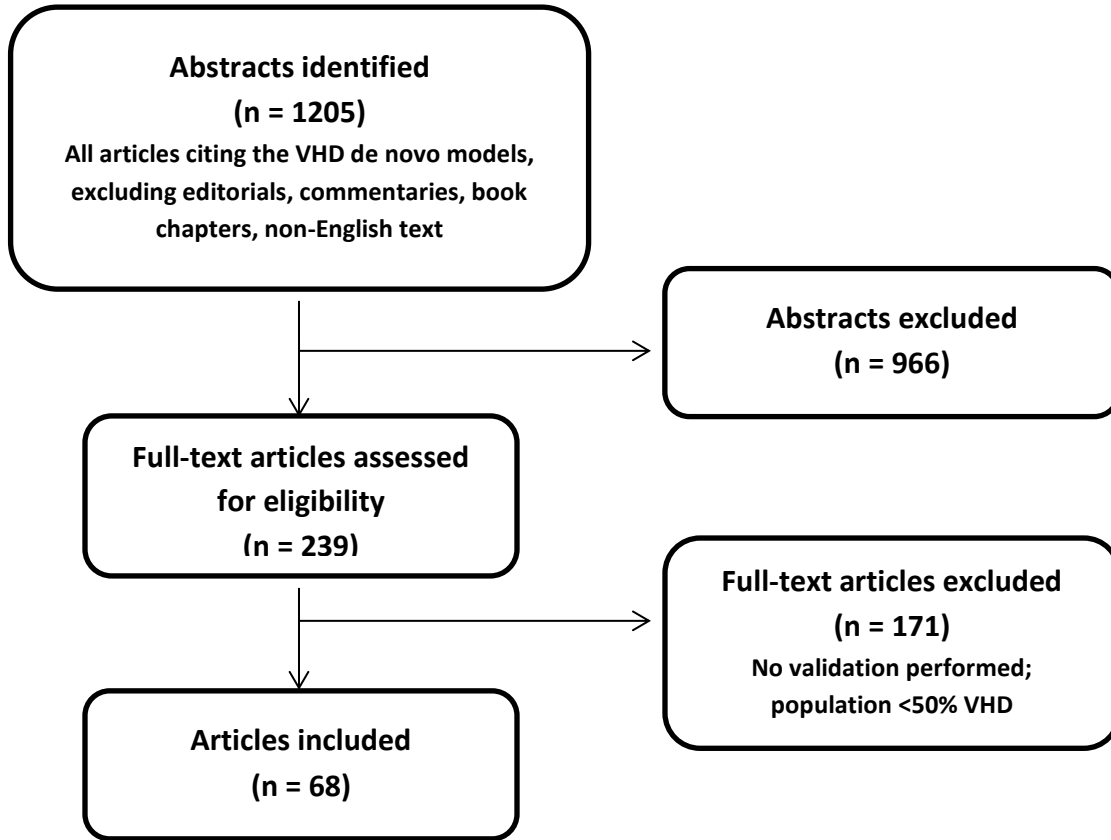
<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
	Wang, 2014 ⁸⁸	3+ procedures	in-hospital mortality	until discharge	Asia	2468	NR	0.73	Yes	- 25.68659128
	Wendt, 2014 ⁴⁹	AVR or TAVR	mortality	30 days	Europe	1512	95	0.712	Yes	- 31.50242326
	Wendt, 2014 ⁴⁹	TAVR (transfemoral)	mortality	30 days	Europe	291	34	0.554	Yes	- 82.55250404
	Wendt, 2014 ⁴⁹	TAVR (transapical)	mortality	30 days	Europe	155	12	0.837	Yes	8.885298869
	Debonnaire, 2015 ¹⁸	TAVR	all-cause mortality	1 year	Europe	471	80	0.633	Yes	- 57.02746365
	Holinski, 2015 ⁵²	repeat AVR	mortality	30 days	Europe	78	8	0.86	Yes	16.31663974
	Moscarelli, 2015 ⁸⁹	minimally invasive MV surgery +/- TVR	in-hospital mortality	until discharge	Europe	1609	28	0.846	Yes	11.79321486
	Poullis, 2015 ⁹⁰	AVR	in-hospital mortality	until discharge	Europe	814	NR	NR	Yes	NA
	Poullis, 2015 ⁹⁰	MVR	in-hospital mortality	until discharge	Europe	340	NR	NR	Yes	NA
	Poullis, 2015 ⁹⁰	AVR +/- CABG	in-hospital mortality	until discharge	Europe	517	NR	NR	Yes	NA
	Silaschi, 2015 ⁵³	TAVR (transfemoral or transapical)	mortality	30 days	Europe	457	44	0.54	Yes	- 87.07592892
	Silva, 2015 ⁵⁴	TAVR	mortality	30 days	South America	418	38	0.54	Yes	- 87.07592892
	Tralhao, 2015 ⁵⁶	AVR	operative mortality	30 days	Europe	106	6	0.792	Yes	- 5.654281099
	Wang, 2015 ⁵⁸	AVR	operative mortality	30 days	Australia	620	18	0.711	Yes	- 31.82552504
	Wang, 2015 ⁵⁹	AVR	morbidity/mortality	30 days	Australia	620	115	0.649	Yes	- 51.85783522
	Halkin, 2016 ⁶²	TAVR	all-cause mortality	30 days	Asia	1327	45	0.70	No	- 35.37964459
	Kortlandt, 2016 ⁶³	MVR	periprocedural mortality	30 days	Europe	136	5	0.54	Yes	- 87.07592892
	Patrat-Delon, 2016 ⁹¹	cardiac surgery for acute	in-hospital mortality	until discharge	Europe	149	32	0.78	Yes	- 9.531502423

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
		infective endocarditis								
	Rosa, 2016 ⁶⁵	TAVR	mortality	30 days	South America	59	8	0.77	Yes	- 12.76252019
	Wang, 2016 ³⁶	AVR/CABG	operative mortality	30 days	Australia	450	29	0.669	Yes	- 45.39579968
	Wang, 2016 ⁶⁶	valve surgery	in-hospital mortality	until discharge	Asia	12412	260	0.704	Yes	- 34.08723748
	Yamaoka, 2016 ⁶⁷	AVR +/- CABG	operative mortality	30 days	Asia	406	14	0.704	Yes	- 34.08723748
	Allyn, 2017 ⁹²	elective cardiac surgery with CPB	post-operative mortality	until discharge	Europe	6520	411	0.737	No	- 23.42487884
	Bomberg, 2017 ⁹³	cardiac surgery	mortality	30 days	Europe	856	27	0.74	No	- 22.45557351
	Bomberg, 2017 ⁹³	cardiac surgery	mortality	6 months	Europe	809	49	0.76	No	- 15.99353796
	Bomberg, 2017 ⁹³	cardiac surgery	mortality	2 years	Europe	809	84	0.74	No	- 22.45557351
	Kalender, 2017 ⁷²	AVR	mortality	until discharge	Asia	35	6	0.603	Yes	- 66.72051696
	Kar, 2017 ⁹⁴	valve surgery +/- CABG	mortality	until discharge	Asia	911	52	0.76	Yes	- 15.99353796
	Kar, 2017 ⁹⁴	valve surgery	mortality	until discharge	Asia	427	18	0.83	Yes	- 6.62358643
	Kar, 2017 ⁹⁴	valve surgery +/- CABG	mortality	until discharge	Asia	49	5	0.78	Yes	- 9.531502423
	Mateos-Pañero, 2017 ⁹⁵	valve surgery +/- CABG	mortality	until discharge	Europe	866	53	0.861	Yes	- 16.63974152
	Mateos-Pañero, 2017 ⁹⁵	valve surgery	mortality	until discharge	Europe	427	NR	0.767	Yes	- 13.73182553
	Mateos-Pañero, 2017 ⁹⁵	valve surgery +/- CABG	mortality	until discharge	Europe	119	NR	0.954	Yes	- 46.68820679
	Schmid, 2017 ⁷⁰	TAVR	all-cause mortality	1 year	Europe	74	10	0.669	No	- 45.39579968
	Schmid, 2017 ⁷⁰	TAVR	all-cause mortality	2 years	Europe	74	18	0.552	No	- 83.19870759
	Wang, 2017 ³⁷	MVR or MVRepair	operative mortality	30 days	Australia	407	10	0.817	Yes	- 2.423263328

<i>De novo</i>	<i>Validation</i>									
Model	Author, Year	Index Condition	Outcome	Timeframe	Continent	Sample Size	Number of Events	C-statistic	Calibration Reported?	Change in Discrimination (%)
NY Operative Mortality Risk Score ²⁸	Hannan, 2013 ²⁸	isolated valve surgery	in-hospital/30-day mortality	30 days	North America	12354	NR	NR	No	NA
	Jin, 2013 ⁹⁶	isolated valve surgery	in-hospital/30-day mortality	30 days	Europe	4021	105	0.777	Yes	- 1.423487544
	Wang, 2016 ⁶⁶	isolated valve surgery	in-hospital mortality	hospitalization period	Asia	5152	84	0.683	Yes	- 34.87544484
<i>Multiple Valve</i>										
AM Preop ³¹	Rankin, 2013 ³¹	AV + MV surgery	operative mortality	30 days	North America	NR	NR	0.71	Yes	NA
MT Preop ³¹	Rankin, 2013 ³¹	AV + MV surgery	operative mortality	30 days	North America	NR	NR	0.722	Yes	NA
AMT Preop ³¹	Rankin, 2013 ³¹	AV + MV surgery	operative mortality	30 days	North America	NR	NR	0.702	Yes	NA
AM Preop + Intraop ³¹	Rankin, 2013 ³¹	AV + MV surgery	operative mortality	30 days	North America	NR	NR	0.714	Yes	NA
MT Preop + Intraop ³¹	Rankin, 2013 ³¹	AV + MV surgery	operative mortality	30 days	North America	NR	NR	0.727	Yes	NA
AMT Preop + Intraop ³¹	Rankin, 2013 ³¹	AV + MV surgery	operative mortality	30 days	North America	NR	NR	0.706	Yes	NA

* 'Isolated Valve' indicates a single valve procedure; 'Multiple Valve' indicates intervention to > 1 valve; AVR indicates aortic valve surgery (repair or replacement); HL, Hosmer-Lemeshow; MVR, mitral valve surgery (repair or replacement); NR, not reported; NA, not applicable; CABG, coronary artery bypass grafting; TAVR, transcatheter aortic valve replacement; TA-AVI, transapical aortic valve implantation; AEs, adverse events; TVR, tricuspid valve surgery (repair or replacement); DVR, double valve surgery (repair or replacement); MACE, major adverse cardiovascular events.

Figure S1. Literature Search Overview.



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