**Supplemental Material**

**List of Content**

1. **Supplemental Figures**
* **Figure S1.** Love plot for absolute standardized differences comparing baseline characteristics between patients receiving early β-blocker (without considering type and dosing) and no early β-blocker before and after propensity score matching (*matching cohort 1*, a *1-to-1* matching)
* **Figure S2.** Love plots for absolute standardized differences comparing baseline characteristics between patients receiving early low-dose vs. no early β-blocker (A. *matching cohort 2*, *1-to-1* matching), and early high-dose vs. no early β-blocker (B. *matching cohort 3*, a maximal of *1-to-2* matching), before and after propensity score matching
* **Figure S3.** The association between early bisoprolol vs. early metoprolol (*matching cohort 4*, a maximal of *1-to-2* matching), early high-dose bisoprolol vs. early high-dose metoprolol (*matching cohort 5*, a maximal of *1-to-2* matching), and study outcomes in propensity score matched samples
* **Figure S4.** Sensitivity analysis (based on *matching cohort 3*): E-values for the joint minimal strength of association that an unmeasured confounder must associate with early high-dose β-blocker use and risk of composite major bleeding (A) and in-hospital death (B) to fully explain the observed odds ratio in the present study
1. **Supplemental Tables**
* **Table S1.** Definition of study variables
* **Table S2.** Missing rates of study variables and management of missingness
* **Table S3.** The specifications of β-blocker exposures, sample sizes and propensity score matching ratios in the five matching cohorts derived from the total analytic sample
* **Table S4**. Baseline characteristics between patients received early β-blocker v.s. non-early β-blocker in *matching cohort 1*
* **Table S5.** The association between early β-blocker strategies and study outcomes
* **Table S6.** Investigators of CCC-ACS project



**Figure S1.** Love plot for absolute standardized differences comparing baseline characteristics between patients receiving early β-blocker (without considering type and dosing) and no early β-blocker before and after propensity score matching (*matching cohort 1*, a *1-to-1* matching)

**Abbreviations:** ACS=acute coronary syndrome; ACE=angiotensin converting enzyme inhibitor; ARB=angiotensin receptor blocker; CABG=coronary artery bypass grafting; COPD=chronic obstructive pulmonary disease; DAPT=dual antiplatelet therapy; eGFR=estimated glomerular filtration rate; HDL-C=high density lipoprotein cholesterol; LDL-C=low density lipoprotein cholesterol; LMWH=low molecular weight heparin; MI=myocardial infarction; PCI=percutaneous coronary intervention; PVD=peripheral vascular disease; UFH=unfractionated heparin.

****

**Figure S2.** Love plots for absolute standardized differences comparing baseline characteristics between patients receiving early low-dose vs. no early β-blocker (A. *matching cohort 2*, *1-to-1* matching), and early high-dose vs. no early β-blocker (B. *matching cohort 3*, a maximal of *1-to-2* matching), before and after propensity score matching.

Low-dose β-blocker was defined as metoprolol-equivalent dose < 50 mg/day.

High-dose β-blocker was defined as metoprolol-equivalent dose ≥ 50 mg/day.

The oral doses of β-blockers administered within the first 24 hours were converted to the total daily dose of metoprolol-equivalent dose: 50 mg metoprolol tartrate = 47.5 mg metoprolol succinate = 2.5 mg bisoprolol fumarate.

**Abbreviations:** ACS=acute coronary syndrome; ACE=angiotensin converting enzyme inhibitor; ARB=angiotensin receptor blocker; CABG=coronary artery bypass grafting; COPD=chronic obstructive pulmonary disease; DAPT=dual antiplatelet therapy; eGFR=estimated glomerular filtration rate; HDL-C=high density lipoprotein cholesterol; LDL-C=low density lipoprotein cholesterol; LMWH=low molecular weight heparin; MI=myocardial infarction; PCI=percutaneous coronary intervention; PVD=peripheral vascular disease; UFH=unfractionated heparin.



**Figure S3.** The association between early bisoprolol vs. early metoprolol (*matching cohort 4*, a maximal of *1-to-2* matching), early high-dose bisoprolol vs. early high-dose metoprolol (*matching cohort 5*, a maximal of *1-to-2* matching), and study outcomes in propensity score matched samples.

High-dose β-blocker was defined as metoprolol-equivalent dose ≥ 50 mg/day.

The oral doses of β-blockers administered within the first 24 hours were converted to the total daily dose of metoprolol-equivalent dose: 50 mg metoprolol tartrate = 47.5 mg metoprolol succinate = 2.5 mg bisoprolol fumarate.

Composite of major bleeds was defined as any occurrence of the following three major bleeding categories: BARC (Bleeding Academic Research Consortium) type 3b-3c and type5, TIMI (Thrombolysis In Myocardial Infarction) major bleeding and PLATO (PLATelet inhibition and patient Outcomes) life threatening major bleeding.



**Figure S4.** Sensitivity analysis (based on *matching cohort 1*): E-values for the joint minimal strength of association that an unmeasured confounder must associate with early β-blocker use and risk of composite major bleeding (A) and in-hospital death (B) to fully explain the observed odds ratio in the present study.

Odds ratio for early β-blocker use vs. no early β-blocker use in terms of composite major bleeding: 0.48, 95% confidence interval, 0.38 to 0.61 (**Figure 2**).

Odds ratio for early β-blocker use vs. no early β-blocker use in terms of in-hospital death: 0.47, 95% confidence interval, 0.34 to 0.64 (**Figure 2**).

**Table S1.** Definition of study variables

|  |  |  |
| --- | --- | --- |
| 　 | Definition | Continuous/Categorical/Binary |
| Demographics and Comorbidities |
| Age | Years after birth | Continuous, per 1 year |
| Sex | Female/Male | Binary, Female/Male |
| Hypertension | Previously diagnosed with hypertension and/or currently on pharmacological therapy for the treatment of hypertension | Binary, Yes/No |
| Diabetes | History of diabetes mellitus, regardless of duration of disease or need for antidiabetic agents | Binary, Yes/No |
| Dyslipidemia | Previously diagnosed with dyslipidemia and/or treated by a physician | Binary, Yes/No |
| Smoking | Cigarette smoking anytime during the year prior to arrival at the hospital | Binary, Yes/No |
| Previous History |
| Myocardial infarction | At least on documented previous myocardial infarction | Binary, Yes/No |
| Percutaneous coronary intervention (PCI) | Previous history of PCI of any type (balloon angioplasty, stent or other) | Binary, Yes/No |
| Coronary artery bypass grafting (CABG) | Previous history of CABG | Binary, Yes/No |
| Heart failure | Previous history of heart failure | Binary, Yes/No |
| Renal failure | Self-reported history of renal failure  | Binary, Yes/No |
| Atrial fibrillation | Atrial fibrillation or flutter was present within the two weeks prior to arrival | Binary, Yes/No |
| Ischemic stroke | Previous history of ischemic stroke | Binary, Yes/No |
| Hemorrhagic stroke | Previous history of hemorrhagic stroke | Binary, Yes/No |
| Peripheral vascular disease | Previous history of peripheral vascular disease (includes upper and lower extremity, renal, mesenteric, and abdominal aortic systems) | Binary, Yes/No |
| Chronic obstructive pulmonary disease (COPD) | Previous history of COPD | Binary, Yes/No |
| Clinical Variables |
| Diagnosis on admission | 1. ST-elevation myocardial infarction | Categorical, three categories |
| 2. Non-ST-elevation myocardial infarction |
| 3. Unstable angina |
| Systolic blood pressure (SBP) | SBP measured on admission | Continuous, in mmHg |
| Diastolic blood pressure (DBP) | DBP measured on admission | Continuous, in mmHg |
| Heart rate | Heart rate measured on admission | Continuous, per 1 beats per minute |
| Killip class | Evaluated on admission | Binary, >Class 1 or not |
| Low density lipoprotein cholesterol (LDL-C) | Admission LDL-C measured within 24 hours of hospitalization | Continuous, in mg/dL |
| High density lipoprotein cholesterol (HDL-C) | Admission HDL-C measured within 24 hours of hospitalization | Continuous, in mg/dL |
| Triglycerides (TG) | Admission TG measured within 24 hours of hospitalization | Continuous, in mg/dL |
| estimated glomerular filtration rate (eGFR) | Calculated using CKD-EPI Equation | Continuous, per 1.0 mL/min/1.73m2  |
| Hemoglobin | Admission hemoglobin level measured within 24 hours of hospitalization | Continuous, 1.0 g/dL |
| Pre-hospital medications |
| Aspirin | Aspirin use in the past 2 weeks before symptom onset | Binary, Yes/No |
| P2Y12 inhibitor | Use of any kinds of P2Y12 inhibitors in the past 2 weeks before symptom onset | Binary, Yes/No |
| Statin | Use of any kinds of statins in the past 2 weeks before symptom onset | Binary, Yes/No |
| Oral anticoagulant | Use of any kinds of oral anticoagulants in the past 2 weeks before symptom onset | Binary, Yes/No |
| β-blocker | Use of any kinds of β-blockers in the past 2 weeks before symptom onset | Binary, Yes/No |
| Angiotensin converting enzyme inhibitor/angiotensin receptor blocker (ACEI/ARB) | Use of any kinds of ACEIs/ARBs in the past 2 weeks before symptom onset | Binary, Yes/No |
| Aldosterone antagonist | Aldosterone antagonist use in the past 2 weeks before symptom onset | Binary, Yes/No |
| Dual antiplatelet therapy (DAPT) after admission |
| 　 | 1. Non-DAPT (DAPT was not in loading dose) | Categorical, four categories |
| 2. Single-loading DAPT (one of DAPT in loading dose) |
| 3. Both-loading DAPT (DAPT both in loading dose) |
| Anticoagulation (Non-PCI procedure use) |
|  Unfractionated Heparin | Use of unfractionated heparin as anticoagulation therapy | Binary, Yes/No |
|  Low molecular weight heparin | Use of low molecular weight heparin as anticoagulation therapy | Binary, Yes/No |
|  Others | Use of other medications as anticoagulation therapy | Binary, Yes/No |
| Other In-hospital medications |
| Statin | Use of any kinds of statins within the first 24 hours of medical contact | Binary, Yes/No |
| Oral anticoagulant | Use of any kinds of oral anticoagulants within the first 24 hours of medical contact | Binary, Yes/No |
| β-blocker | Use of any kinds of β-blockers within the first 24 hours of medical contact | Binary, Yes/No |
| ACEI/ARB | Use of any kinds of ACEIs/ARBs within the first 24 hours of medical contact | Binary, Yes/No |
| Aldosterone antagonist | Use of any kinds of Aldosterone antagonists within the first 24 hours of medical contact | Binary, Yes/No |
| Platelet glycoprotein IIb/IIIa inhibitor | Use any kinds of platelet glycoprotein IIb/IIIa inhibitors during hospitalization | Binary, Yes/No |
| PCI route | Radial route or not | Binary, Yes/No |

**Table S2.** Missing rates of study variables and management of missingness

|  |  |  |
| --- | --- | --- |
| Variables | Missing, N (%) (n=104516) | Management of missing data |
| Age | 407 (0.4%) | Imputed using sequential regression multiple imputation method implemented by IVEware software |
| Sex | 5 (0.0%) |
| Systolic blood pressure | 175 (0.2%) |
| Diastolic blood pressure | 209 (0.2%) |
| Heart rate | 247 (0.2%) |
| Creatinine (for estimated glomerular filtration rate calculation) | 4165 (4.0%) |
| Hemoglobin, baseline | 3733 (3.6%) |
| Hemoglobin, lowest value | 5655 (5.4%) |
| High density lipoprotein cholesterol | 10703 (10.2%) |
| Low density lipoprotein cholesterol | 10300 (9.9%) |
| Triglycerides | 10440 (10.0%) |
| Creatine kinase MB isoform | 10111 (9.7%) |
| Killip Class | 12804 (12.3%) | Patients with unclear status for Killip class were imputed based on the status of heart failure or cardiogenic shock at admission. Patients with acute heart failure were identified as Killip class 2-3 and patients with cardiogenic shock were identified as Killip class IV. If patients with unclear status of heart failure or cardiogenic shock, we imputed the missing values using sequential regression multiple imputation method implemented by IVEware software. |

**Table S3**. The specifications of β-blocker exposures, sample sizes and propensity score matching ratios in the five matching cohorts derived from the total analytic sample

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 　 | Exposures | Sample sizes before matching | Matching ratios | Sample sizes after matching |
| Matching cohort 1 | On Early β-blocker | 15727 | 1-to-1 | 12307 |
| No Early β-blocker | 27913 | 12307 |
| Matching cohort 2 | On Early low-dose β-blocker | 10170 | 1-to-1 | 9141 |
| No Early β-blocker | 27913 | 9141 |
| Matching cohort 3 | On Early high-dose β-blocker | 5557 | 1-to-2 | 4539 |
| No Early β-blocker | 27913 | 9050 |
| Matching cohort 4 | On Early bisoprolol | 1635 | 1-to-2 | 1627 |
| On Early metoprolol | 14092 | 3250 |
| Matching cohort 5 | On Early high-dose bisoprolol | 1347 | 1-to-2 | 1300 |
| On Early high-dose metoprolol | 4210 | 2592 |

Low-dose β-blocker was defined as metoprolol-equivalent dose < 50 mg/day.

High-dose β-blocker was defined as metoprolol-equivalent dose ≥ 50 mg/day.

The oral doses of β-blockers administered within the first 24 hours were converted to the total daily dose of metoprolol-equivalent dose: 50 mg metoprolol tartrate = 47.5 mg metoprolol succinate = 2.5 mg bisoprolol fumarate.

**Abbreviations:** ACEI=angiotensin converting enzyme inhibitor; ARB=angiotensin receptor blocker.

**Table S4**. Baseline characteristics between patients received early β-blocker v.s. non-early β-blocker in matching cohort 1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 　 | Total Cohort (n=24614) | No Early β-blocker (n=12307) | Early β-blocker (n=12307) | *ASD, %* |
|  |
| Age, year | 62.1±12.0 | 62.2±11.8 | 62.0±12.1 | 2.15 |  |
| Male, No. (%) | 19040 (77.4) | 9470 (76.9) | 9570 (77.8) | 1.94 |  |
| Smoking, No. (%) | 11954 (48.6) | 5931 (48.2) | 6023 (48.9) | 1.50 |  |
| Acute coronary syndrome subtypes, No. (%) |  |
|  STEMI | 16016 (65.1) | 8131 (66.1) | 7885 (64.1) | 0.17 |  |
|  NSTEMI | 5796 (23.5) | 2659 (21.6) | 3137 (25.5) |  |
|  Unstable angina | 2802 (11.4) | 1517 (12.3) | 1285 (10.4) |  |
| Previous History, No. (%) |  |
| Myocardial infarction | 1604 (6.5) | 808 (6.6) | 796 (6.5) | 0.40 |  |
| PCI | 1868 (7.6) | 940 (7.6) | 928 (7.5) | 0.37 |  |
| Coronary bypass grafting | 75 (0.30) | 35 (0.30) | 40 (0.30) | 0.74 |  |
| Diabetes | 5538 (22.5) | 2778 (22.6) | 2760 (22.4) | 0.35 |  |
| Dyslipidemia | 1609 (6.50) | 811 (6.60) | 798 (6.50) | 0.43 |  |
| Hypertension | 12890 (52.4) | 6440 (52.3) | 6450 (52.4) | 0.16 |  |
| Heart failure | 203 (0.80) | 102 (0.80) | 101 (0.80) | 0.09 |  |
| Renal failure | 243 (1.00) | 124 (1.00) | 119 (1.00) | 0.41 |  |
| Atrial fibrillation | 328 (1.30) | 161 (1.30) | 167 (1.40) | 0.43 |  |
| Ischemic stroke | 1413 (5.70) | 728 (5.90) | 685 (5.60) | 1.50 |  |
| Hemorrhagic stroke | 128 (0.50) | 59 (0.50) | 69 (0.60) | 1.13 |  |
| Peripheral vascular disease | 161 (0.70) | 83 (0.70) | 78 (0.60) | 0.50 |  |
| Chronic obstructive lung disease | 236 (1.00) | 125 (1.00) | 111 (0.90) | 1.17 |  |
| Systolic blood pressure, mmHg | 131.4±22.9 | 131.3±23.6 | 131.6±22.1 | 1.22 |  |
| Diastolic blood pressure, mmHg | 79.2±14.1 | 79.0±14.5 | 79.3±13.7 | 2.07 |  |
| Heart rate, beats/min | 77.7±15.5 | 77.5±17.1 | 77.9±13.7 | 2.00 |  |
| Killip Class >I, No. (%) | 6875 (27.9) | 3470 (28.2) | 3405 (27.7) | 1.18 |  |
| Low density lipoprotein cholesterol, mg/dL | 105.0 (82.0 to 130) | 105 (82.0 to 131) | 105 (82.0 to 130) | 0.36 |  |
| High density lipoprotein cholesterol, mg/dL | 40.0 (34.0 to 48.0) | 41.0 (34.0 to 49.0) | 40.0 (34.0 to 48.0) | 1.10 |  |
| Triglycerides, mg/dL | 132 (92.0 to 197.0) | 130 (91.0 to 197) | 134 (94.0 to 197) | 0.21 |  |
| eGFR, mL/min/1.73m2 | 85.7±22.5 | 85.6±22.4 | 85.9±22.7 | 1.57 |  |
| Hemoglobin on admission, g/dL | 139 (127 to 151) | 139 (126.4 to 151.0) | 140 (127.0 to 151.8) | 1.97 |  |
| Pre-hospital medication in the past 2 weeks, No. (%) |  |
| Aspirin | 4341 (17.6) | 2190 (17.8) | 2151 (17.5) | 0.83 |  |
| P2Y12 inhibitor | 3180 (12.9) | 1612 (13.1) | 1568 (12.7) | 1.07 |  |
| Statin | 3402 (13.8) | 1712 (13.9) | 1690 (13.7) | 0.02 |  |
| Oral anticoagulants | 46 (0.20) | 25 (0.20) | 21 (0.20) | 0.52 |  |
| β-blocker | 1274 (5.20) | 591 (4.80) | 683 (5.50) | 3.38 |  |
| ACEI/ARB | 2421 (9.80) | 1179 (9.60) | 1242 (10.1) | 1.72 |  |
| Aldosterone antagonist | 251 (1.00) | 126 (1.00) | 125 (1.00) | 0.08 |  |
| Dual Antiplatelet therapy (DAPT) status in the first 24 hours of medical contact, No. (%) |  |
|  Non-DAPT | NA | NA | NA | 2.21 |  |
|  DAPT, neither loading dose | 1846 (7.50) | 615 (5.00) | 1231 (10.0) |  |
|  DAPT, either loading dose | 6697 (27.2) | 4050 (32.9) | 2647 (21.5) |  |
|  DAPT, both loading dose | 16071 (65.3) | 7642 (62.1) | 8429 (68.5) |  |
| Anticoagulation therapy following PCI, No. (%) |  |
|  Unfractionated heparin | 817 (3.30) | 417 (3.40) | 400 (3.30) | 0.77 |  |
|  Low molecular weight heparin | 817 (3.30) | 8218 (66.8) | 8256 (67.1) | 0.66 |  |
|  Others | 383 (1.60) | 198 (1.60) | 185 (1.50) | 0.85 |  |
| Glycoprotein IIb/IIIa inhibitor, No. (%) | 7907 (32.1) | 3930 (31.9) | 3977 (32.3) | 0.82 |  |
| Other In-hospital medications in the first 24 hours of medical contact, No. (%) |  |
| Statin | 23950 (97.3) | 11953 (97.1) | 11997 (97.5) | 2.21 |  |
| Oral anticoagulant | 127 (0.50) | 61 (0.50) | 66 (0.50) | 0.57 |  |
| ACEI/ARB | 13153 (53.4) | 6431 (52.3) | 6722 (54.6) | 4.74 |  |
| Aldosterone antagonist | 3728 (15.1) | 1868 (15.2) | 1868 (15.2) | 0.18 |  |
| Radial route for PCI, No. (%) | 23434 (95.2) | 11705 (95.1) | 11729 (95.3) | 0.91 |  |

**Abbreviations:** ACEI=angiotensin converting enzyme inhibitor; ARB=angiotensin receptor blocker; DAPT=dual antiplatelet therapy; eGFR=estimated glomerular filtration rate; PCI=percutaneous coronary intervention; STEMI=ST-elevation myocardial infarction; NSTEMI=non-ST-elevation myocardial infarction.

**Table S5.** The association between early β-blocker strategies and study outcomes.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 　 | Major bleeds | BARC type 3b-3c and type 5 | TIMI major bleeds | PLATO life threatening major bleeds | Mortality |
| *Matching cohort 1: Early β-blocker v.s. non-early β-blocker* |
| Total (n=24614)  | 329 (1.30) | 296 (1.20) | 219 (0.90) | 271 (1.10) | 182 (0.70) |
| Early β-blocker (n=12307) | 108 (0.90) | 102 (0.80) | 57 (0.50) | 74 (0.60) | 58 (0.50) |
| No Early β-blocker (n=12307) | 221 (1.80) | 194 (1.60) | 162 (1.30) | 197 (1.60) | 124 (1.00) |
| Odd Ratio and 95% Confidence Interval  | 0.48 (0.38 to 0.61) | 0.52 (0.41 to 0.66) | 0.35 (0.26 to 0.47) | 0.38 (0.28 to 0.49) | 0.47 (0.34 to 0.64) |
| *Matching cohort 2: Early low-dose β-blocker v.s. non-early β-blocker* |
| Total (n=18282)  | 239 (1.30) | 221 (1.20) | 159 (0.90) | 201 (1.10) | 137 (0.70) |
| Early low-dose β-blocker (n=9141) | 91 (1.00) | 87 (0.93) | 49 (0.54) | 66 (0.71) | 40 (0.42) |
| No Early β-blocker (n=9141) | 148 (1.60) | 134 (1.52) | 110 (1.32) | 135 (1.58) | 97 (1.09) |
| Odd Ratio and 95% Confidence Interval  | 0.61 (0.47 to 0.79) | 0.65 (0.49 to 0.85) | 0.44 (0.32 to 0.62) | 0.49 (0.37 to 0.65) | 0.41 (0.28 to 0.59) |
| *Matching cohort 3: Early high-dose β-blocker v.s. non-early β-blocker* |
| Total (n=13589)  | 186 (1.40) | 164 (1.20) | 124 (0.90) | 161 (1.20) | 115 (0.80) |
| Early high-dose β-blocker (n=4539) | 36 (0.80) | 34 (0.70) | 20 (0.40) | 24 (0.50) | 28 (0.60) |
| No Early β-blocker (n=9050) | 150 (1.70) | 130 (1.40) | 104 (1.10) | 137 (1.50) | 87 (1.10) |
| Odd Ratio and 95% Confidence Interval  | 0.47 (0.33 to 0.68) | 0.52 (0.35 to 0.76) | 0.38 (0.24 to 0. 62) | 0.35 (0.22 to 0.53) | 0.64 (0.42 to 0.98) |
| *Matching cohort 4: Early bisoprolol v.s. early metoprolol* |
| Total (n=4877)  | 48 (1.00) | 46 (0.90) | 22 (0.50) | 32 (0.70) | 29 (0.60) |
| Early bisoprolol (n=1627) | 16 (1.00) | 15 (0.90) | 6 (0.40) | 11 (0.70) | 11 (0.70) |
| Early metoprolol (n=3250) | 32 (1.00) | 31 (1.00) | 16 (0.50) | 21 (0.60) | 18 (0.60) |
| Odd Ratio and 95% Confidence Interval  | 1.00 (0.55 to 1.83) | 0.97 (0.52 to 1.80) | 0.75 (0.29 to 1.92) | 1.05 (0.50 to 2.18) | 1.22 (0.58 to 2.59) |
| *Matching cohort 5: Early high-dose bisoprolol v.s. early high-dose metoprolol* |
| Total (n=3892)  | 30 (0.80) | 29 (0.70) | 13 (0.30) | 17 (0.40) | 22 (0.60) |
| Early high-dose bisoprolol (n=1300) | 13 (1.00) | 12 (0.90) | 4 (0.30) | 8 (0.60) | 8 (0.60) |
| Early high-dose metoprolol (n=2592) | 17 (0.70) | 17 (0.70) | 9 (0.30) | 9 (0.30) | 14 (0.50) |
| Odd Ratio and 95% Confidence Interval  | 1.53 (0.74 to 3.16) | 1.41 (0.67 to 2.96) | 0.89 (0.27 to 2.88) | 1.78 (0.68 to 4.62) | 1.14 (0.48 to 2.72) |
| *Sensitivity analysis: Early ACEI/ARB v.s. early non-ACEI/ARB after propensity score matching* |
| Total (n=24918)  | 331 (1.30) | 291 (1.20) | 205 (0.80) | 275 (1.10) | 160 (0.60) |
| Early ACEI/ARB (n=12459) | 167 (1.30) | 147 (1.20) | 107 (0.90) | 141 (1.10) | 58 (0.50) |
| No Early ACEI/ARB (n=12459) | 164 (1.30) | 144 (1.20) | 98 (0.80) | 134 (1.10) | 102 (0.80) |
| Odd Ratio and 95% Confidence Interval  | 1.02 (0.82 to 1.27) | 1.02 (0.81 to 1.29) | 1.09 (0.83 to 1.44) | 1.05 (0.83 to 1.34) | 0.57 (0.41 to 0.78) |

The number in the parenthesis indicates percentage. Composite of major bleeds was defined as any occurrence of the following three major bleeding categories: BARC (Bleeding Academic Research Consortium) type 3b-3c and type5, TIMI (Thrombolysis In Myocardial Infarction) major bleeding and PLATO (PLATelet inhibition and patient Outcomes) life threatening major bleeding.

**Table S6.** Investigators of CCC-ACS project

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID | Hospitals  | Territories  | Provinces  | City  | Investigator  |
| 1 | Yangzhou First People's Hospital | Eastern China | Jiangsu | Yangzhou | Aihua Li |
| 2 | Shanxi Cardiovascular Hospital | Northern China | Shanxi | Taiyuan | Bao Li |
| 3 | Nanjing Drum Tower Hospital, The Affiliated Hospital of Nanjing University Medical School | Eastern China | Jiangsu | Nanjing | Biao Xu, Guangshu Han |
| 4 | Hainan General Hospital | Southern China | Hainan | Haikou | Bin Li |
| 5 | The Second Hospital of Jilin University | Northeast China | Jilin | Changchun | Bin Liu |
| 6 | Shanghai Jingan District Shibei Hospital | Eastern China | Shanghai | Shanghai | Bin Wang |
| 7 | Guangyuan Central Hospital | Northwest China | Sichuan | Guangyuan | Bing Fu |
| 8 | The 2nd Affiliated Hosiptal of Harbin Medical University | Northeast China | Heilongjiang | Harbin | Bo Yu |
| 9 | Hospital 463 of Chinese People's Liberation Army | Northeast China | Liaoning | Shenyang | Bosong Yang |
| 10 | The Central Hospital of Mianyang | Northwest China | Sichuan | Mianyang | Caidong Luo |
| 11 | The Ninth Hospital Affiliated to Shanghai Jiaotong University School of Medicine | Eastern China | Shanghai | Shanghai | Changqian Wang |
| 12 | Zhangzhou Municipal Hospital of Fujian Province | Eastern China | Fujian | Zhangzhou | Changyong Liu |
| 13 | Shimen People’s Hospital | Central China | Hunan | Changde | Chuanliang Liang |
| 14 | Henan Provincial People's Hospital | Central China | Henan | Zhengzhou | Chuanyu Gao |
| 15 | Shanxi Provincial People's Hospital | Northern China | Shanxi | Taiyuan | Chunlin Lai |
| 16 | Xihua County People’s Hospital | Central China | Henan | Zhoukou | Chuntong Wang |
| 17 | Liaocheng People's Hospital | Eastern China | Shandong | Liaocheng | Chunyan Zhang |
| 18 | Yancheng Third People's Hospital | Eastern China | Jiangsu | Yancheng | Chunyang Wu |
| 19 | Quyang Renji Hospital | Northern China | Hebei | Baoding | Congliang Zhang |
| 20 | Xinqiao Hospital, Third Military Medical University | Southwest China | Chongqing | Chongqing | Cui Bin, Lan Huang |
| 21 | The Second Xiangya Hospital of Central South University | Central China | Hunan | Changsha | Daoquan Peng |
| 22 | The Central Hospital of Panzhihua | Northwest China | Sichuan | Panzhihua | Dawen Xu |
| 23 | China Meitan General Hospital | Northern China | Beijing | Beijing | Di Wu |
| 24 | Xiantao First People’s Hospital | Central China | Hubei | Xiantao | Dongmei Zhu |
| 25 | Chest Hospital of Xinjiang Uygur Autonomous Region | Northwest China | Xinjiang | Urumchi | Dongsheng Chai |
| 26 | Beian First People’s Hospital | Northeast China | Heilongjiang | Heihe | Dongyan Li |
| 27 | The 309th Hospital of Chinese People's Liberation Army | Northern China | Beijing | Beijing | Fakuan Tang, Jun Xiao |
| 28 | Baiyin Cite Center Hospital | Northwest China | Gansu | Baiyin | Fang Zhao |
| 29 | Deqing People’s Hospital | Eastern China | Zhejiang | Huzhou | Fangfang Huang |
| 30 | Dunhua City Hospital | Northeast China | Jilin | Yanbian | Fanju Meng |
| 31 | Suizhou Central Hospital | Central China | Hubei | Suizhou | Fengwei Li |
| 32 | Binyang People’s Hospital | Southern China | Guangxi | Nanning | Fudong Gan |
| 33 | The First Hospital of Qiqihaer City | Northeast China | Heilongjiang | Qiqihaer | Gang Xu |
| 34 | The Third the People‘s Hospital of Bengbu | Eastern China | Anhui | Bengbu | Gengsheng Sang |
| 35 | Zhongda Hospital, Southeast University | Eastern China | Jiangsu | Nanjing | Genshan Ma |
| 36 | The First Hospital of Jiamusi | Northeast China | Heilongjiang | Jiamusi | Guixia Zhang |
| 37 | The First Affiliated Hospital of Liaoning Medical University | Northeast China | Liaoning | Jinzhou | Guizhou Tao |
| 38 | Luan County People’s Hospital | Northern China | Hebei | Tangshan | Guo Li |
| 39 | Guiding People’s Hospital | Southwest China | Guizhou | Qinan | Guoduo Chen |
| 40 | Haidong Ping’an District Hospital of Traditional Chinese Medicine | Northwest China | Qinghai | Haidong | Guoqin Xin |
| 41 | Xinjiang Uygur Autonomous Region People’s Hospital | Northwest China | Xinjiang | Urumchi | Guoqing Li |
| 42 | Sir Run Run Shaw Hospital, College of Medicine, Zhejiang University | Eastern China | Zhejiang | Hangzhou | Guosheng Fu |
| 43 | Zhoushan People's Hospital | Eastern China | Zhejiang | Zhoushan | Guoxiong Chen |
| 44 | Dalian Municipal Central Hospital | Northeast China | Liaoning | Dalian | Hailong Lin |
| 45 | Hebei Daming County People’s Hospital | Northern China | Hebei | Handan | Haiping Guo |
| 46 | Dongguan Changping hospital | Southern China | Guangdong | Dongguan | Haiyun Lin |
| 47 | Renmin Hospital of Wuhan University | Central China | Hubei | Wuhan | Hong Jiang |
| 48 | Honghu People’s Hospital | Central China | Hubei | Jingzhou | Hong Liu |
| 49 | Ningxia People's Hospital | Northwest China | Ningxia | Yinchuan | Hong Luan |
| 50 | The First People's Hospital of Yunnan Province (Kunhua Hospital) | Northwest China | Yunnan | Kunming | Hong Zhang |
| 51 | The People’s Hospital Feixian | Eastern China | Shandong | Linyi | Honghua Deng |
| 52 | Beijing Friendship Hospital, Capital Medical University | Northern China | Beijing | Beijing | Hongwei Li |
| 53 | The First Affiliated Hospital of Bengbu Medical College | Eastern China | Anhui | Bengbu | Honhju Wang |
| 54 | The Central Hospital of Zhoukou | Central China | Henan | Zhoukou | Hualing Liu |
| 55 | Nanpi People’s Hospital | Northern China | Hebei | Cangzhou | Hui Dong |
| 56 | Anyang District Hospital | Central China | Henan | Anyang | Hui Liu |
| 57 | Dalian Fourth People’s Hospital | Northeast China | Liaoning | Dalian | Huifang Zhang |
| 58 | General Hospital of TISCO | Northern China | Shanxi | Taiyuan | Huifeng Wang |
| 59 | Ningbo First Hospital | Eastern China | Zhejiang | Ningbo | Huimin Chu |
| 60 | Huining People’s Hospital | Northwest China | Gansu | Baiyin | Jiabin Xi |
| 61 | Jining City Yanzhou District People’s Hospital | Eastern China | Shandong | Jining | Jian Yang |
| 62 | Dongguan People's Hospital | Southern China | Guangdong | Dongguan | Jianfeng Ye |
| 63 | Panyu Hospital of Chinese Medicine | Southern China | Guangdong | Guangzhou | Jianhao Li |
| 64 | Sichuan Provincial People’s Hospital | Northwest China | Sichuan | Chengdu | Jianhong Tao |
| 65 | Mudanjiang Cardiovascular Disease Hospital | Northeast China | Heilongjiang | Mudanjiang | Jianwen Liu |
| 66 | People’s Hospital of Wugang | Central China | Hunan | Shaoyang | JiaoMei Yang |
| 67 | Yichang Central Hospital | Central China | Hubei | Yichang | Jiawang Ding |
| 68 | Zhongda Hospital, Southeast University (Jiangbei) | Eastern China | Jiangsu | Nanjing | Jiayi Tong |
| 69 | People’s Hospital of Rongchang District  | Southwest China | Chongqing | Chongqing | Jie Chen |
| 70 | Peking University First Hospital | Northern China | Beijing | Beijing | Jie Jiang |
| 71 | Ye County people’s hospital | Central China | Henan | Pingdingshan | Jie Yang |
| 72 | Qilu Hospital of Shandong University | Eastern China | Shandong | Jinan | Jifu Li |
| 73 | Affiliated Hospital of Jiangsu University | Eastern China | Jiangsu | Zhenjiang | Jinchuan Yan |
| 74 | Wuhan University of Science and Technology Hospital | Central China | Hubei | Wuhan | Jing Hu |
| 75 | Shenyang City Electricity Central Hospital | Northeast China | Liaoning | Shenyang | Jing Xu |
| 76 | Sun Yat-sen Memorial Hospital, Sun Yat-sen University | Southern China | Guangdong | Guangzhou | Jingfeng Wang |
| 77 | Yuncheng Hospital  | Eastern China | Shandong | Heze | Jinglan Diao |
| 78 | Fengrun District Second People’s Hospital | Northern China | Hebei | Tangshan | Jingshan Zhao |
| 79 | The First People's Hospital of Nanning City | Southern China | Guangxi | Nanning | Jinru Wei |
| 80 | Zhangping City Hospital | Eastern China | Fujian | Longyan | Jinxing Yi |
| 81 | The First Affiliated Hospital of Fujian Medical University | Eastern China | Fujian | Fuzhou | Jinzi Su |
| 82 | Chengdu Third People’s Hospital | Northwest China | Sichuan | Chengdu | Jiong Tang |
| 83 | Guangdong General Hospital | Southern China | Guangdong | Guangzhou | Jiyan Chen |
| 84 | Heilongjiang Fujin City Central Hospital | Northeast China | Heilongjiang | Jiamusi | Jiyan Yin |
| 85 | Yantaishan hospital | Eastern China | Shandong | Yantai | Juexin Fan |
| 86 | Qingdao Municipal Hospital | Eastern China | Shandong | Qingdao | Jun Guan |
| 87 | Zhongshan Hospital Affiliated to Fudan University | Eastern China | Shanghai | Shanghai | Junbo Ge |
| 88 | Hospital of Xinjiang Production & Construction Corps | Northwest China | Xinjiang | Urumchi | Junming Liu |
| 89 | Linfen People’s Hospital | Northern China | Shanxi | Linfen | Junping Deng |
| 90 | The First People’s Hospital of Horqin District, Tongliao City | Northern China | Inner Mongolia | Tongliao | Junping Fang |
| 91 | The Military General Hospital of Beijing PLA  | Northern China | Beijing | Beijing | Junxia Li |
| 92 | Longyan First Hospital | Eastern China | Fujian | Longyan | Kaihong Chen |
| 93 | Guiyang Sixth People’s Hospital | Southwest China | Guizhou | Guiyang | Kalan Luo |
| 94 | Affiliated Hospital of Guangdong Medical College | Southern China | Guangdong | Guangzhou | Keng Wu |
| 95 | Jiangxi Provincial People's Hospital | Eastern China | Jiangxi | Nanchang | Lang Ji |
| 96 | The First Affiliated Hospital of Guangxi Medical University | Southern China | Guangxi | Nanning | Lang Li |
| 97 | Tongren Hospital Affiliated to Shanghai Jiaotong University School of Medicine | Eastern China | Shanghai | Shanghai | Li Jiang |
| 98 | Huaiyang People’s Hospital | Central China | Henan | Zhoukou | Li Wei |
| 99 | Binzou City Center Hospital | Eastern China | Shandong | Binzhou | Lijun Meng |
| 100 | Anhui Provincial Hospital | Eastern China | Anhui | Hefei | Likun Ma |
| 101 | Xiangtan City Central Hospital | Central China | Hunan | Xiangtan | Lilong Tang |
| 102 | Tangshan City Fengrun District People’s Hospital | Northern China | Hebei | Tangshan | Lin Wang |
| 103 | The First Hospital of Haerbin City | Northeast China | Heilongjiang | Harbin | Lin Wei |
| 104 | The First Affiliated Hospital of Zhengzhou University | Central China | Henan | Zhengzhou | Ling Li |
| 105 | Xijing Hospital | Northwest China | Shaanxi | Xi'an | Ling Tao |
| 106 | Yiniang Hospital  | Southwest China | Yunnan | Kunming | Liqiong Yang |
| 107 | The Affiliated Hospital of Guizhou Medical University | Southwest China | Guizhou | Guiyang | Lirong Wu |
| 108 | Central Hospital Affiliated to Shenyang Medical College | Northeast China | Liaoning | Shenyang | ManZhang, |
| Kaiming Chen |
| 109 | Hepu People’s Hospital | Southern China | Guangxi | Beihai | Meisheng Lai |
| 110 | First Affiliated Hospital of the People's Liberation Army General Hospital | Northern China | Beijing | Beijing | Miao Tian |
| 111 | Yanting People’s Hospital | Southwest China | Sichuan | Mianyang | Mingcheng Bai |
| 112 | The Second People's Hospital of Yunnan Province | Southwest China | Yunnan | Kunming | Minghua Han |
| 113 | Haikou People's Hospital | Southern China | Hainan | Haikou | Moshui Chen |
| 114 | Geological Mining Hospital of Hunan Province | Central China | Hunan | Changsha | Naiyi Liang |
| 115 | The Eight Affiliated Hospital, Sun Yat-sen University | Southern China | Guangdong | Guangzhou | Nan Jia |
| 116 | The Central Hospital of Xuzhou | Eastern China | Jiangsu | Xuzhou | Peiying Zhang |
| 117 | The Second hospital of Dalian Medical University | Northeast China | Liaoning | Dalian | Peng Qu |
| 118 | The second people’s hospital of Mengcheng | Eastern China | Anhui | Bozhou | Pengfei Zhang |
| 119 | Fuqing Cite Hospital | Eastern China | Fujian | Fuqing | Ping Chen |
| 120 | The First Affiliated Hospital of Liaoning University of Traditional Chinese Medicine | Northeast China | Liaoning | Shenyang | Ping Hou |
| 121 | Gansu Provincial Hospital | Northwest China | Gansu | Lanzhou | Ping Xie |
| 122 | Beijing Tsinghua Changgung Hospital | Northern China | Beijing | Beijing | Ping Zhang |
| 123 | The First Affiliated Hospital of Henan University of Science and Technology | Central China | Henan | Luoyang | Pingshuan Dong |
| 124 | Guizhou Provincial People's Hospital | Northwest China | Guizhou | Guiyang | Qiang Wu |
| 125 | The First Affiliated Hospital of Xiamen University | Eastern China | Fujian | Xiamen | Qiang Xie |
| 126 | Chenzhou First People's Hospital | Central China | Hunan | Chenzhou | Qiaoqing Zhong |
| 127 | Lujiang People’s Hospital | Eastern China | Anhui | Hefei | Qichun Wang |
| 128 | Yuzhou City Central Hospital | Central China | Henan | Xuchang | Qinfeng Su |
| 129 | People’s Hospital of Qinghai Province | Northwest China | Qinghai | Xining | Rong Chang |
| 130 | Quanzhou First Hospital | Eastern China | Fujian | Quanzhou | Rong Lin |
| 131 | Baotou City Center Hospital | Northern China | Inner Mongolia | Baotou | Ruiping Zhao |
| 132 | Affiliated Hospital of Ningxia Medical University | Northwest China | Ningxia | Yinchuan | Shaobin Jia |
| 133 | Beijing Anzhen Hospital, Capital Medical University | Northern China | Beijing | Beijing | Shaoping Nie |
| 134 | Wuzhou People's Hospital | Southern China | Guangxi | Wuzhou | Shaowu Ye |
| 135 | North Jiangsu People's Hospital | Eastern China | Jiangsu | Yangzhou | Shenghu He |
| 136 | People’s Hospital of Bozhou District | Southwest China | Guizhou | Zunyi | Shengyong Chen |
| 137 | Shanghai Sixth People's Hospital | Eastern China | Shanghai | Shanghai | Shixin Ma |
| 138 | The Central Hospital of Jilin | Northeast China | Jilin | Changchun | Shuangbin Li |
| 139 | The First Hospital of Handan | Northern China | Hebei | Handan | Shuanli Xin |
| 140 | The Fourth Affiliated Hospital Zhejiang University School of Medicine | Eastern China | Zhejiang | Yiwu | Shudong Xia |
| 141 | Nenjiang People’s Hospital | Northeast China | Heilongjiang | Heihe | Shuhua Zhang |
| 142 | Duzishan Petrochemical Hospital | Northwest China | Xinjiang | Karamay | Shuqiu Qu |
| 143 | Huai'an First People's Hospital | Eastern China | Jiangsu | Huai'an | Shuren Ma |
| 144 | Hunan Changsha County First People’s Hospital | Central China | Hunan | Changsha | Siding Wang |
| 145 | Li County Hospital of Traditional Chinese Medicine | Central China | Hunan | Changde | Songbai Li |
| 146 | The First Affiliated Hospital of Chongqing Medical University | Southwest China | Chongqing | Chongqing | Suxin Luo |
| 147 | Nanchong Central Hospital | Northwest China | Sichuan | Nanchong | Tao Liu |
| 148 | Ningjin People’s Hospital | Eastern China | Shandong | Dezhou | Tao Zhang |
| 149 | Guang’an People’s Hospital | Southwest China | Sichuan | Guang’an | Tian Tuo |
| 150 | Navy General Hospital | Northern China | Beijing | Beijing | Tianchang Li |
| 151 | Xiangya Hospital Central South University | Central China | Hunan | Changsha | Tianlun Yang |
| 152 | Gongyi people’s hospital | Central China | Henan | Zhengzhou  | Tianmin Du |
| 153 | Guangzhou Red Cross Hospital | Southern China | Guangdong | Guangzhou | Tongguo Wu |
| 154 | Dongfeng Hospital | Northeast China | Jilin | Liaoyuan | Wei Liu |
| 155 | Zhejiang Provincial Hospital of TCM | Eastern China | Zhejiang | Hangzhou | Wei Mao |
| 156 | The First People’s Hospital of Longquanyi District | Southwest China | Sichuan | Chengdu | Wei Tuo |
| 157 | The First Affiliated Hospital of Guangzhou Medical College | Southern China | Guangdong | Guangzhou | Wei Wang |
| 158 | The Third Xiangya Hospital of Central South University | Central China | Hunan | Changsha | Weihong Jiang |
| 159 | The First Affiliated Hospital of Wenzhou Medical University | Eastern China | Zhejiang | Wenzhou | Weijian Huang |
| 160 | Affiliated Hospital of Qinghai University | Northwest China | Qinghai | Xining | Weijun Liu |
| 161 | Jianshui County People’s Hospital | Southwest China | Yunnan | Honghe | Weiqing Fan |
| 162 | The Second Affiliated Hospital of Soochow University | Eastern China | Jiangsu | Suzhou | Weiting Xu |
| 163 | Teda International Cardiovascular Hospital | Northern China | Tianjin | Tianjin | Wenhua Lin |
| 164 | Wuhan Asia Heart Hospital | Central China | Hubei | Wuhan | Xi Su |
| 165 | Shanghai Jiading District Center Hospital | Eastern China | Shanghai | Shanghai | Xia Chen |
| 166 | Guangxi Hengxian County People’s Hospital | Southern China | Guangxi | Nanning | Xianan Zhang |
| 167 | The Second Hospital of Hebei Medical University | Northern China | Hebei | Shijiazhuang | Xianghua Fu |
| 168 | The First Affiliated Hospital of Soochow University | Eastern China | Jiangsu | Suzhou | Xiangjun Yang |
| 169 | Changhai Hospital of Shanghai | Eastern China | Shanghai | Shanghai | Xianxian Zhao |
| 170 | Affiliated Hospital of Yan'an University | Northwest China | Shaanxi | Yan'an | Xiaochuan Ma |
| 171 | The First People's Hospital of Jining | Eastern China | Shandong | Jining | Xiaofei Sun |
| 172 | Longhui County People’s Hospital | Central China | Hunan | Shaoyang | Xiaojun Wang |
| 173 | Tonglu First People’s Hospital | Eastern China | Zhejiang | Hangzhou | Xiaolan Li |
| 174 | Xinmi people’s hospital | Central China | Henan | Zhengzhou  | Xiaolei Li |
| 175 | Zunhua People’s Hospital | Northern China | Hebei | Tangshan | Xiaoli Yang |
| 176 | West China Hospital of Sichuan University | Northwest China | Sichuan | Chengdu | Xiaoping Chen |
| 177 | The Central Hospital of Taiyuan | Northern China | Shanxi | Taiyuan | Xiaoping Chen |
| 178 | Datong City Second People’s Hospital | Northern China | Shanxi | Datong | Xiaoqin Zhang |
| 179 | The Second Affiliated Hospital to Nanchang University | Eastern China | Jiangxi | Nanchang | Xiaoshu Cheng |
| 180 | Yuzhong County People’s Hospital | Northwest China | Gansu | Lanzhou | Xiaowei Peng |
| 181 | Qinyang People’s Hospital | Central China | Henan | Jiaozuo | Xiaowen Ma |
| 182 | Hebei General Hospital | Northern China | Hebei | Shijiazhuang | Xiaoyong Qi |
| 183 | Yutian Hospital | Northern China | Hebei | Tangshan | Xiaoyun Feng |
| 184 | The Third Affiliated Hospital of Guangzhou Medical College | Southern China | Guangdong | Guangzhou | Ximing Chen |
| 185 | Chongqing Hechuan District People’s Hospital | Southwest China | Chongqing | Chongqing | Xin Tang |
| 186 | The First Affiliated Hospital of Wannan Medical College | Eastern China | Anhui | Wuhu | Xingsheng Tang |
| 187 | Inner Mongolia People's Hospital | Northern China | Inner Mongolia | Hohhot | Xingsheng Zhao |
| 188 | Ledong Second People’s Hospital | Southern China | Hainan | Ledong | Xiufeng Chen |
| 189 | Wuxi Xishan People’s Hospital | Eastern China | Jiangsu | Wuxi | Xudong Li |
| 190 | Tangdu Hospital of The Fourth Military Medical University | Northwest China | Shaanxi | Xi'an | Xue Li |
| 191 | Shanghai East Hospital Affiliated to Tongji University | Eastern China | Shanghai | Shanghai | Xuebo Liu |
| 192 | Beijing Fangshan District First Hospital | Northern China | Beijing | Beijing | Xuemei Peng |
| 193 | The General Hospital of Shenyang Military Region | Northeast China | Liaoning | Shenyang | Yaling Han |
| 194 | Xiamen Cardiovascular Disease Hospital | Eastern China | Fujian | Xiamen | Yan Wang |
| 195 | Tieli People’s Hospital | Northeast China | Heilongjiang | Yichun | Yanbo Niu |
| 196 | Dianjiang People’s Hospital | Southwest China | Chongqing | Chongqing | Yang Yu |
| 197 | The First Hospital of Jilin University | Northeast China | Jilin | Changchun | Yang Zheng |
| 198 | The Second Affiliated Hospital of Qiqihar Medical Hospital | Northeast China | Heilongjiang | Qiqihar | Yanli Wang |
| 199 | General Hospital of Guangzhou Military Command | Southern China | Guangdong | Guangzhou | Yanlie Zheng |
| 200 | Fujian Provincial Hospital | Eastern China | Fujian | Fuzhou | Yansong Guo |
| 201 | The First Affiliated hospital of Dalian Medical University | Northeast China | Liaoning | Dalian | Yanzong Yang |
| 202 | The First People's Hospital of Changde | Central China | Hunan | Changde | Yi Huang |
| 203 | Tianjin Chest Hospital | Northern China | Tianjin | Tianjin | Yin Liu |
| 204 | Hunan Provincial People's Hospital | Central China | Hunan | Changsha | Ying Guo |
| 205 | Longmen People’s Hospital | Southern China | Guangdong | Huizhou | Yingchao Luo |
| 206 | People's Hospital of Yuxi City | Southwest China | Yunnan | Yuxi | Yinglu Hao |
| 207 | The First Affiliated Hospital of China Medical University | Northeast China | Liaoning | Shenyang | Yingxian Sun |
| 208 | The People's Hospital of Guangxi Zhuang Autonomous Region | Southern China | Guangxi | Nanning | Yingzhong Lin |
| 209 | The First Teaching Hospital of Xinjiang Medical University | Northwest China | Xinjiang | Urumchi | Yitong Ma |
| 210 | Mingguang People’s Hospital | Eastern China | Anhui | Chuzhou | Yong Li |
| 211 | Baogang Hospital | Northern China | Inner Mongolia | Baotou | Yongdong Li |
| 212 | Jiangsu Binhai County People’s Hospital | Eastern China | jiangsu | Yancheng | Yonglin Zhang |
| 213 | The Fourth Affiliated Hospital of China Medical University | Northeast China | Liaoning | Shenyang | Yuanzhe Jin |
| 214 | First Affiliated Hospital of Harbin Medical University. | Northeast China | Heilongjiang | Harbin | Yue Li |
| 215 | Sihui People’s Hospital | Southern China | Guangdong | Zhaoqing  | Yuehua Huang |
| 216 | Tianjin Medical University General Hospital | Northern China | Tianjin | Tianjin | Yuemin Sun |
| 217 | Qian’an People’s Hospital | Northern China | Hebei | Tangshan | Yuheng Yang |
| 218 | Zhalantun People’s Hospital | Northern China | Inner Mongolia | Hulunbeier | Yuhua Zhu |
| 219 | Longjiang First People’s Hospital | Northeast China | Heilongjiang | Qiqihar | Yuhuan Shi |
| 220 | The Second Affiliated Hospital of Zhengzhou University | Central China | Henan | Zhengzhou | Yulan Zhao |
| 221 | Nanfang Hospital of Southern Medical University | Southern China | Guangdong | Guangzhou | Yuqing Hou |
| 222 | The First Affiliated Hospital to Nanchang University | Eastern China | Jiangxi | Nanchang | Zeqi Zheng |
| 223 | Cangzhou Central Hospital | Northern China | Hebei | Cangzhou | Zesheng Xu |
| 224 | The Central Hospital of Shaoyang | Central China | Hunan | Shaoyang | Zewei Ouyang |
| 225 | Yulong Hospital | Southwest China | Yunnan | Lijiang | Zeyuan He |
| 226 | Affilioted Hospital of North Sichuan Medical College | Northwest China | Sichuan | Nanchong | Zhan Lv |
| 227 | The People's Hospital of Liaoning Province | Northeast China | Liaoning | Shenyang | Zhanquan Li |
| 228 | The First Affiliated Hospital of Jiamusi University | Northeast China | Heilongjiang | Jiamusi | Zhaofa He |
| 229 | Tangshan Gongren Hospital | Northern China | Hebei | Tangshan | Zheng Ji |
| 230 | The First Affiliated Hospital of Lanzhou University | Northwest China | Gansu | Lanzhou | Zheng Zhang |
| 231 | The Third Hospital of Shijiazhuang | Northern China | Hebei | Shijiazhuang | Zhenguo Ji |
| 232 | Huaibei Miners General Hospital | Eastern China | Anhui | Huaibei | Zhenqi Su |
| 233 | Wuxi People's Hospital | Eastern China | Jiangsu | Wuxi | Zhenyu Yang |
| 234 | Linyi People's Hospital | Eastern China | Shandong | Linyi | Zhihong Ou |
| 235 | Jiangsu Province Hospital | Eastern China | Jiangsu | Nanjing | Zhijian Yang |
| 236 | The Second Hospital of Shanxi Medical University | Northern China | Shanxi | Taiyuan | Zhiming Yang |
| 237 | The Affiliated Hospital of Xuzhou Medical College | Eastern China | Jiangsu | Xuzhou | Zhirong Wang |
| 238 | Southwest Hospital, Third Military Medical University | Southwest China | Chongqing | Chongqing | Zhiyuan Song |
| 239 | Zhijin People’s Hospital | Southwest China | Guizhou | Bijie | Zhongshan Wang |
| 240 | The First Affiliated Hospital of Xi’an Jiaotong University | Northwest China | Shaanxi | Xi'an | Zuyi Yuan |

**Supplemental References**

1. Zhang H, Masoudi FA, Li J, *et al*. National assessment of early β-blocker therapy in patients with acute myocardial infarction in China, 2001-2011: The China Patient-centered Evaluative Assessment of Cardiac Events (PEACE)-Retrospective AMI Study. *Am Heart J* 2015;**170**:506-15.e1.
2. Goldberger JJ, Bonow RO, Cuffe M, *et al*. beta-Blocker use following myocardial infarction: low prevalence of evidence-based dosing. *Am Heart J* 2010;**160**:435-442.e1.
3. Gaggin HK, Motiwala S, Bhardwaj A, Parks KA, Januzzi JL, Jr. Soluble concentrations of the interleukin receptor family member ST2 and β-blocker therapy in chronic heart failure. *Circ Heart Fail* 2013;**6**:1206-13.
4. [2019 Chinese Society of Cardiology (CSC) guidelines for the diagnosis and management of patients with ST-segment elevation myocardial infarction]. *Zhonghua Xin Xue Guan Bing Za Zhi* 2019;**47**:766-783.
5. O'gara PT, Kushner FG, Ascheim DD, *et al*. 2013 ACCF/AHA guideline for the management of ST-elevation myocardial infarction: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation* 2013;**127**:e362-425.
6. Levey AS, Stevens LA, Schmid CH, *et al*. A new equation to estimate glomerular filtration rate. *Ann Intern Med* 2009;**150**:604-12.
7. Mathews R, Peterson ED, Chen AY, *et al*. In-hospital major bleeding during ST-elevation and non-ST-elevation myocardial infarction care: derivation and validation of a model from the ACTION Registry®-GWTG™. *Am J Cardiol* 2011;**107**:1136-43.
8. Rao SV, O'grady K, Pieper KS, *et al*. A comparison of the clinical impact of bleeding measured by two different classifications among patients with acute coronary syndromes. *J Am Coll Cardiol* 2006;**47**:809-16.
9. James S, Akerblom A, Cannon CP, *et al*. Comparison of ticagrelor, the first reversible oral P2Y(12) receptor antagonist, with clopidogrel in patients with acute coronary syndromes: Rationale, design, and baseline characteristics of the PLATelet inhibition and patient Outcomes (PLATO) trial. *Am Heart J* 2009;**157**:599-605.
10. Hao Y, Liu J, Liu J, *et al*. Rationale and design of the Improving Care for Cardiovascular Disease in China (CCC) project: A national effort to prompt quality enhancement for acute coronary syndrome. *Am Heart J* 2016;**179**:107-15.
11. Austin PC. Optimal caliper widths for propensity-score matching when estimating differences in means and differences in proportions in observational studies. *Pharm Stat* 2011;**10**:150-61.
12. Vanderweele TJ and Ding P. Sensitivity Analysis in Observational Research: Introducing the E-Value. *Ann Intern Med* 2017;**167**:268-274.