Table 1: List of string text variables used for exclusion of Primary / DMR

If the string text variable listed was present in the study report or conclusion, the study was excluded from analysis as ‘primary / DMR’.

Mitral valve prolapse	Ruptured chordae	Systolic anterior motion of the anterior mitral leaflet
MVP	Flail leaflet	Mitral leaflet SAM
MV prolapse	Flail chord	Mitral leaflet systolic anterior motion
Posterior mitral leaflet prolapse	Flail chordae	Anterior mitral leaflet motion in systole
Anterior mitral leaflet prolapse	Barlow	Systolic anterior mitral leaflet motion
Partial mitral valve prolapse	Perforated mitral	
Barlow’s syndrome	Leaflet perforation	
Mitral prolapse	Mitral valve endocarditis	
Anterior leaflet prolapse	Mitral vegetation	
Posterior leaflet prolapse	Mitral valve vegetation	
Bi-leaflet prolapse	Vege on the mitral valve	
Prolapse of both mitral leaflets	Vegetation on the mitral valve	
Prolapsed mitral leaflets	Mitral valve mass	
Mitral valve leaflet prolapse	Mitral mass	
Mitral valve flail	Mitral systolic anterior motion	
Mitral valve partial flail	Mitral SAM	
Ruptured chord	Anterior leaflet systolic motion	

Table 2: Echocardiographic quantitative cut-points used for categorisation of chamber size and LV function

Parameter	**Definition**
Dilated LA, moderate	LAVi >41ml/m^2
Dilated LA, severe	LAVi >48ml/m^2
Dilated LV, moderate	LVEDV >175ml (M) / >109ml (F) or LVEDVi ≥90ml (M) / ≥71ml (F)
Dilated LV, severe	LVEDV >200ml (M) / >130ml (F) or LVEDVi >100 ml (M) / ≥ 80ml (F)
LV EF	Simpson's Biplane or echocardiologist judgement

From: Lang et al. Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the ASE and the EACVI. JASE (2015)

LA = left atrium, LAVi = LAV indexed to body surface area (BSA), LVEDV = left ventricular end-diastolic volume, LVEDVi = LVEDV indexed to BSA, LV EF = left ventricular ejection fraction

Table 3: Log-Rank comparison of seven m-CDS Models for Predicting All-Cause Mortality in Derivation cohort (n=5000)
As all p values are significant, larger χ^2 = further away from null hypothesis

CDS Model	Log Rank χ^2 (p value)
1	640 (<0.001)
2	650 (<0.001)
3	432 (<0.001)
4	641 (<0.001)
5	503 (<0.001)
6	432 (<0.001)
7	293 (<0.001)

Table 4: Demographic and echocardiographic data; Derivation and Validation Cohorts

	Derivation cohort (n = 5000)	Validation cohort (n = 12 658)	P value
Age	76 ± 6	79 ± 14	<0.001
Male	2430 (49)	6116 (48)	NS
Female	2570 (51)	6542 (52)	NS
BMI	26 ± 6	26 ± 6	NS
AF	1571 (31)	3928 (31)	NS
LAVi	40 ± 32	47 ± 19	<0.001
LVEDV	107 ± 51	108 ± 53	NS
LVEF	50 ± 16	52 ± 18	<0.001
PASP	39 ± 13	43 ± 11	<0.001
≥Moderate TR	2204 (13)	7172 (57)	<0.001
Moderate MR	3959 (79)	10491 (83)	<0.001
Severe MR	1041 (21)	2167 (17)	<0.001

BMI: body mass index, AF: atrial fibrillation, LAVi: left atrial volume indexed LVEDV: left ventricular end diastolic volume, LVEF: left ventricular ejection Fraction, PASP: pulmonary artery systolic pressure, TR: tricuspid regurgitation, MR: mitral regurgitation

Table 5: rates of each CDS component within each CDS Stage, Validation Cohort

	Validation Cohort (n = 12658)	**0 - Control n=1046 (8%)**	**1 - LA Damage n=3416 (27%)**	**2 - LV Damage n=3352 (26%)**	**3 - RV Damage n=1551 (12%)**	**4 - PH n=3293 (26%)**
LA Damage	10584 (84)	0	3416 (100)	2708 (81)	1484 (96)	2976 (90)
LV Damage	6017 (48)	0	0	3352 (100)	875 (56)	1790 (54)
RV Damage	2496 (20)	0	0	0	1551 (100)	945 (29)
PH	3293 (26)	0	0	0	0	3293 (100)

Table 6: Survival Outcomes by CDS Stage, Validation Cohort

CDS Stage	Validation Cohort (n = 12658)	0 - Control n=1046 (8%)	1 - LA Damage n=3416 (27%)	2 - LV Damage n=3352 (26%)	3 - RV Damage n=1551 (12%)	4 - PH n=3293 (26%)
All-cause Death	7257 (57)	359 (34)	1596 (47)	1957 (58)	950 (61)	2395 (73)
CV Death	3330 (26)	117 (11)	621 (18)	930 (28)	474 (31)	1188 (36)
Survival (months)	31 (54)	49 (62)	42 (61)	30 (50)	28 (57)	18 (40)
Survival (years)	2.6 (5)	4.1 (5)	3.5 (5)	2.5 (4)	2.3 (5)	1.5 (3)
1 year All-cause Mortality	2984 (24)	106 (10)	403 (12)	816 (24)	386 (25)	1273 (39)
5 year All-cause Mortality	3330 (26)	117 (11)	621 (18)	930 (28)	474 (31)	1188 (36)
1 year CV Mortality	1526 (12)	34 (3)	161 (5)	433 (13)	216 (14)	682 (21)
5 year CV Mortality	2835 (22)	89 (9)	459 (13)	800 (24)	406 (26)	1081 (33)

Table 7: Univariate model: hazard ratios with 95% CIs, for all-cause and cardiovascular mortality

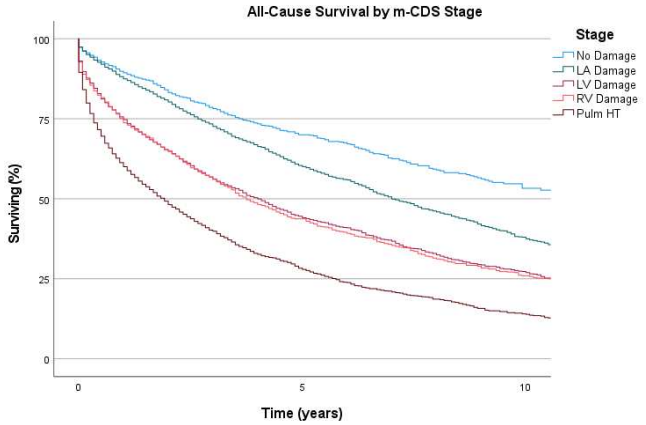
	All-Cause Mortality		Cardiovascular Mortality	
	HR (95% CI)	**P value**	**HR (95% CI)**	**P value**
Age (vs <60 years)				
60-70 years	1.6 (1.4 – 1.8)		1.4 (1.2 – 1.7)	
70-80 years	2.6 (2.3 – 2.9)	<0.001 for all	2.2 (1.9 – 2.6)	<0.001 for all
>80 years	4.3 (3.9 – 4.8)		3.9 (3.4 – 4.6)	
Female (vs male)	0.8 (0.8 – 0.8)	<0.001	0.8 (0.8 – 0.9)	0.001
Severe MR (vs mod MR)	1.7 (1.6 – 1.7)	<0.001	2.0 (1.8 – 2.2)	<0.001
AF (vs no AF)	1.1 (1.1 – 1.2)	<0.001	1.1 (1.0 – 1.2)	0.001
≥Mod TR	1.0 (0.9 – 1.0)	NS	1.0 (0.9 – 1.0)	NS
Reduced EF	1.9 (1.8 – 2.6)	<0.001	2.0 (1.9 – 2.1)	<0.001
CDS Stage (vs Stage 0)				
Stage 1	1.4 (1.3 – 1.6)		1.7 (1.4 – 2.1)	
Stage 2	2.2 (2.0 – 2.5)	<0.001 for all	3.2 (2.6 – 3.8)	<0.001 for all
Stage 3	2.2 (2.0 – 2.5)		3.4 (2.8 – 4.2)	
Stage 4	3.5 (3.2 – 4.0)		5.2 (4.3 – 6.3)	

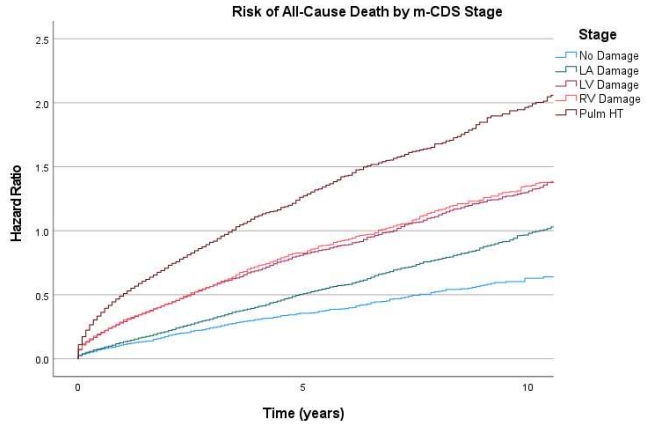
Table 8: CDS Models studied in MR populations and aortic-CDS

	Stage 1	**Stage 2**	**Stage 3**	**Stage 4**
Moonen et al (2024)	LA >41ml/m^2 AF / AFlu	≥moderate RV dilatation ≥moderate RV dysfunction	LVEDVi >90ml/m^2 (man) or 71ml/m^2 (women) LV EF <52% (men) or <54% (women)	SPAP >50mmHg
Genereux et al[4] (2017)	LV mass index >95g/m^2 (women) or >115m/m^2 (men) E/e' >14 LVEF <50%	LAVi >34ml/m^2 AF ≥moderate MR	SPAP >60mmHg ≥moderate TR	≥moderate RV dysfunction
Cavalcante et al[10] (2023)	LAVi >34ml/m^2 LAD >45mm AF	LVEF <35% LVEDD >75mm	PASP >45mmHg	≥moderate RV dysfunction (FAC <28% / FWS <15%) ≥moderate TR
Singh et al[9] (2022)	LVEDD >57mm LVEF <50%	LAVi >34ml/m^2 History of AF	SPAP >40mmHg TR Grade >2	TAPSE <17mm
Van Wijngaarden et al[12] (2023)	LVESD >40mm LVESVi >30ml/m^2 LVEF <60%	LAD >55mm History of AF	SPAP >50mmHg TR grade >2	TAPSE <17mm
Stolz et al[11] (2023)	LVEF <50% LVEDV >159ml	LAVi >34ml/m2 AF / AFlu	TR grade >2 SPAP >65mmHg	RVPAc <0.274mm/mmHg
Bernard et al[8] (2022)	LAVi >40ml/m^2 LVEDD >55mm LVESD >35mm LVEF <60%	LAVi >60ml/m^2 LVEDD >60mm LVESD >40mm LVEF <50% AF	TR grade >2 SPAP >50mmHg	≥moderate RV dysfunction

LA: left atrium, LAVi: indexed left atrial volume, AF: atrial fibrillation, RV: right ventricular, LV EF: left ventricular ejection fraction, LVEDVi: indexed left ventricular end-diastolic volume , SPAP: systolic pulmonary artery pressure, LVEDD: left ventricular end diastolic diameter, LVESD: left ventricular end systolic diameter, TR: tricuspid regurgitation, TAPSE: tricuspid annular plane systolic excursion, MR: mitral regurgitation, FAC: fractional area change, FWS: free wall strain, RVPAc: right ventricular-pulmonary artery coupling.

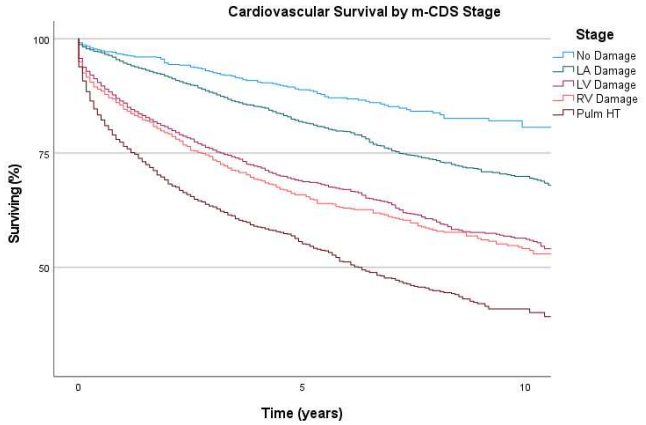
Figure 1: (a) KM survival curve and (b) hazard plot for *all-cause* mortality for *validation cohort* (n = 12 658) by m-CDS.





# at risk	Baseline	1 year	5 years	10 years
Stage 0	1046	937	440	109
Stage 1	3416	2952	1250	365
Stage 2	3352	2486	863	233
Stage 3	1551	1130	425	148
Stage 4	3293	1969	550	106

Figure 1: (c) KM survival curve and (d) hazard plot for *cardiovascular* mortality for *validation cohort* (n = 12 658) by m-CDS.



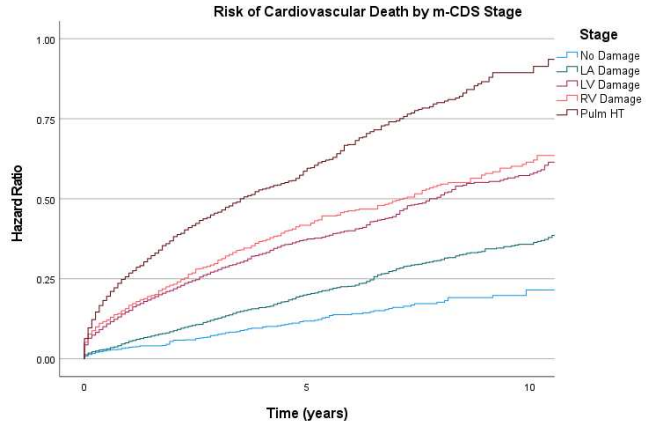
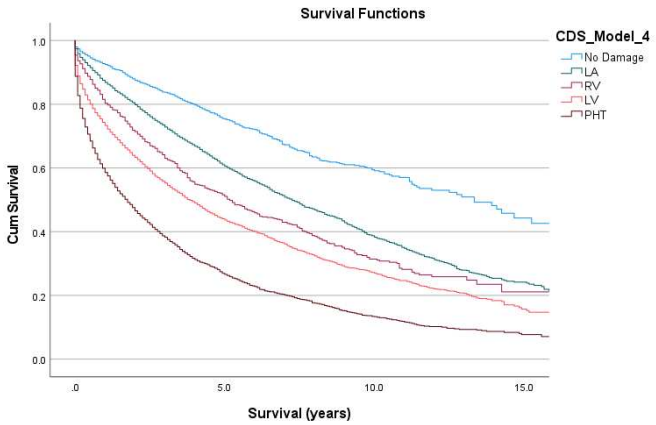
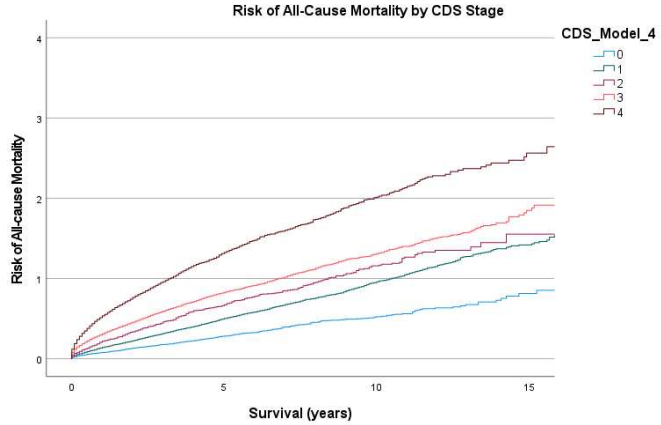


Figure 2: (a) KM survival curve and (b) hazard plot for *all-cause* mortality for *full cohort* (n = 17 658) by m-CDS.





	Baseline	1 year	5 years	10 years
# at risk	19397	14596	5534	1532

Figure 2: (c) KM survival curve and (d) hazard plot for *cardiovascular* mortality for *full cohort* (n = 17 658) by m-CDS