SUPPLEMENTAL MATERIAL

Misestimation of Coronary Lesions and Rectification by SYNTAX Score Feedback for Coronary Revascularization Appropriateness

1.1. Chinese Appropriate Use Criterion for Coronary Revascularization

Supplemental Table 1.1.1. Recommendations for patients with acute coronary syndromes

	Indication	Appropriate Use Score (1-9)
1	• STEMI • ≤12 hours from onset of symptoms • Revascularization of the culprit artery	A (9)
2	• STEMI • ≤12 hours from onset of symptoms • Revascularization of the non-culprit artery	I (3)
3	• STEMI • 12 to 24 hours from onset of symptoms • Severe HF, persistent ischemic symptoms, or hemodynamic or electrical instability present	A (8)
4	• STEMI • ≥12 hours from symptom onset • Asymptomatic • No hemodynamic instability and no electrical instability	I (3)
5	• STEMI with presumed successful treatment with fibrinolysis • Evidence of HF, recurrent ischemia, or unstable ventricular arrhythmias present • One-vessel CAD presumed to be the culprit artery	A (8)
6	• STEMI with presumed successful treatment with fibrinolysis • Asymptomatic, no HF or no recurrent ischemic symptoms, or no unstable ventricular arrhythmias • Normal LVEF • One-vessel CAD presumed to be the culprit artery	U (6)
7	• STEMI with presumed successful treatment with fibrinolysis • Asymptomatic, no HF, no recurrent ischemic symptoms, or no unstable ventricular arrhythmias at the time of presentation • Depressed LVEF • Three-vessel CAD • Elective/semi-elective revascularization	A (8)
8	• STEMI with successful treatment of the culprit artery by primary PCI or fibrinolysis	A (7)

	• Asymptomatic; no HF, no evidence of recurrent or provokable ischemia, or no unstable ventricular arrhythmias during index hospitalization • Normal LVEF • Revascularization A of a non-infarct-related artery during index hospitalization	
9	• STEMI or NSTEMI and successful PCI of culprit artery during index hospitalization • Symptoms of recurrent myocardial ischemia and/or high-risk findings on noninvasive stress testing performed after index hospitalization • Revascularization of ≥1 additional coronary arteries	A (8)
10	• UA/NSTEMI and high-risk features for short-term risk of death or nonfatal MI • Revascularization of the presumed culprit artery	A (9)
11	• UA/NSTEMI and high-risk features for short-term risk of death or nonfatal MI • Revascularization of multiple coronary arteries when the culprit artery cannot clearly be determined	A (8)
12	• Patients with acute myocardial infarction (STEMI or NSTEMI) • Evidence of cardiogenic shock • Revascularization of ≥1 coronary arteries	A (8)
13	• UA/NSTEMI and low-risk features (e g, TIMI score ≤2) for short-term risk of death or nonfatal MI • Revascularization of the presumed culprit artery	A (7)
14	• UA/NSTEMI and intermediate-risk features (e g, TIMI score 3-4) for short-term risk of death or nonfatal MI • Revascularization of the presumed culprit artery	A (7)

A: appropriate; U: uncertain; I: inappropriate; LVEF: left ventricular ejection fraction; UA: unstable angina; NSTEMI: non-ST-segment elevation myocardial infarction; TIMI: thrombolysis in myocardial infarction study; PCI: percutaneous coronary intervention.

Supplemental Table 1.1.2. Recommendations for patients without prior bypass surgery

	Indication	Appropriate Use Score (1-9)		
		CCS		
		Asymptomatic	I or II	III or IV
15	• One- or 2-vessel CAD without involvement of proximal LAD • No noninvasive testing performed • Receiving no or one course of anti-ischemic medical therapy	I (1)	U (4)	U (6)
16	• One- or 2-vessel CAD without involvement of proximal LAD • No noninvasive testing performed • Receiving two or three courses of anti-ischemic medical therapy	I (3)	U (5)	A (7)
17	• One- or 2-vessel CAD without involvement of proximal LAD • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	I (1)	I (3)	U (4)
18	• One- or 2-vessel CAD without involvement of proximal LAD • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	I (2)	I (3)	U (6)
19	• One- or 2-vessel CAD without involvement of proximal LAD • Ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (6)	A (7)
20	• One- or 2-vessel CAD without involvement of proximal LAD • Ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (5)	A (7)	A (8)
21	• CAD with borderline stenosis “50% – 70%” • 22No ischemic findings on noninvasive testing	I (1)	I (3)	U (4)

	• No further invasive evaluation performed (ie, FFR, IVUS) • Receiving no or one course of anti-ischemic medical therapy			
22	• CAD with borderline stenosis “50%-70%” • No ischemic findings on noninvasive testing • No further invasive evaluation performed (ie, FFR, IVUS) • Receiving two or three courses of anti-ischemic medical therapy	I (2)	I (3)	U (6)
23	• CAD with borderline stenosis “50%-70%” • Uncertain ischemic findings on noninvasive testing • FFR≤0.8 and/or IVUS with significant reduction in cross-sectional area • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (6)	A (8)
24	• CAD with borderline stenosis “50%-70%” • Uncertain ischemic findings on noninvasive testing • FFR≤0.8 and/or IVUS with significant reduction in cross-sectional area • Receiving two or three courses of anti-ischemic medical therapy	U (6)	A (7)	A (9)
25	• CAD with borderline stenosis “50%-70%” • Uncertain ischemic findings on noninvasive testing • FFR＞0.8 and/or IVUS findings do not meet criteria for significant stenosis • Receiving no or one course of anti-ischemic medical therapy	I (1)	I (3)	I (3)
26	• CAD with borderline stenosis “50%-70%” • Uncertain ischemic findings on noninvasive testing • FFR＞0.8 and/or IVUS findings do not meet criteria for significant stenosis	I (1)	I (3)	U (4)

	• Receiving two or three courses of anti-ischemic medical therapy			
27	• CAD with borderline stenosis “50%-70%” • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (4)	U (6)
28	• CAD with borderline stenosis “50%-70%” • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (5)	U (6)	A (7)
29	• Chronic total occlusion of 1 major epicardial coronary artery, without other coronary stenosis • No noninvasive testing performed • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (4)	A (7)
30	• Chronic total occlusion of 1 major epicardial coronary artery, without other coronary stenosis • No noninvasive testing performed • Receiving two or three courses of anti-ischemic medical therapy	I (3)	U (6)	A (8)
31	• Chronic total occlusion of 1 major epicardial coronary artery, without other coronary stenosis • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	I (2)	U (4)	U (6)
32	• Chronic total occlusion of 1 major epicardial coronary artery, without other coronary stenosis • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	I (3)	U (6)	A (7)
33	• Chronic total occlusion of 1 major epicardial coronary artery, without other coronary stenosis • Ischemic findings on noninvasive	I (3)	A (7)	A (8)

	testing • Receiving no or one course of anti-ischemic medical therapy			
34	• Chronic total occlusion of 1 major epicardial coronary artery, without other coronary stenosis • Ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (6)	A (7)	A (8)
35	• One-vessel CAD involving the proximal LAD • No noninvasive testing performed • Receiving no or one course of anti-ischemic medical therapy	U (5)	U (6)	A (8)
36	• One-vessel CAD involving the proximal LAD • No noninvasive testing performed • Receiving two or three courses of anti-ischemic medical therapy	U (5)	A (7)	A (8)
37	• One-vessel CAD involving the proximal LAD • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (5)	A (7)
38	• One-vessel CAD involving the proximal LAD • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (4)	U (6)	A(8)
39	• One-vessel CAD involving the proximal LAD • Ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	U (5)	A (7)	A (8)
40	• One-vessel CAD involving the proximal LAD • Ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	A (7)	A (8)	A (9)

41	• Two-vessel CAD involving the proximal LAD • No noninvasive testing performed • Receiving no or one course of anti-ischemic medical therapy	U (4)	U (6)	A (8)
42	• Two-vessel CAD involving the proximal LAD • No noninvasive testing performed • Receiving two or three courses of anti-ischemic medical therapy	U (6)	A (7)	A (9)
43	• Two-vessel CAD involving the proximal LAD • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	U (4)	U (6)	A (7)
44	• Two-vessel CAD involving the proximal LAD • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (4)	U (6)	A (8)
45	• Two-vessel CAD involving the proximal LAD • Ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	A (7)	A (8)	A (9)
46	• Two-vessel CAD involving the proximal LAD • Ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	A (7)	A (8)	A (9)
47	• Three-vessel CAD (no left main) • No noninvasive testing performed and normal LV systolic function • Receiving no or one course of anti-ischemic medical therapy	U (5)	A (7)	A (8)
48	• Three-vessel CAD (no left main) • No noninvasive testing performed and normal LV systolic function • Receiving two or three courses of anti-ischemic medical therapy	U (6)	A (7)	A (8)

49	• Three-vessel CAD (no left main) • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	U (5)	U (6)	A (7)
50	• Three-vessel CAD (no left main) • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (5)	A (7)	A (8)
51	• Three-vessel CAD (no left main) • Ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	A (7)	A (8)	A (9)
52	• Three-vessel CAD (no left main) • Ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	A (7)	A (8)	A (9)
53	• Three-vessel CAD (no left main) • Abnormal LV systolic function	A (7)	A (8)	A (9)
54	• Left main stenosis	A (7)	A (9)	A (9)

CAD: coronary artery diseases; LAD: left anterior descending; FFR: fractional flow reserve; IVUS: intravenous ultrasound; LVEF: left ventricular ejection fraction.

Supplemental Table 1.1.3. Recommendations for patients with prior bypass surgery (without acute coronary syndrome)

	Indication	Appropriate Use Score (1-9)		
		CCS		
		Asymptomatic	I or II	III or IV
55	• One or more stenosis in saphenous vein graft(s) • No noninvasive testing performed • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (5)	U (6)
56	• One or more stenosis in saphenous vein graft(s) • No noninvasive testing performed • Receiving two or three courses of anti-ischemic medical therapy	I (5)	U (6)	A (8)
57	• One or more stenosis in saphenous vein graft(s) • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (5)	U (6)
58	• One or more stenosis in saphenous vein graft(s) • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (4)	U (6)	A (7)
59	• One or more stenosis in saphenous vein graft(s) • Ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	U (5)	U (6)	A (8)
60	• One or more stenosis in saphenous vein graft(s) • Ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	U (6)	A (8)	A (9)
61	• All bypass grafts patent and without significant disease • One or more lesions in native coronary arteries without bypass	I (3)	U (5)	U (6)

	grafts • No noninvasive testing performed • Receiving no or one course of anti-ischemic medical therapy			
62	• All bypass grafts patent and without significant disease • One or more lesions in native coronary arteries without bypass grafts • No noninvasive testing performed • Receiving two or three courses of anti-ischemic medical therapy	I (3)	U (6)	A (7)
63	• All bypass grafts patent and without significant disease • One or more lesions in native coronary arteries without bypass grafts • No ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	I (3)	U (5)	U (6)
64	• All bypass grafts patent and without significant disease • One or more lesions in native coronary arteries without bypass grafts • No ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy	I (3)	U (5)	A (7)
65	• All bypass grafts patent and without significant disease • One or more lesions in native coronary arteries without bypass grafts • Ischemic findings on noninvasive testing • Receiving no or one course of anti-ischemic medical therapy	U (5)	U (6)	A (8)
66	• All bypass grafts patent and without significant disease • One or more lesions in native coronary arteries without bypass grafts	U (6)	A (7)	A (8)

	• Ischemic findings on noninvasive testing • Receiving two or three courses of anti-ischemic medical therapy			

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22

Supplemental Table 1.1.4. Chinese AUC recommendations for patients with advanced coronary disease, CCS angina greater than or equal to class III, and/or evidence of high-risk findings on noninvasive testing

	Indication	Appropriate Use Score (1-9)	
		PCI	CABG
67	• Two-vessel CAD with proximal LAD stenosis • No diabetes and normal LVEF	A (8)	A (8)
68	• Two-vessel CAD with proximal LAD stenosis • Diabetes	A (7)	A (9)
69	• Two-vessel CAD with proximal LAD stenosis • Depressed LVEF	A (8)	A (9)
70	• Three-vessel CAD • SYNTAX≥33 • No diabetes • Normal LVEF	U (4)	A (9)
71	• Three-vessel CAD • SYNTAX 23~32 • No diabetes • Normal LVEF	U (6)	A (8)
72	• Three-vessel CAD • SYNTAX ≤22 • No diabetes • Normal LVEF	A (98)	A (7)
73	• Three-vessel CAD • SYNTAX ≥33 • Diabetes	I (3)	A (9)
74	• Three-vessel CAD • SYNTAX 23~32 • Diabetes	U (4)	A (8)
75	• Three-vessel CAD • SYNTAX ≤ 22 • Diabetes	A (7)	A (8)
76	• Three-vessel CAD • SYNTAX ≥ 33 • Depressed LVEF	I (3)	A (9)
77	• Three-vessel CAD	U (5)	A (9)

	• SYNTAX 23~32 • Depressed LVEF		
78	• Three-vessel CAD • SYNTAX ⩽ 22 • Depressed LVEF	A (7)	A (8)
79	• Isolated left main stenosis • No diabetes • Normal LVEF	A (7)	A (9)
80	• Isolated left main stenosis • Diabetes	A (7)	A (9)
81	• Isolated left main stenosis • Depressed LVEF	A (7)	A (9)
82	• Left main stenosis and additional CAD • SYNTAX ⩾ 33 • No diabetes • Normal LVEF	I (3)	A (9)
83	• Left main stenosis and additional CAD • SYNTAX 23~32 • No diabetes • Normal LVEF	A (7)	A (9)
84	• Left main stenosis and additional CAD • SYNTAX ⩽ 22 • No diabetes • Normal LVEF	A (8)	A (8)
85	• Left main stenosis and additional CAD • SYNTAX ⩾ 33 • Diabetes	I (3)	A (9)
86	• Left main stenosis and additional CAD • SYNTAX 23~32 • Diabetes	U (5)	A (9)
87	• Left main stenosis and additional CAD • SYNTAX ⩽ 22 • Diabetes	A (7)	A (8)
88	• Left main stenosis and additional CAD • SYNTAX ⩾ 33 • Depressed LVEF	I (3)	A (9)
89	• Left main stenosis and additional CAD • SYNTAX 23~32	U (6)	A (9)

	• Depressed LVEF		
90	• Left main stenosis and additional CAD • SYNTAX ⩽ 22 • Depressed LVEF	A (7)	A (8)
91	• Prior bypass surgery with native 3-vessel disease and failure of multiple bypass grafts • LIMA remains patent to native coronary artery • Depressed LVEF	A (7)	U (6)
92	• Prior bypass surgery with native 3-vessel disease and failure of multiple bypass grafts • LIMA was used as a graft but is no longer functional • Depressed LVEF	I (3)	A (9)

CAD: coronary artery diseases; LVEF: left ventricular ejection fraction; LIMA: left internal mammary artery.

1.2. Image Analysts Training and Testing

STANDARD OPERATING PROCEDURE

SOP Number: 1.0

Title: Angiographic Analyst Training

Effective Date: December 01, 2012

PURPOSE

To establish a standardized Angiographic Analyst training system in order to ensure the highest accuracy and quality of analysis output from the core lab.

SCOPE

This procedure applies to all Core Laboratory Angiogram analysts.

RESPONSIBILITIES

Department Head and senior Angiographic Analyst

PROCEDURE

1.1 Every employee should receive at least one year of training on angiographic analysis before becoming a qualified analyst.

1.2 A dedicated senior Angiographic Analyst, under the supervision of the

Department Head, is assigned to train the trainees.

1.3 Anatomy of the cardiovascular system:

1.3.1 Senior Angiographic Analyst teaches the anatomy using provided teaching materials (PowerPoint, heart model, and relevant books).

1.3.2 Trainees learn the anatomy of the cardiovascular system through review of angiograms (at least 50 cases per day).

1.3.3 The senior Angiographic Analyst should arrange an examination on the anatomy of the cardiovascular system every week (content of the examination decided by the senior Angiographic Analyst).

1.3.4 Only when the trainees master the anatomy of the cardiovascular system will the next lesson be taught.

1.4 SYNTAX Score

1.4.1 Senior Angiographic Analyst teaches SYNTAX score using provided teaching materials (PowerPoint, example cases, SYNTAX score website, and SYNTAX score calculator).

14.2 Trainees learn SYNTAX score calculation through practice (at least 30 cases a day).

1.4.3 Senior Angiographic Analyst reviews the cases calculated by trainees every day and corrects any mistakes.

1.4.4 Senior Angiographic Analyst should arrange an examination on the SYNTAX score every week (content of the examination decided by the senior Angiographic Analyst).

1.4.5 To become a qualified SYNTAX score calculator, trainees should pass the final test.

1.4.5.1 50 cases are selected, including cases with total occlusion lesion, bifurcation, trifurcation, tortuosity, calcification, thrombus, and small diffuse disease.

1.4.5.2 The trainees and a qualified analyst calculate the SYNTAX scores, and they perform a second analysis 4-6 weeks later.

1.4.5.3 Scores are calculated independent of each other and their original results. A biostatistician provides a kappa statistic for the SYNTAX score. kappa ≥ 0.8 will be considered acceptable agreement.

1.5 Qualitative and Quantitative Angiographic Analysis

1.5.1 Senior Angiographic Analyst teaches Qualitative and Quantitative Angiographic Analysis using provided teaching materials (PowerPoint, example cases, and computer software systems: Medis's Cardiovascular Measurement System and Pie Medical Imaging's CAAS).

1.5.2 Trainees learn analysis through practice (at least 2 cases per day).

1.5.3 Senior Angiographic Analyst reviews the cases analyzed by trainees every day and corrects any mistakes.

1.5.4 Senior Angiographic Analyst should arrange an examination on Qualitative and Quantitative Angiographic Analysis every week (content of the examination decided by the senior Angiographic Analyst).

1.5.5 To become a qualified Angiographic Analyst, trainees should pass the final

test.

1.5.5.1 30 cases are selected, with a range of characteristics (e.g., calcification, thrombus, dissection, perforation).

1.5.5.2 The trainees and a qualified analyst perform the Qualitative and Quantitative Angiographic Analysis, and they perform a second analysis 4-6 weeks later.

1.5.5.3 Analysis is completed independent of each other and their original results. A biostatistician provides a kappa statistic for all continuous variables assessed in the test. kappa ≥ 0.8 will be considered acceptable agreement.

1.6 Intensive training. After the training in our Angiographic Core Lab, trainees are sent to the internationally recognized Angiographic Core Lab of the Cardiovascular Research Foundation (USA) for a two-week training lesson.

1.7 Quality Control

1.7.1 The Angiographic Core Lab conducts an inter-and intra- variability test, at a minimum of every other year. Variability testing serves as continuing training documentation, demonstrating knowledge and understanding of the definitions and quantitative coronary angiography techniques, with a goal of kappa ≥ 0.8. Parameters with poor agreement are revisited during group training. If necessary, consistent outliers for individual readers are followed up on with individual training and additional monitoring.

1.7.2 30 cases are selected. The criterion for selection is single percutaneous

coronary intervention (PCI) lesions. The selected cases represent a wide range of characteristics (e.g., calcification, thrombus, dissection, and perforation). All cases will have documented diagnostic and guiding catheter sizes.

1.7.3 Each analyst is assigned a unique identifier to differentiate each reader in the data. The team performs an independent initial read of all cases and enters the results into the database. They perform a second analysis 4-6 weeks later, independent of each other and their original results. A biostatistician provides a kappa statistic for each categorical variable and the intra-class correlation for all continuous variables assessed in the test.

1.3. Clinical endpoint definitions

Death was defined as death from any cause. The cause of death will be adjudicated as being due to cardiac death or non-cardiac death.

Myocardial infarction (MI)

In-hospital MI: Defined as the occurrence during hospitalization after PCI, CABG or coronary angiography meeting at least 1 of the following criteria:

1. The rise in cardiac troponin I (cTnI) is ≥ 70 times the 99th percentile URL (where the baseline is lower than the
URL, elevated and stable, or falling).

2. If cTnI was not available, MI was defined with at least one of the following:

- New ischaemic ECG changes;
- Development of new pathological Q waves;
- Imaging evidence of loss of viable myocardium that is presumed to be new and in a pattern consistent with an ischaemic etiology;
- Angiographic findings consistent with a procedural flow-limiting complication such as coronary dissection, occlusion of a major epicardial artery or graft, side-branch occlusion-thrombus, disruption of collateral flow or distal embolization.

Spontaneous MI: Defined as detection of a rise and/or fall of cTn values with at least one value above the 99th percentile URL after discharge and with at least one of the following:

- Symptoms of acute myocardial ischemia;
- New ischaemic ECG changes;
- Development of pathological Q waves;

- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality in a pattern consistent with an ischaemic etiology;
- Identification of a coronary thrombus by angiography including intracoronary imaging or by autopsy

Stroke was confirmed by a neurologist on the basis of imaging studies and was defined as follows:

1. A focal neurologic deficit of central origin lasting >72 hours, or
2. A focal neurologic deficit of central origin lasting >24 hours, with imaging evidence of cerebral infarction or intracerebral hemorrhage, or
3. A non-focal encephalopathy lasting >24 hours with imaging evidence of cerebral infarction or hemorrhage adequate to account for the clinical state.

Repeat revascularization was defined as any repeat coronary artery bypass graft (CABG) or PCI.

Target Lesion: Lesions were revascularized in the index procedure (or during a planned or provisional staged procedure).

Non-Target Vessel: Lesions were not treated by either PCI or CABG at the index procedure.

1.4. Supplementary materials for statistical analysis

Statistics for primary and secondary outcomes

For primary outcome, we used both multivariable logistic regression models and hierarchical logistic regression models to examine the associations between the intervention and the inappropriate revascularization. Model candidate variables of interests included patient demographics (age, sex) and AUC scenario variables (including number of antianginal medications, symptom, extent of coronary diseases and stress test, **Supplemental material 1.2**), as well as cardiologist annual PCI volume. We used multivariable hierarchical logistic regression (random effect cardiologist PCI caseload) to select the variables associated with primary outcome (**Supplemental Table 1.4.1**). Finally, age, symptom and annual PCI volume (random effect) were selected for hierarchical logistic regression model for primary outcome. And age and symptom were selected for logistic regression models for primary outcome.

For secondary outcomes about revascularization decision making, we used the same multivariable logistic regression models and hierarchical logistic regression models in primary outcome analysis.

Statistics for subgroups analysis

Subgroup analyses about the associations between the intervention and the decision making were also conducted using hierarchical logistic regression models as mentioned in primary outcome analysis.

Statistics for one-year outcomes

Multivariable Cox proportional models were used to adjust for the potential impact of confounding factors between the intervention and one-year outcomes. Model candidate variables of interests were selected based on clinical knowledge that included demographics (age, sex), severity of angina, extent of coronary artery disease, cardiac risk factors, comorbidities, cardiac history and procedural information. We used univariate analysis to select the variables associated with one-year major adverse cardiac events (**Supplemental Table 1.4.2**). Finally, age, SYNTAX score, extent of coronary disease,

previous heart failure, peripheral vascular disease, CAD family history, procedural information (medical therapy, PCI or CABG) were selected for the model.

Supplemental Table 1.4.1. Multivariable hierarchical logistic regression of inappropriate revascularization

Variables	Adjusted OR (95% CI)	*P*
Patients characteristics		
Age	0.98 (0.973–0.995)	0.005
Men	0.769 (0.577–1.025)	0.074
Number of antianginal medications		
0	Ref	
1	0.942 (0.749–1.186)	0.614
2	1.068 (0.855–1.335)	0.561
3	0.923 (0.692–1.230)	0.583
Symptom		
No angina	Ref	
Symptomatic	0.013 (0.006–0.027)	<0.001
Study group (intervention group)	0.832 (0.725–0.956)	0.009
Cardiologist characteristics		
Annual PCI volume		
Low (≤412/year)	Ref	
Medium (413–615/year)	2.492 (1.542–4.027)	0.002
High (>615/year)	1.919 (1.337–2.756)	0.003

Hierarchical multivariable logistic regression cannot be done for extent of coronary disease and stress test, because few primary outcomes occurred in one of the groups. CI: confidence interval; OR: odds ratio; Ref: reference.

Supplemental Table 1.4.2. Univariate analysis for one-year major adverse cardiac events

Variables	HR (95% CI)	*P*
Age (years), mean±SD	1.017 (1.005–1.029)	0.004
Men	0.936 (0.720–1.216)	0.619
SYNTAX score	1.049 (1.040–1.058)	<0.001
Extent of coronary disease		
Mild disease (50%–69% stenosis)	Ref	
1 vessel	2.962 (1.427–6.146)	0.004
2 vessels	5.456 (2.677–11.347)	<0.001
3 vessels	9.196 (4.475–18.883)	<0.001
Left main stenosis	8.589 (4.132–18.594)	<0.001
Severity of chest pain		
No angina	Ref	
CCS class I–II	0.993 (0.789–1.250)	0.953
CCS class III–IV	1.577 (1.064–2.338)	0.023
Left ventricular ejection		
Not assessed	Ref	
≤35%	3.464 (0.458–26.227)	0.229
36%–50%	1.442 (0.776–2.680)	0.247
>50%	0.906 (0.539–1.524)	0.710
Cardiac history		
Previous myocardial infarction	1.009 (0.756–1.346)	0.951
Previous heart failure	2.051 (1.201–3.505)	0.009
Previous PCI	0.949 (0.745–1.210)	0.675
Cerebrovascular disease	1.265 (0.931–1.720)	0.133
Peripheral vascular disease	1.495 (1.008–2.217)	0.046
Cardiac risk factors and medical comorbidities		
Hypertension	1.087 (0.867–1.363)	0.469
Hyperlipidemia	0.830 (0.660–1.043)	0.110
Diabetes	1.111 (0.879–1.405)	0.377
Smoked during the last year	1.117 (0.897–1.391)	0.324
CAD family history	2.913 (1.087–7.810)	0.034
COPD	0.531 (0.075–3.778)	0.527

All baseline variables were used for single-factor analysis. Finally, we selected age, SYNTAX score, extent of coronary disease, previous heart failure, peripheral vascular disease, CAD family history. SD: standard deviation; CABG: coronary artery bypass graft; CAD: coronary artery disease; COPD: chronic obstructive pulmonary disease; CI: confidence interval; HR: hazard ratio; PCI: percutaneous coronary intervention.

II. Supplementary Tables

Supplementary Table 1. Cardiologist characteristics.

No.	Seniority	PCI volume	CA volume	Rate of PCI/CA (%)	Accuracy of SYNTAX score tertiles assessment (%)	Rate of overestimation (%)	Rate of underestimation (%)	Overestimation by two levels * (%)	Overestimation by one level † (%)
1	Chief	1359	2334	40.5	57.1	42.9	0.0	28.6	14.3
2	Chief	615	1167	52.7	75.7	21.4	2.9	4.8	16.6
3	Chief	693	1137	73.6	82.4	14.2	3.4	5.5	8.7
4	Chief	543	757	45.5	83.4	14.0	2.6	3.1	10.9
5	Associate	917	2076	62.1	76.9	23.1	0.0	5.1	18.0
6	Associate	528	905	71.7	77.0	21.1	1.9	3.3	17.8
7	Associate	412	892	56.5	82.9	17.1	0.0	7.5	9.6
8	Associate	476	766	60.9	75.8	20.1	4.1	2.7	17.4
9	Associate	307	758	58.2	58.8	40.3	0.9	13.9	26.4
10	Attending	340	748	44.2	90.1	9.3	0.6	1.4	7.9
11	Attending	440	598	46.2	82.1	16.2	1.7	6.0	10.2
12	Attending	298	527	58.3	77.2	19.8	3.0	2.5	17.3

Information on cardiologist SYNTAX score assessment was based on agreement on the SYNTAX score tertile assessment between the image analysts and cardiologists in the control group. * Overestimation by two levels indicates that the scores were misestimated from low (0–22) to high risk (≥33). † Overestimation by one level indicates that the scores were misestimated from low (0–22) to intermediate risk (23–32), or from intermediate (23–32) to high risk (≥33). CA: coronary angiography; PCI: percutaneous coronary intervention; SYNTAX: Synergy Between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery.

Supplementary Table 2. One-year clinical outcomes in the control and intervention groups

Outcomes	Control (*n*=1498)	Intervention (SYNTAX score feedback) (*n*=1682)	Unadjusted		Adjusted for patient characteristics	
			HR (95% CI)	*P*	HR (95% CI)	*P*
MACE *	152 (10.1)	168 (10.0)	0.99 (0.79–1.23)	0.912	0.94 (0.75–1.17)	0.570
Death from all cause †	9 (0.6)	15 (0.9)	1.34 (0.55–3.28)	0.521	-	-
Cardiac death †	3 (0.2)	8 (0.5)	2.23 (0.43–11.51)	0.337	-	-
Non-cardiac death †	6 (0.4)	7 (0.4)	1.04 (0.35–3.10)	0.940	-	-
Myocardial infarction	57 (3.8)	76 (4.5)	1.17 (0.83–1.66)	0.362	1.15 (0.81–1.62)	0.435
Repeat revascularization	93 (6.2)	86 (5.1)	0.82 (0.61–1.10)	0.194	0.77 (0.58–1.04)	0.085
TVR	62 (4.1)	59 (3.5)	0.85 (0.60–1.21)	0.369	0.80 (0.56–1.14)	0.210
Non-TVR	31 (2.1)	27 (1.6)	0.77 (0.46–1.30)	0.328	0.70 (0.42–1.18)	0.183

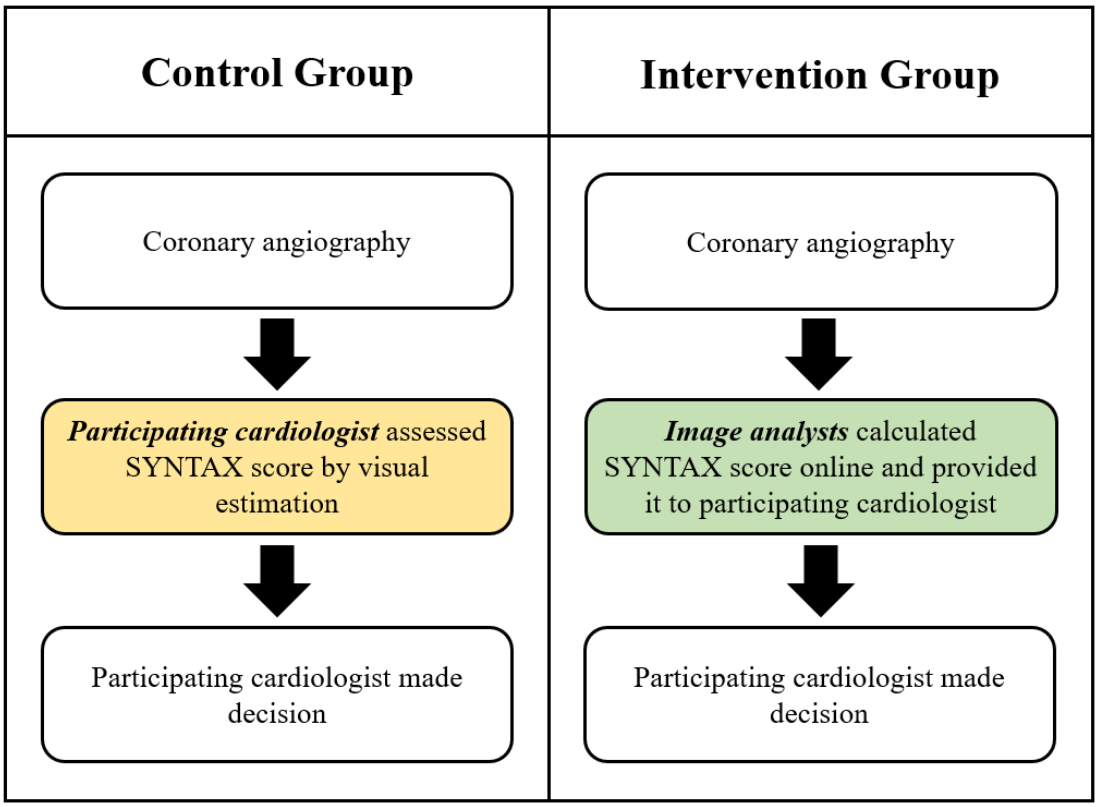
Data were presented as *n* (%). One-year clinical outcomes were adjusted for age, SYNTAX score, extent of coronary disease, prior heart failure, CAD family history, and peripheral vascular disease. * MACE includes death, myocardial infarction, repeat revascularization at one year. †Because of the small number of death, adjustment was not done. -: not applicable. CI: confidence interval; HR: hazard ratio; MACE: major adverse cardiac events; TVR: target vessel revascularization; SYNTAX: Synergy Between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery.

Supplemental Table 3. One-year clinical outcomes in subgroups of different treatment strategies

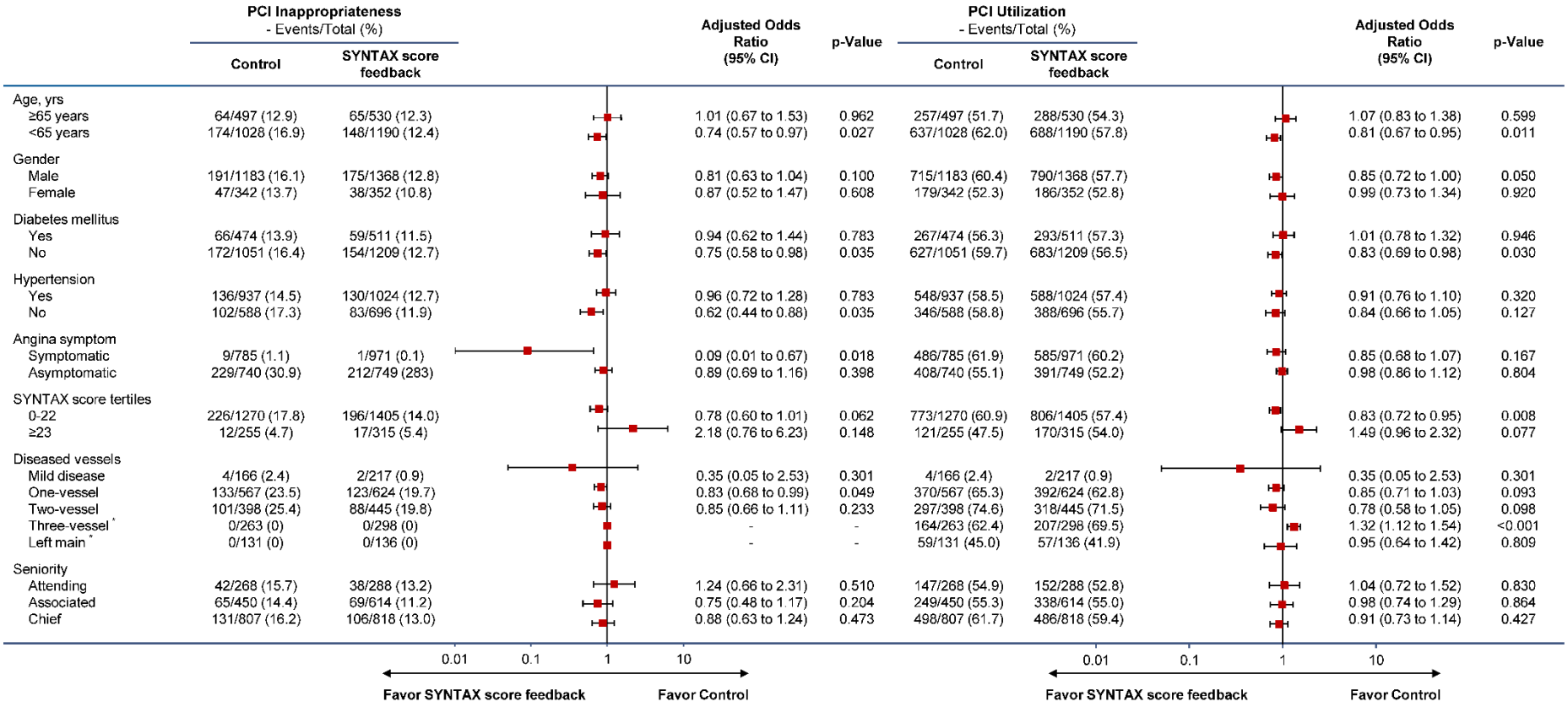
Outcomes	Control	SYNTAX score feedback	Unadjusted		Adjusted for patient characteristics	
			HR (95% CI)	*P*	HR (95% CI)	*P*
MACE (PCI subgroup) *	96/870 (11.0)	103/951 (10.8)	0.99 (0.75–1.30)	0.914	0.90 (0.68–1.19)	0.456
MACE (CABG subgroup) *	19/104 (18.3)	15/107 (14.0)	0.76 (0.39–1.49)	0.423	0.62 (0.30–1.27)	0.191
MACE (Medical therapy subgroup) *	37/487 (7.1)	50/624 (8.0)	1.15 (0.75–1.75)	0.529	1.07 (0.69–1.64)	0.774

Data were presented as *n* (%). One-year clinical outcomes were adjusted for age, SYNTAX score, extent of coronary disease, prior heart failure, CAD family history, and peripheral vascular disease. * MACE includes death, myocardial infarction, repeat revascularization at one year. CI: confidence interval; HR: hazard ratio; MACE: major adverse cardiac events; TVR: target vessel revascularization.

III. Supplementary Figures

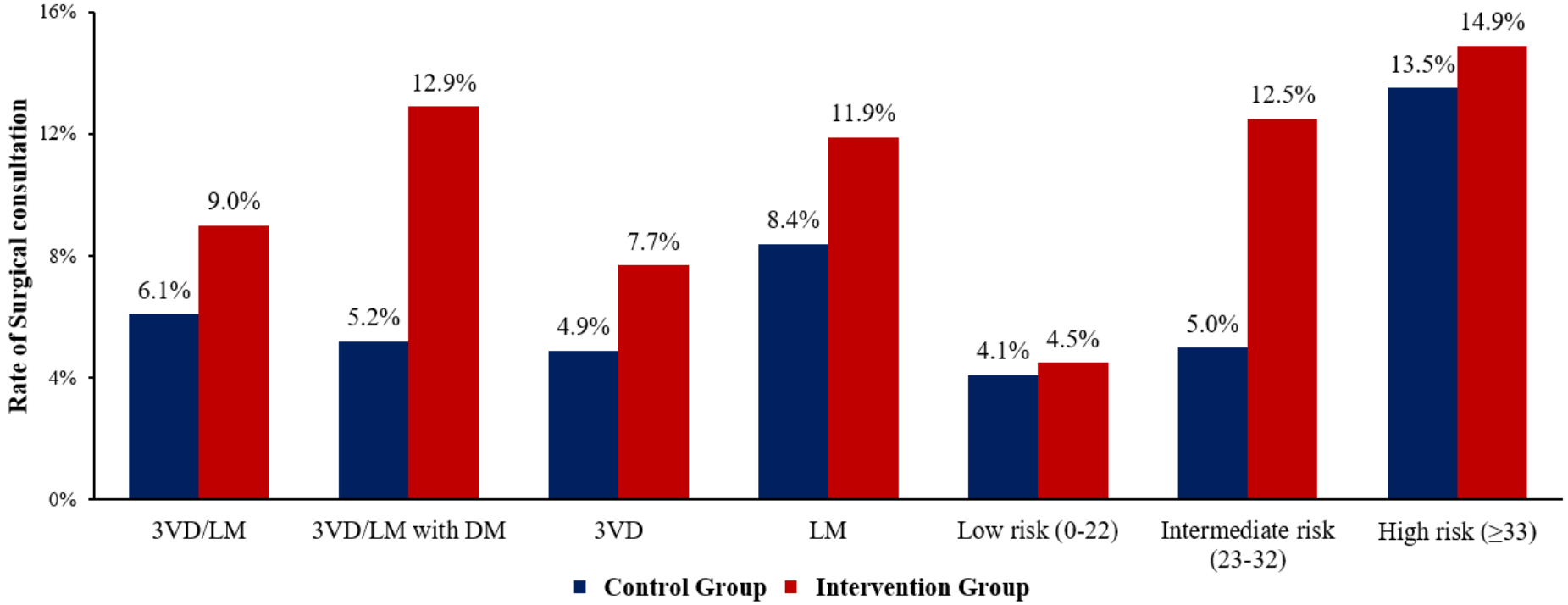


Supplementary Figure 1. Decision-making procedures in the control group and the intervention group. SYNTAX: Synergy Between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery.

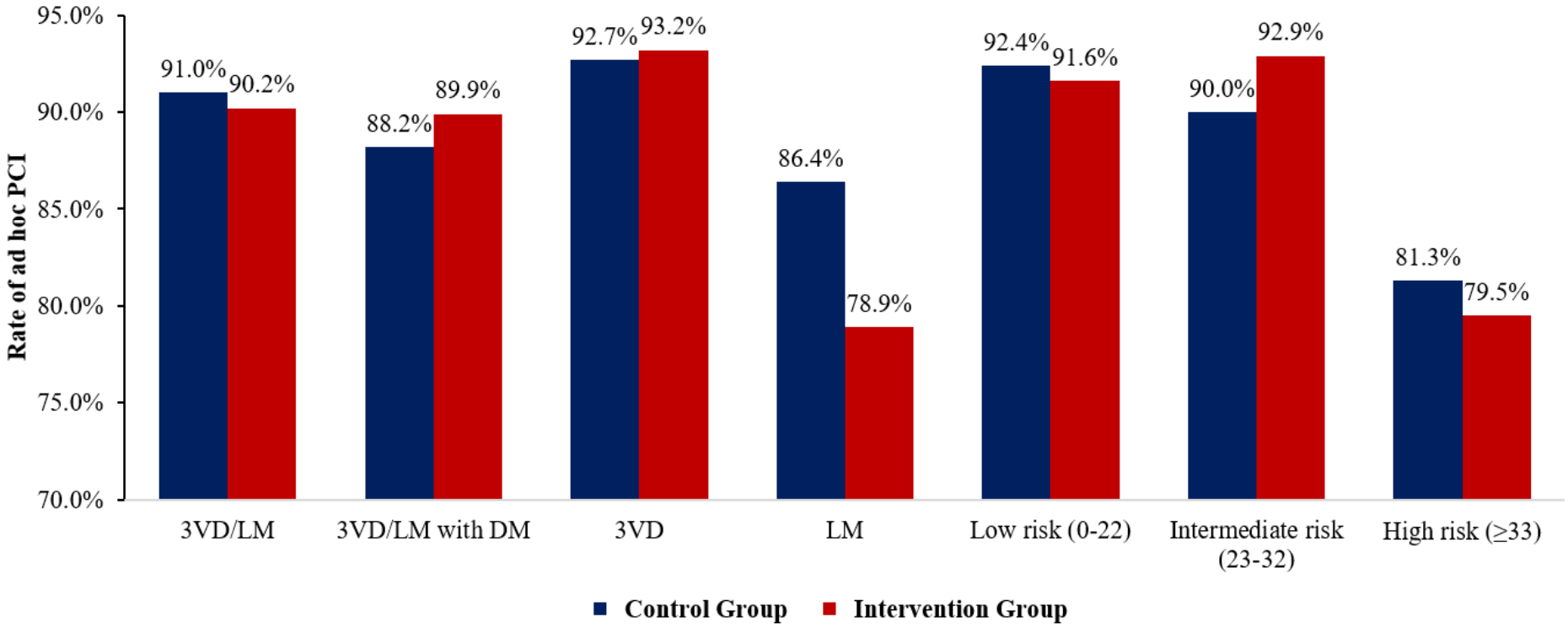


Supplementary Figure 2. Subgroup analyses of inappropriate PCI and PCI utilization. * No outcomes occurred in the subgroup of triple vessel and left main disease because revascularization procedures in the present study were all deemed appropriate according to Chinese appropriate use criteria.

CI: confidence interval; SYNTAX: Synergy Between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery.



Supplementary Figure 3. Rate of surgical consultation in 3-vessel or left main coronary diseases. Totally, 828 3VD or LM patients were analyzed (394 in control group and 434 in intervention group). The rates of surgical consultation were analyzed in different subgroups among 828 patients. 3VD: 3-vessel coronary diseases; LM: left main coronary disease; DM: diabetes mellitus.



Supplementary Figure 4. Rate of ad hoc PCI in 3-vessel or left main coronary diseases. Totally, 487 3VD or LM patients treated by PCI were analyzed (223 in control group and 264 in intervention group). The rates of ad hoc PCI were analyzed in different subgroups among 487 patients. 3VD: 3-vessel coronary diseases; DM: diabetes mellitus; LM: left main coronary disease; PCI: percutaneous coronary intervention.