Surveillance Stress Testing After Percutaneous Intervention for Patients with Multivessel or Left Main Coronary Disease

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Disclosure

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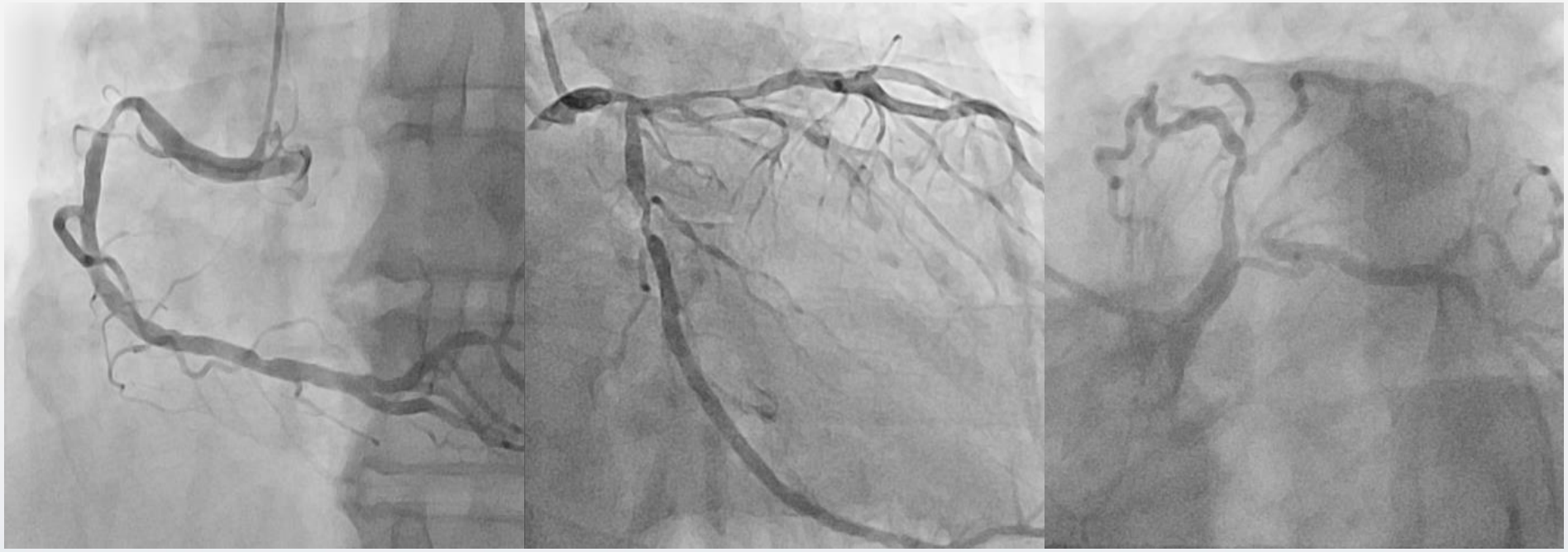
- The presenter has no conflict of interest

Background

- PCI has been widely performed for patients with multivessel or left main coronary artery disease in the daily clinical practice



Background

- However, the incidence of MACE remains substantial after PCI for multivessel (MVD) or left main (LM) coronary disease during follow-up
- Increasing clinical unmet needs for optimal follow-up strategy

Objective

- Assessment of the risk of MACE differed between
  - “Routine functional-testing” vs “Standard-care alone”
    - in Patients with MVD or LM who underwent PCI
    - Contemporary data from the POST-PCI study

Methods

- Study Design and Patient Population
  - **POST-PCI Trial** (D.W. Park et al, NEJM, 2022): multicenter, pragmatic, and randomized trial conducted at 11 hospitals in Korea (2017-2019)
  - A total of 1706 patients with *at least one high-risk anatomical or clinical characteristic* who had undergone PCI → randomized to routine functional testing group and standard care group

Methods

- Study Design and Patient Population
  - *high-risk patients with MVD or LM* were included
  - Sub-cohorts
    - **Multivessel disease (MVD) group**
    - **Left main disease (LM) group**

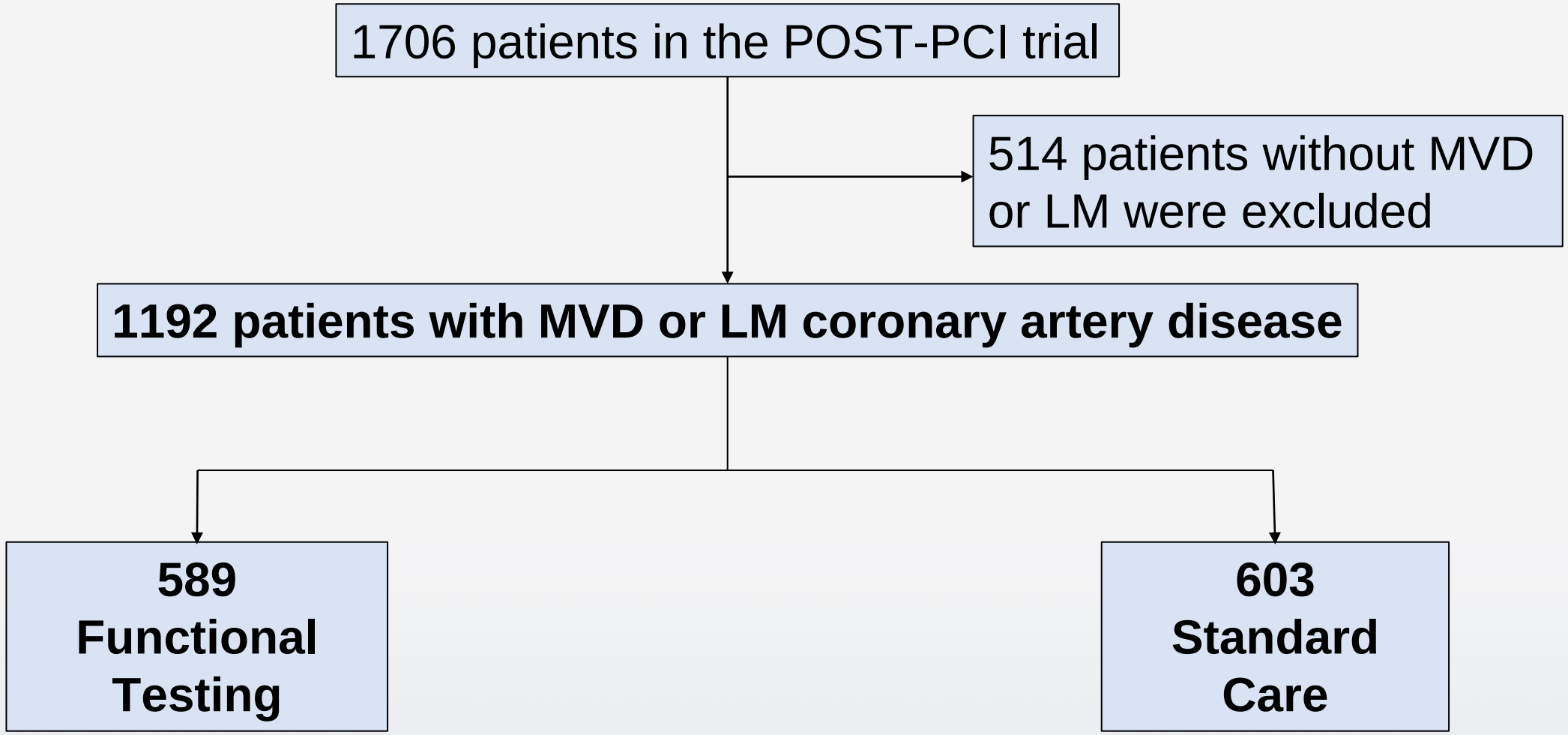
Methods

- Trial processes and Follow-up
  - **In the routine functional testing group**: exercise ECG, SPECT, or stress echocardiography at 12 months after randomization
  - **In the standard care group**: stress testing was only performed when clinically indicated during follow-up.

Methods

- Study Endpoints and Follow-up
  - **Primary endpoint**: a composite of MACE (Death from any cause + MI + Hospitalization for UA) at 2 years after randomization
  - **Secondary endpoint**: including each component of the primary composite endpoint and invasive coronary angiography (CAG), and repeat revascularization (RR)

Results


1706 patients in the POST-PCI trial
514 patients without MVD or LM were excluded
1192 patients with MVD or LM coronary artery disease
589 Functional Testing
603 Standard Care

Baseline characteristics	Functional-Testing (n=589)	Standard-Care (n=603)
Age — yrs	65.3±9.9	65.2±10.0
Male sex — no. (%)	456 (77.4)	490 (81.3)
Body-mass index	24.9±2.9	25.0±3.2
Cardiac risk factors and comorbidities		
Hypertension — no. (%)	421 (71.5)	430 (71.3)
Diabetes — no. (%)	236 (40.1)	247 (41.0)
Dyslipidemia — no. (%)	511 (86.8)	535 (88.7)
Current smoker — no. (%)	154 (26.1)	168 (27.9)
Family history of premature CAD — no. (%)	37 (6.3)	35 (5.8)
Previous MI — no. (%)	31 (5.3)	41 (6.8)
Previous PCI — no. (%)	130 (22.1)	127 (21.1)
Previous CABG — no. (%)	19 (3.2)	18 (3.0)
History of cerebrovascular disease — no. (%)	36 (6.1)	52 (8.6)
History of peripheral artery disease — no. (%)	18 (3.1)	14 (2.3)
Atrial fibrillation or atrial flutter — no. (%)	18 (3.1)	11 (1.8)

Baseline characteristics	Functional-Testing (n=589)	Standard-Care (n=603)
Criteria for high risk after PCI — no. (%)		
High-risk anatomical characteristics		
Bifurcation disease	278 (47.2)	263 (43.6)
Ostial lesion	105 (17.8)	101 (16.7)
Chronic total occlusion	72 (12.2)	93 (15.4)
Restenotic lesion	46 (7.8)	57 (9.5)
Diffuse long lesion	364 (61.8)	372 (61.7)
Bypass graft disease	2 (0.3)	1 (0.2)
High-risk clinical characteristics		
Diabetes on insulin	24 (4.1)	31 (5.1)
Chronic renal failure	31 (5.3)	31 (5.1)
On dialysis	18 (3.1)	16 (2.7)
Enzyme-positive acute coronary syndrome	91 (15.4)	100 (16.6)

Baseline characteristics	Functional-Testing (n=589)	Standard-Care (n=603)
Clinical indication for index PCI — no. (%)		
Stable angina or silent ischemia	444 (75.4)	436 (72.3)
Unstable angina	54 (9.2)	67 (11.1)
NSTEMI	60 (10.2)	62 (10.3)
STEMI	31 (3.1)	38 (6.3)
Procedural characteristics		
Total no. of diseased lesions per patient	2.7±1.1	2.7±1.0
Total no. of treated lesions per patient	1.6±0.8	1.6±0.7
Total no. of stents per patient	2.2±1.1	2.2±1.3
Total stent length per patient — mm	64.5±35.0	65.6±36.1
Use of drug-eluting stents — no. (%)	575 (97.6)	582 (96.5)
Use of bioabsorbable scaffold — no. (%)	4 (0.7)	5 (0.8)
Use of drug-coated balloon — no. (%)	37 (6.3)	49 (8.1)
Intravascular ultrasound guidance — no. (%)	459 (77.9)	469 (77.8)
Fractional flow reserve assessed — no. (%)	255 (43.3)	257 (42.6)

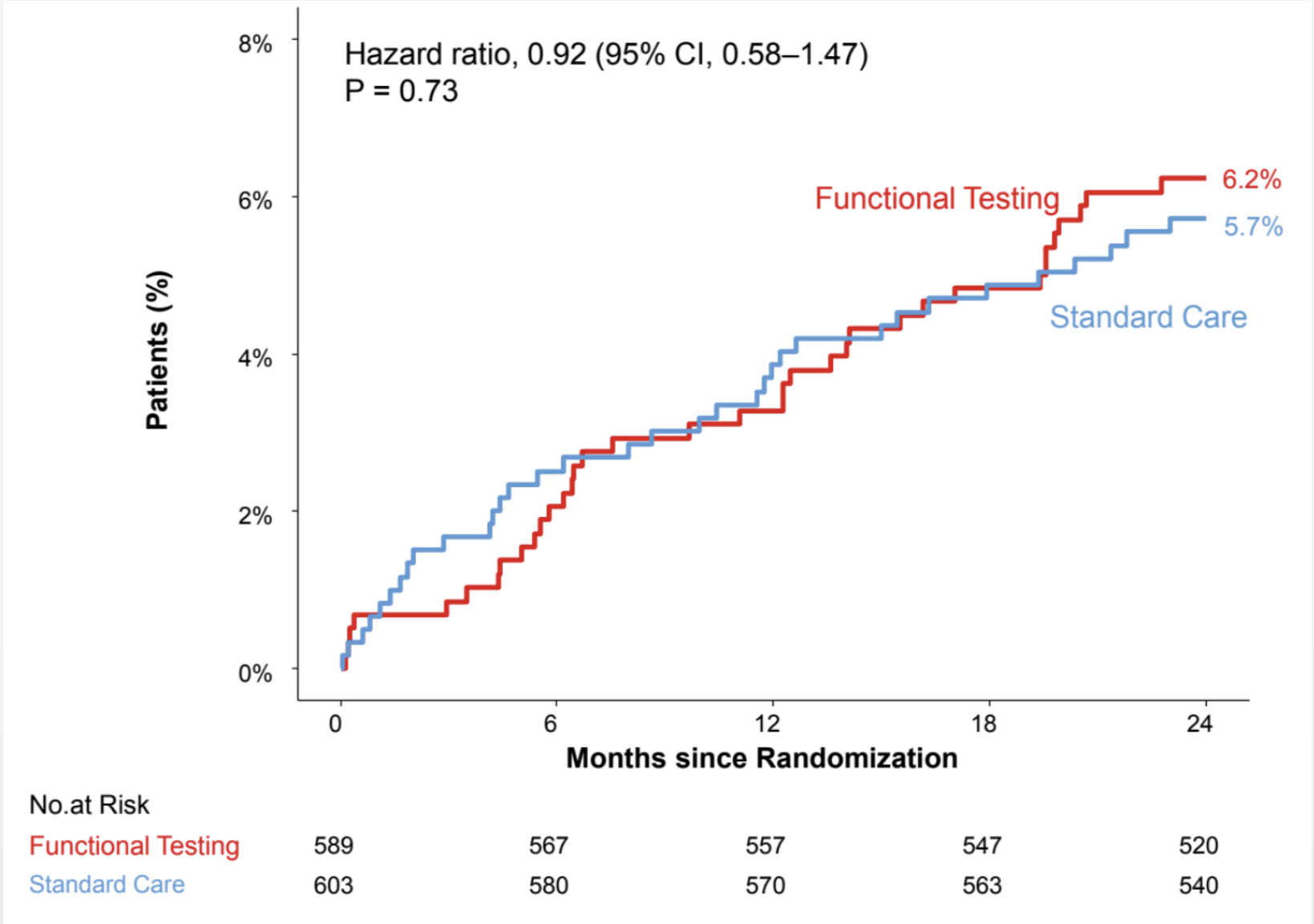
Clinical Endpoints	No. of Events (%) at 2 Years			
Endpoint	**Functional-Testing Group (N=589)**	**Standard-Care Group (N=603)**	**HR (95% CI)**	**P-value**
Primary endpoint*	**36 (6.2)**	**34 (5.7)**	1.09 (0.68–1.74)	0.73
Secondary endpoints				
Death from any cause	18 (3.1)	18 (3.0)	1.03 (0.53–1.97)	0.94
Myocardial infarction	2 (0.3)	7 (1.2)	0.29 (0.06–1.41)	0.13
Hospitalization for unstable angina	16 (2.8)	9 (1.5)	1.83 (0.81–4.13)	0.15

Primary endpoint: Death from any cause + Myocardial infarction + Hospitalization for unstable angina

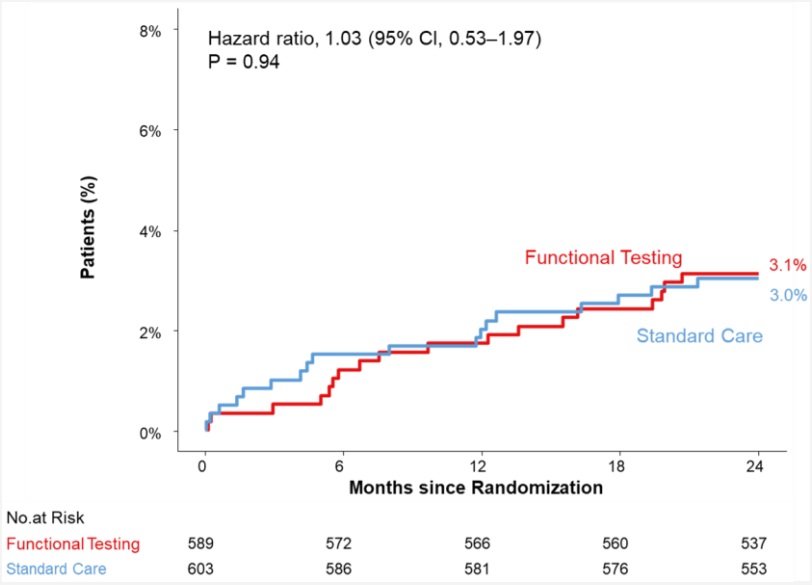
Clinical Endpoints	No. of Events (%) at 2 Years			
Endpoint	**Functional-Testing Group (N=589)**	**Standard-Care Group (N=603)**	**HR (95% CI)**	**P-value**
Death or myocardial infarction	20 (3.5)	25 (4.2)	0.82 (0.46–1.47)	0.50
Hospitalization				
Any reason	156 (27.3)	133 (22.6)	1.23 (0.97–1.54)	0.09
Cardiac reason	91 (16.0)	73 (12.5)	1.27 (0.94–1.73)	0.12
Noncardiac reason	65 (11.4)	60 (10.2)	1.13 (0.80–1.61)	0.50
Invasive coronary angiography	**76 (13.5)**	**56 (9.6)**	1.39 (0.98–1.96)	0.06
Repeat revascularization	**54 (9.6)**	**35 (6.0)**	1.59 (1.04–2.43)	0.03

	Multivessel disease (n=833)				Left main disease (n=359)				
	Functional Testing (n=408)	Standard Care (n=425)	Hazard Ratio (95% CI)	P-value	Functional Testing (n=181)	Standard Care (n=178)	Hazard Ratio (95% CI)	P-value	P value -for-interaction
Primary composite endpoint	**25 (6.2)**	**24 (5.7)**	**1.09 (0.62–1.90)**	**0.78**	**11 (6.2)**	**10 (5.7)**	**1.09 (0.46–2.56)**	**0.85**	**0.90**
Secondary endpoint									
Death from any cause	12 (3.0)	15 (3.6)	0.83 (0.39-1.77)	0.6	6 (3.4)	3 (1.7)	1.99 (0.50–7.94)	0.33	0.64
Myocardial infarction	1 (0.2)	4 (1.0)	0.26 (0.03-2.32)	0.23	1 (0.6)	3 (1.7)	0.33 (0.03–3.19)	0.34	0.78
Hospitalization for unstable angina	12 (3.0)	5 (1.2)	2.49 (0.88-7.09)	0.09	4 (2.3)	4 (2.3)	1.00 (0.25–3.98)	>0.99	0.40
Invasive coronary angiography	52 (13.2)	38 (9.3)	1.41 (0.93-2.15)	0.11	24 (14.0)	18 (10.4)	1.32 (0.72–2.43)	0.37	0.50
Repeat revascularization	32 (8.1)	22 (5.4)	1.51 (0.88-2.59)	0.14	22 (12.9)	13 (7.5)	1.73 (0.87–3.44)	0.12	0.69

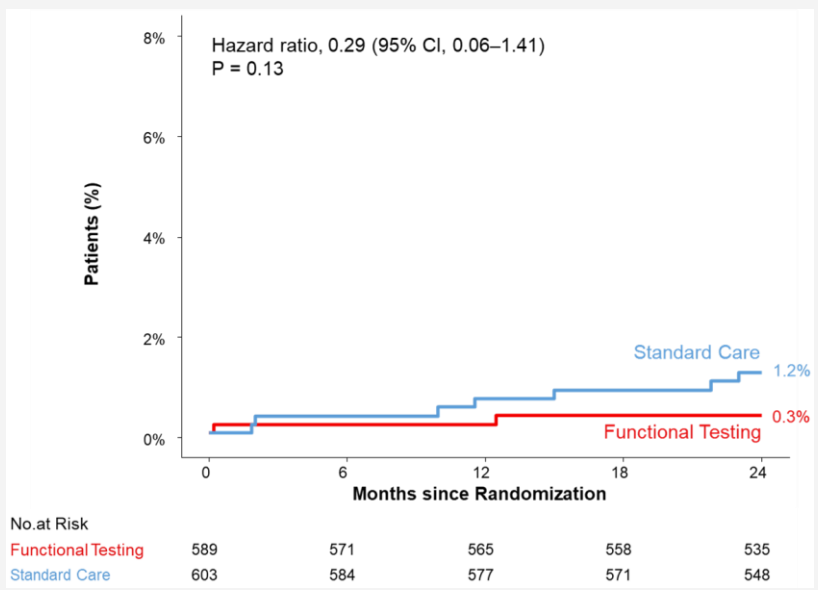
Primary composite endpoint



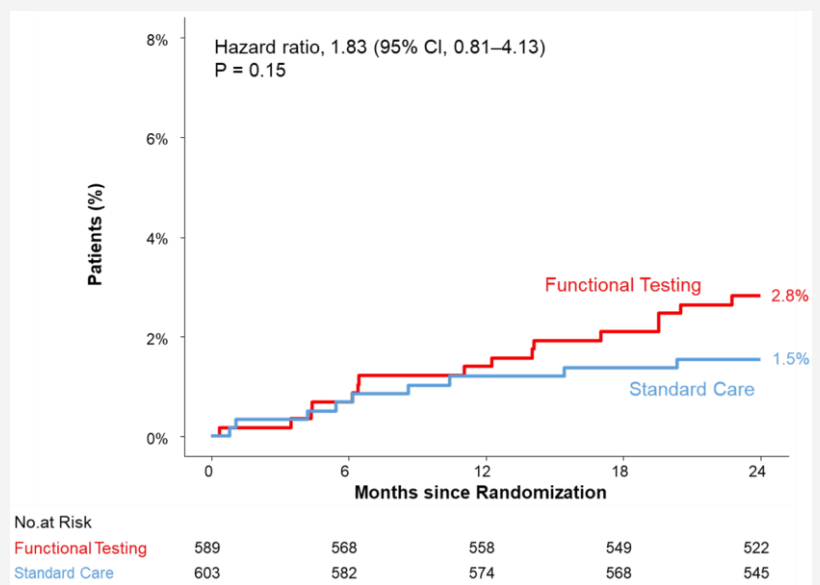
Each component of primary endpoint



Death from any cause

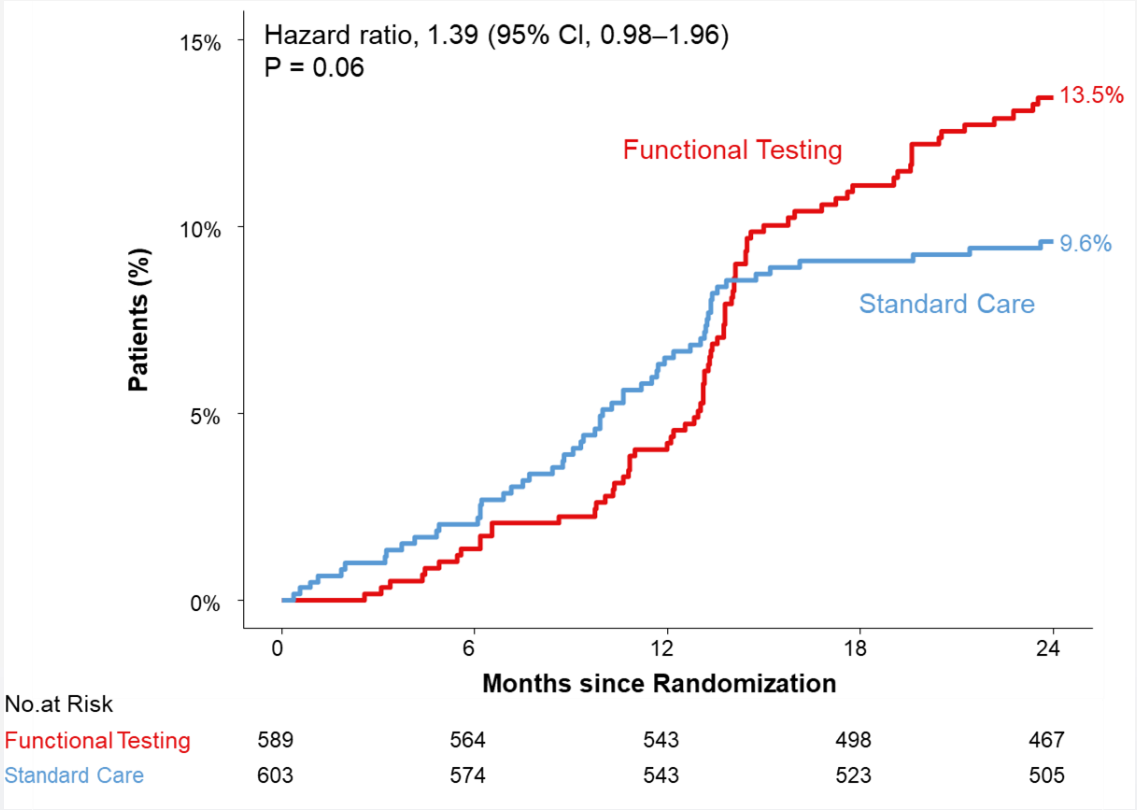


Myocardial infarction

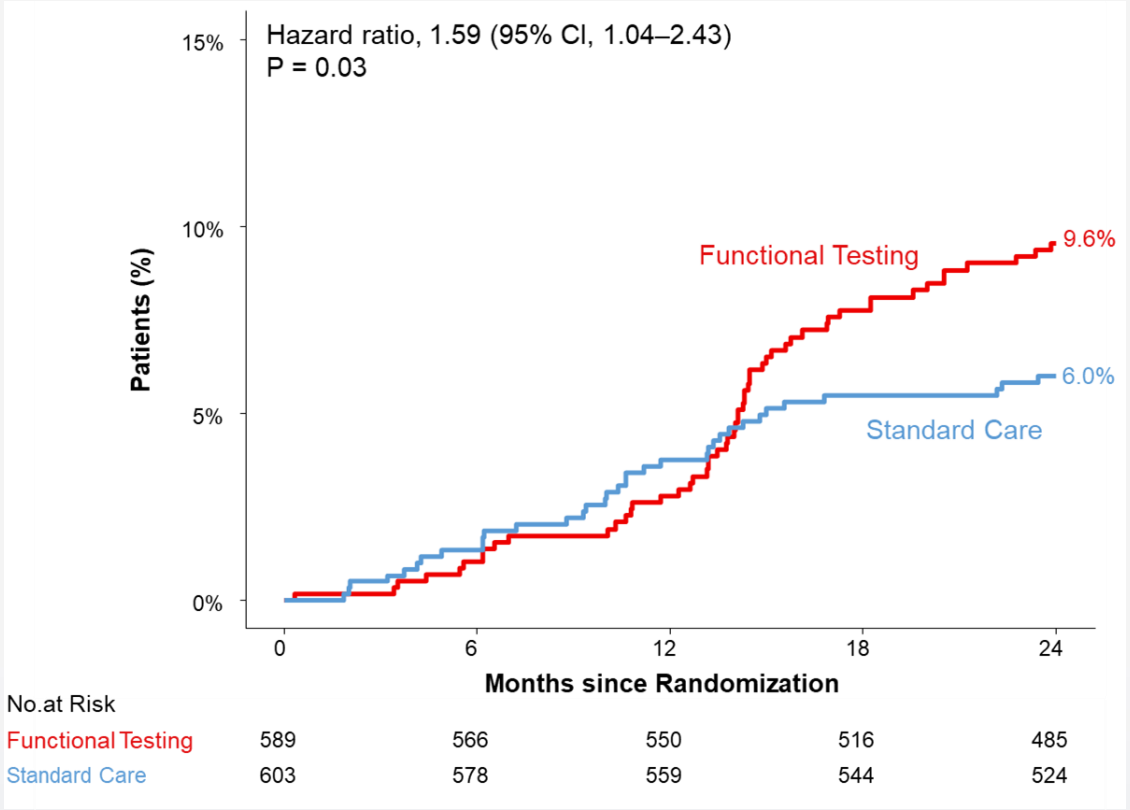


Hospitalization for UA

Invasive CAG & Repeat revascularization

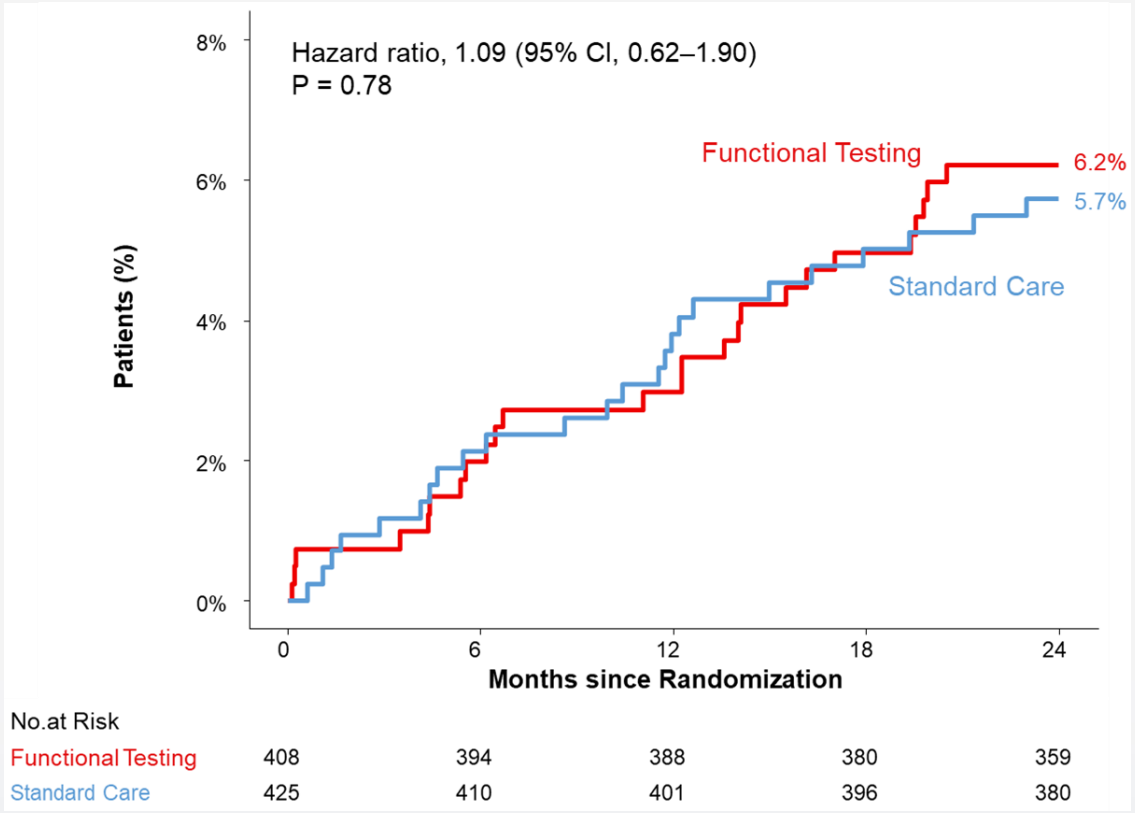


Invasive CAG

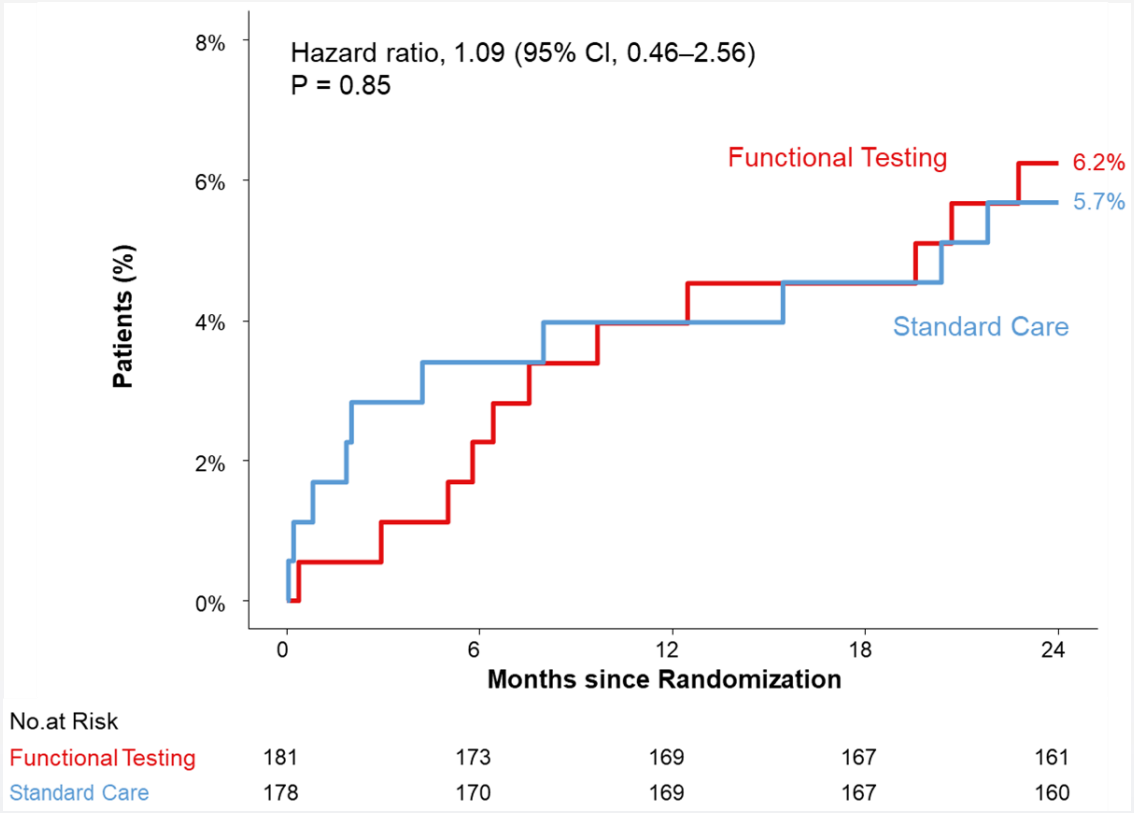


Repeat revascularization

Primary endpoint of Each sub-cohort

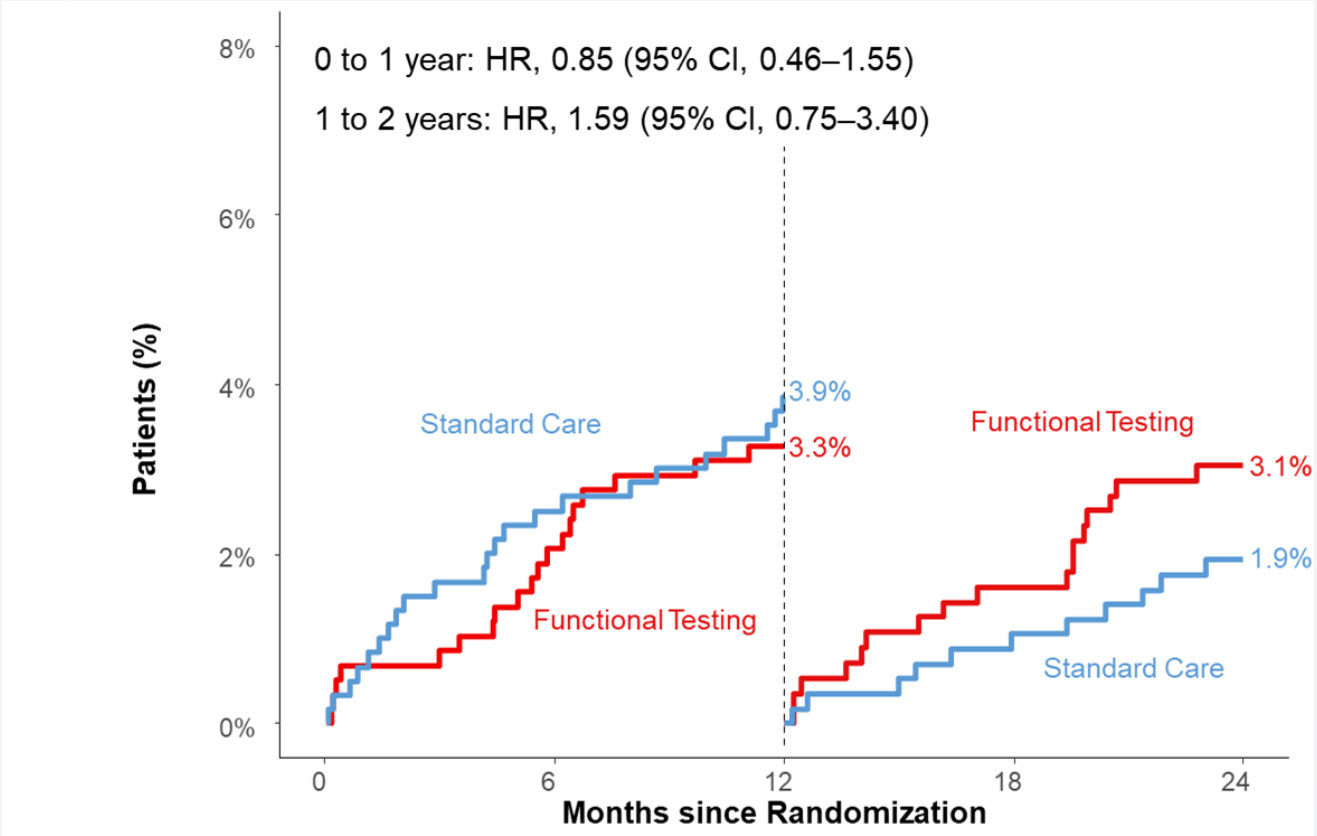


Primary composite endpoint in MVD group



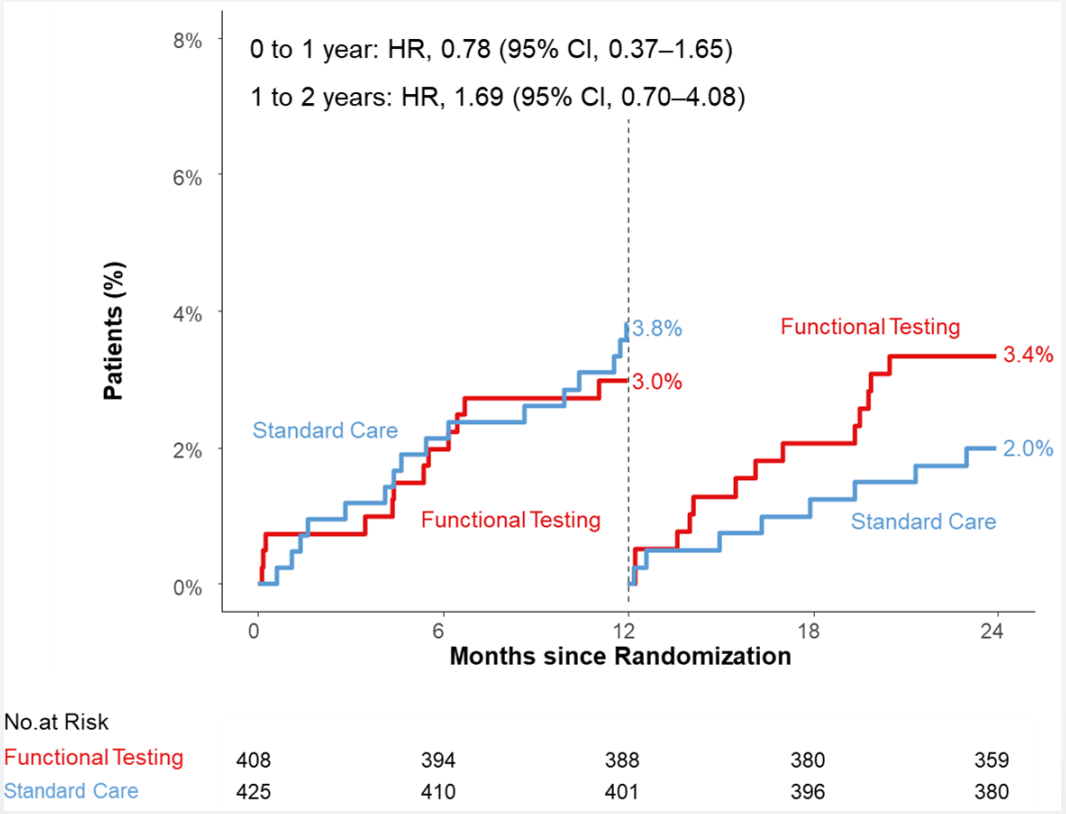
Primary composite endpoint in LM group

Landmark analysis of the primary endpoint

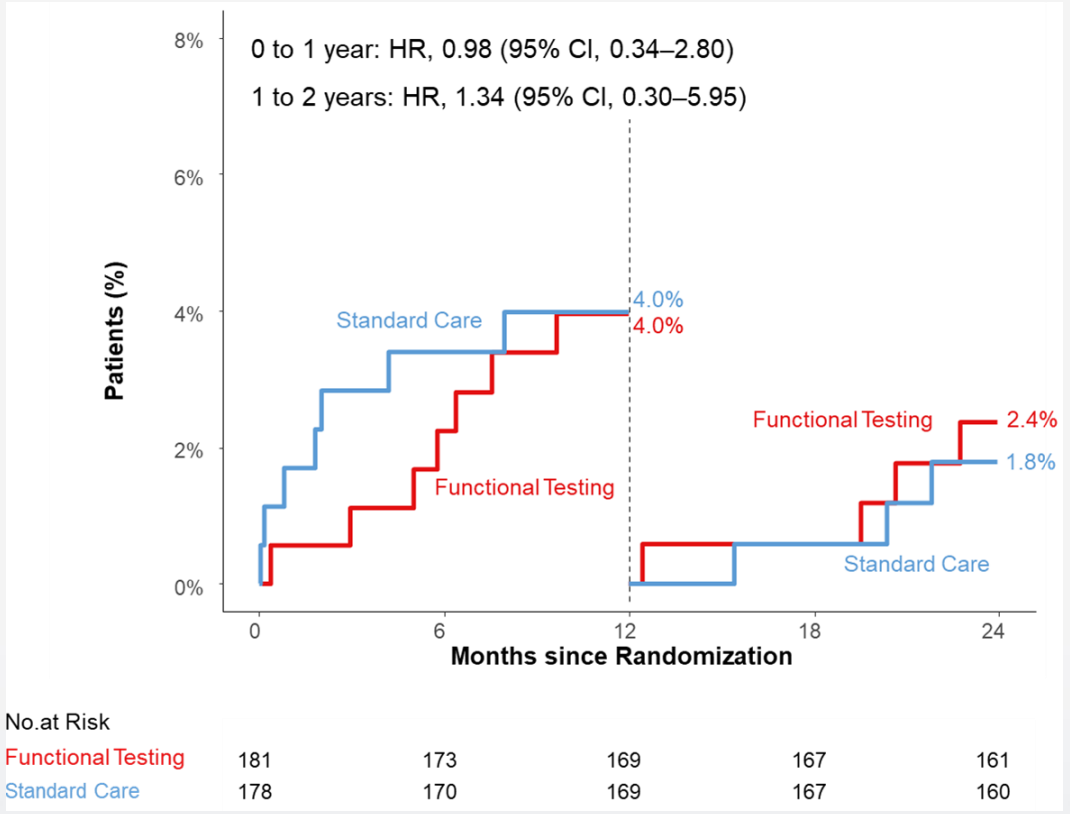


No.at Risk					
Functional Testing	589	567	557	547	520
Standard Care	603	580	570	563	540

Landmark analysis of the primary endpoint in each sub-cohort



MVD group



LM group

Conclusion

- In high-risk patients with MVD or LM who have undergone PCI, routine functional testing did not reduce the risk of primary composite outcome (Death, MI, or Hospitalization for UA) at 2 years
  - These findings → consistent in each cohort of MVD or LM group
- Routine functional testing after PCI for MVD or LM only increased the risk of invasive procedure