**SUPPLEMENTAL MATERIAL**

This appendix has been provided by the authors to give readers additional information about their work.

**Contents**

Supplementary Method

Supplementary Table 1: Medication for comorbidities prior to admission

Supplementary Table 2 Comparison of mortality and other outcomes between ACEI and Non-RAASi; and ARB and Non-RAASi

Supplementary Table 3 Comparison of mortality and other outcomes between patients solely treated with ACEI or ARB and CCB

Supplementary Table 4: Baseline Characteristics of the survived and deceased patients

Supplementary Table 5 Multivariable Cox regression analysis with backwards-stepwise (Likelihood Ratio) selection to show the independent predictors of mortality

Supplementary Figure 1: The relationship of Age and Respiratory rate and mortality

Supplementary Table 6 Laboratory results among patients with or without history of hypertension upon admission

Supplementary Table 7 Laboratory results among patients with or without treatment of hypertension upon admission

Supplementary Table 8 Laboratory results among patients with RAAS inhibitors or Non-RAAS inhibitors for treating hypertension upon admission

**Supplementary Method**

**Propensity scores calculation**

Propensity scores (PS) were calculated1 by including the variables shown in the table below. PS were distributed in a range of 0.1 to 0.75. Therefore, no case was considered to have an extreme propensity score, and none were trimmed. Cox proportional hazard models adjusted to propensity score were then used to compare the endpoints in different cohorts. A value of *p* < 0.05 was considered significant.

**Table 2 Comparison of mortality between cohorts**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Hypertension | No history of hypertension |  | HR (95%CI) | P value |
| 34/850 (4.0%) | 22/2027 (1.1%) | Unadjusted | 3.75 (2.19-6.41) | <0.001 |
| Adjusted | 2.06 (1.10-3.83) | 0.023 |
| Propensity score adjusted\* | 3.45 (1.39-8.55) | 0.008 |
| No Antihypertension Treatment | Antihypertension Treatment |  | HR (95%CI) | P value |
| 11/140 (7.9%) | 23/710 (3.2%) | Unadjusted | 2.52 (1.23-5.17) | 0.012 |
| Adjusted | 2.24 (1.05-4.76) | 0.037 |
| Propensity score adjusted\*\* | 2.43 (1.01-5.38) | 0.028 |
| RAAS inhibitors | Non-RAAS inhibitors |  | HR (95%CI) | P value |
| 4/183 (2.2%) | 19/527 (3.6%) | Unadjusted | 0.60 (0.20-1.76) | 0.354 |
| Adjusted | 0.85 (0.28-2.58) | 0.774 |
| Propensity score adjusted\*\*\* | 0.93 (0.31-2.84) | 0.901 |

-Cox regression adjusted for age, sex, medical history of diabetes, insulin treated diabetes, myocardial infarction, underwent PCI/CABG, renal failure, stroke, heart failure, and COPD

\*Propensity score method, adjusted for age, sex, Symptoms at admission (Fever, Cough, Fatigue, Muscle ache, Head ache, Hemoptysis, Shortness of breath, Chest pain, Diarrhea and Shivering), Heart rate, Respiratory rate, Medical history (Diabetes, Myocardial angina, Myocardial infarction, PCI/CABG, Peripheral vascular disease, Chronic heart failure, Stroke, Renal failure, Chronic obstructive pulmonary disease, Pneumonia, Obstructive sleep apnea, Cancer, Alcoholism, and Smoker), medication prior to admission (Acarbose, Metformin, Glimepiride, Insulin, ARB, ACEI, Beta-blocker, CCB, Diuretics, Aspirin, Ticagrelor or Clopidogrel, and Statin).

\*\*Propensity score method, adjusted for age, sex, Symptoms at admission (Fever, Cough, Fatigue, Muscle ache, Head ache, Hemoptysis, Shortness of breath, Chest pain, Diarrhea and Shivering), Heart rate, Respiratory rate, Medical history (Diabetes, Myocardial angina, Myocardial infarction, PCI/CABG, Peripheral vascular disease, Chronic heart failure, Stroke, Renal failure, Chronic obstructive pulmonary disease, Pneumonia, Obstructive sleep apnea, Cancer, Alcoholism, and Smoker), medication prior to admission (Acarbose, Metformin, Glimepiride, Insulin, Aspirin, Ticagrelor or Clopidogrel, and Statin).

\*\*\*Propensity score method, adjusted for age, sex, Symptoms at admission (Fever, Cough, Fatigue, Muscle ache, Head ache, Hemoptysis, Shortness of breath, Chest pain, Diarrhea and Shivering), Heart rate, Respiratory rate, Medical history (Diabetes, Myocardial angina, Myocardial infarction, PCI/CABG, Peripheral vascular disease, Chronic heart failure, Stroke, Renal failure, Chronic obstructive pulmonary disease, Pneumonia, Obstructive sleep apnea, Cancer, Alcoholism, and Smoker), medication prior to admission (Acarbose, Metformin, Glimepiride, Insulin, Diuretics, Beta-blocker, Aspirin, Ticagrelor or Clopidogrel, and Statin).

**Meta-analysis**

We searched PubMed and ISI Web of Science from Dec 1, 2019, to April 25, 2020 for clinical studies that compared the mortality rates between RAASi and non-RAASi. We have also checked the reference lists of original trials. Two authors (Y.C. and C.G.) independently assessed trial eligibility and extracted data. Disagreements were resolved by consensus and by discussion with a third author (F.L.).

The meta-analytic summary estimates (relative risk [RR] with 95% CIs) for the RAASi versus Non-RAASi for the mortality were calculated by using both the fixed-effect model and the random-effects model of DerSimonian and Laird. This was done to compare the fixed- and random-effects estimates of the intervention effect as recommended by the Cochrane Collaboration given that we anticipated some heterogeneity (I2 >0). If the estimates are similar, then any small-study effects have little effect on the intervention effect estimate. Heterogeneity was assessed using the I2 statistic, with I2 <25% considered low, I2 ≥25% and ≤75% considered moderate, and I2 >75% considered high.

**Supplementary Table 1 Medication for comorbidities prior to admission**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Hypertension (-) | Hypertension (+) | P value | Antihypertension (-) | Antihypertension (+) | P value | RAASi (-) | RAASi (+) | P value |
| (n=2027) | (n=850) | (n=140) | (n=710) | (n=527) | (n=183) |
|  Acarbose | 62 (3.1%) | 86 (10.1%) | <0.001 | 4 (2.9%) | 82 (11.6%) | 0.001 | 58 (11.0%) | 24 (13.1%) | 0.424 |
|  Metformin | 64 (3.2%) | 86 (10.1%) | <0.001 | 6 (4.3%) | 80 (11.3%) | 0.009 | 60 (11.4%) | 20 (10.9%) | 0.998 |
|  Glimepiride | 42 (2.1%) | 49 (5.8%) | <0.001 | 3 (2.1%) | 46 (6.5%) | 0.046 | 30 (5.7%) | 16 (8.7%) | 0.164 |
|  Insulin | 52 (2.6%) | 60 (7.1%) | <0.001 | 9 (6.4%) | 51 (7.2%) | 0.858 | 37 (7.0%) | 14 (7.7%) | 0.742 |
|  ACEI or ARB | 17 (0.8%) | 183 (21.5%) | <0.001 | 0 (0%) | 183 (25.8%) | <0.001 | 0 (0%) | 183 (100%) | <0.001 |
|  ARB | 11 (0.5%) | 131 (15.4%) | <0.001 | 0 (0.0%) | 131 (18.5%) | <0.001 | 0 (0.0%) | 131 (77.0%) | <0.001 |
|  Candesartan | 1 (0.05%) | 18 (2.1%) |  | 0 (0.0%) | 18 (2.5%) |  | 0 (0.0%) | 18 (9.8%) |  |
|  Valsartan | 5 (0.2%) | 36 (4.2%) |  | 0 (0.0%) | 36 (5.1%) |  | 0 (0.0%) | 36 (19.8%) |  |
|  Telmisartan | 1 (0.05%) | 30 (3.5%) |  | 0 (0.0%) | 30 (4.2%) |  | 0 (0.0%) | 30 (16.4%) |  |
|  Irbesartan | 4 (0.2%) | 38 (4.5%) |  | 0 (0.0%) | 38 (5.4%) |  | 0 (0.0%) | 38 (20.1%) |  |
|  Other ARB | 0 (0.0%) | 9 (1.1%) |  | 0 (0.0%) | 9 (1.3%) |  | 0 (0.0%) | 9 (4.9%) |  |
|  ACEI | 6 (0.3%) | 52 (6.1%) | <0.001 | 0 (0.0%) | 52 (7.3%) | <0.001 | 0 (0.0%) | 52 (23.0%) | <0.001 |
|  Perindopril | 2 (0.1%) | 24 (2.8%) |  | 0 (0.0%) | 24 (3.4%) |  | 0 (0.0%) | 24 (13.1%) |  |
|  Benapril | 3 (0.1%) | 11 (1.3%) |  | 0 (0.0%) | 11 (1.5%) |  | 0 (0.0%) | 11 (6.0%) |  |
|  Other ACEI | 1 (0.05%) | 19 (2.2%) |  | 0 (0.0%) | 19 (2.7%) |  | 0 (0.0%) | 19 (10.4%) |  |
|  Beta-blocker | 28 (1.4%) | 133 (15.7%) | <0.001 | 0 (0.0%) | 133 (18.7%) | <0.001 | 100 (19.0%) | 33 (18.0%) | 0.827 |
|  Metoprolol | 19 (0.9%) | 85 (10.0%) |  | 0 (0.0%) | 85 (12.0%) |  | 66 (12.5%) | 19 (10.4%) |  |
|  Bisoprolol | 9 (0.4%) | 48 (5.6%) |  | 0 (0.0%) | 48 (6.8%) |  | 34 (6.5%) | 14 (7.7%) |  |
|  Others | 0 (0.0%) | 1 (0.1%) |  | 0 (0.0%) | 1 (0.1%) |  | 1 (0.2%) | 0 (0%) |  |
|  CCB | 36 (1.8%) | 574 (67.5%) | <0.001 | 0 (0.0%) | 574 (67.5%) | <0.001 | 492 (93.4%) | 82 (44.8%) | <0.001 |
|  Amlodipine | 5 (0.2%) | 181 (21.3%) |  | 0 (0.0%) | 181 (25.5%) |  | 144 (27.3%) | 37 (20.2%) |  |
|  Felodipine | 6 (0.3%) | 29 (3.4%) |  | 0 (0.0%) | 29 (4.1%) |  | 21 (4.0%) | 8 (4.4%) |  |
|  Levamlodipine | 4 (0.2%) | 80 (9.4%) |  | 0 (0.0%) | 80 (11.3%) |  | 74 (14.0%) | 6 (3.3%) |  |
|  Nifedipine | 20 (0.1%) | 284 (33.4%) |  | 0 (0.0%) | 284 (40.0%) |  | 244 (46.3%) | 40 (21.9%) |  |
|  Others | 1 (0.05%) | 24 (2.8%) |  | 0 (0.0%) | 24 (3.4%) |  | 16 (3.0%) | 8 (4.4%) |  |
|  Diuretics | 11 (0.5%) | 37 (4.4%) | <0.001 | 0 (0.0%) | 37 (5.2%) | 0.002 | 20 (3.8%) | 17 (9.3%) | 0.006 |
|  Furosemide | 4 (0.2%) | 14 (1.6%) |  | 0 (0.0%) | 14 (2.0%) |  | 10 (1.9%) | 4 (2.2%) |  |
|  Spironolactone | 5 (0.2%) | 19 (2.2%) |  | 0 (0.0%) | 19 (2.7%) |  | 15 (2.8%) | 4 (2.2%) |  |
|  Hydrocholrothiazide | 1 (0.05%) | 5 (0.6%) |  | 0 (0.0%) | 5 (0.7%) |  | 2 (0.4%) | 3 (1.6%) |  |
|  Other Diuretics | 1 (0.05%) | 5 (0.6%) |  | 0 (0.0%) | 5 (0.7%) |  | 3 (0.6%) | 2 (1.1%) |  |
|  Aspirin | 59 (2.9%) | 81 (9.5%) | <0.001 | 6 (4.3%) | 75 (10.6%) | 0.031 | 53 (10.1%) | 22 (12.0%) | 0.545 |
|  Ticagrelor or Clopidogrel | 28 (1.4%) | 39 (4.6%) | <0.001 | 3 (2.1%) | 36 (5.1%) | 0.196 | 26 (4.9%) | 10 (5.5%) | 0.931 |
|  Statin | 63 (3.1%) | 104 (12.2%) | <0.001 | 16 (11.4%) | 88 (12.4%) | 0.859 | 63 (12.0%) | 25 (13.7%) | 0.636 |

**Supplementary Table 2 Comparison of mortality and other outcomes between ACEI and Non-RAASi; and ARB and Non-RAASi**

To understand whether ACEI and ARB had distinct effects on outcomes, we have also compared the influence of ACEI and ARB with Non-RAASi respectively. Compared with non-RAASi, the risks of mortality in patients with ARB or ACEI were both numerically lower. Although the event rates were low in both groups, therefore any results could be largely due to play of chance, these results did not indicate an obvious propensity that ARB and ACEI might have opposite hazard ratio for mortality.

A. Comparison of mortality

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ARB | Non-RAASi | HR (95% CI) | P value |
| Death/N | 3/131 (2.3%) | 19/527 (3.6%) | ﻿0.96 (0.27-3.42) | 0.953 |
|  | ACEI | Non-RAASi | HR (95% CI) | P value |
| Death/N | 1/52 (1.9%) | 19/527 (3.6%) | ﻿0.97 (0.12-7.66) | 0.975 |

B. Comparison of severity of COVID-19 and rates of ventilation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Severity of COVID-19 |  |  | Invasive mechanical ventilation |
| 　 | Mild | Severe | Critical | P for trend |  | Number of ventilation (%) | P value |
| ARB | 79 (60.3%) | 51 (38.9%) | 1 (0.8%) | 0.058 |  | 4 (3.1%) | 0.399 |
| Non-RAAS inhibitors | 350 (66.4%) | 159 (30.2%) | 18 (3.4%) |  |  | 25 (4.7%) |  |
|  |  |  |  |  |  |  |  |
| ACEI | 28 (53.8%) | 23 (44.2%) | 1 (1.9%) | 0.108 |  | 1 (1.9%) | 0.349 |
| Non-RAAS inhibitors | 350 (66.4%) | 159 (30.2%) | 18 (3.4%) |  |  | 25 (4.7%) |  |

**Supplementary Table 3 Comparison of mortality and other outcomes between patients solely treated with ACEI or ARB and CCB**

A. Comparison of mortality

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | ACEI or ARB | CCB | HR (95% CI) | P value |
| Death/N | 1/92 (1.1%) | 15/440 (3.4%) | 1.98 (0.25-15.55) | 0.518 |

**B.** Comparison of severity of COVID-19 and rates of ventilation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Severity of COVID-19 |  |  | Invasive mechanical ventilation  |
| 　 | Mild  | Severe  | Critical | P for trend  |  | Number of ventilation (%) | P value  |
| CCB | 290 (65.9%) | 136 (30.9%) | 14 (3.2%) | 0.959 |  | 22 (5.0%) | 0.093 |
| ACEI or ARB | 58 (63.0%) | 34 (37.0%) | 0 (0%) |  |  | 1 (1.1%) |  |

**Supplementary Table 4 Baseline Characteristics of the survived and deceased patients**

|  |  |  |  |
| --- | --- | --- | --- |
| 　 | Survived | Deceased | P value |
| 　 | N=2821 | N=56 |  |
| Age, yrs | 57.74 (14.42) | 70.96 (9.75) | <0.001 |
| Female Sex | 1387 (49.2) | 20 (35.7) | 0.063 |
| **Symptoms at admission** |  |  |  |
|  Fever | 2063 (73.1) | 40 (71.4) | 0.895 |
|  Cough | 1944 (68.9) | 46 (82.1) | 0.048 |
|  Fatigue | 1514 (53.7) | 47 (83.9) | <0.001 |
|  Muscle ache | 883 (31.3) | 32 (57.1) | <0.001 |
|  Head ache | 57 (2.0) | 1 (1.8) | 1 |
|  Hemoptysis | 12 (0.4) | 1 (1.8) | 0.619 |
|  Shortness of breath | 1264 (44.8) | 39 (69.6) | <0.001 |
|  Chest pain | 53 (1.9) | 4 (7.1) | 0.021 |
|  Diarrhea | 136 (4.8) | 2 (3.6) | 0.906 |
|  Shivering | 45 (1.6) | 6 (10.7) | <0.001 |
| **Blood pressure at admission (mmHg)** |  |  |  |
|  Systolic | 130.02 (16.12) | 132.34 (18.25) | 0.288 |
|  Diastolic | 81.23 (11.06) | 76.21 (12.05) | 0.001 |
| **Heart rate (per/min)** | 86.69 (13.34) | 90.45 (14.10) | 0.037 |
| **Respiratory rate (per/min)** | 20.24 (2.39) | 23.93 (5.88) | <0.001 |
| **Medical history** |  |  |  |
|  Hypertension | 816 (28.9) | 34 (60.7) | <0.001 |
|  Diabetes | 370 (13.1) | 17 (30.4) | <0.001 |
|  Myocardial angina | 202 (7.2) | 19 (33.9) | <0.001 |
|  Myocardial infarction | 7 (0.2) | 5 (8.9) | <0.001 |
|  PCI/CABG | 58 (2.1) | 4 (7.1) | 0.033 |
|  Peripheral vascular disease | 2 (0.1) | 0 (0.0) | 1 |
|  Chronic heart failure | 11 (0.4) | 12 (21.4) | <0.001 |
|  Stroke | 49 (1.7) | 3 (5.4) | 0.132 |
|  Renal failure | 8 (0.3) | 21 (37.5) | <0.001 |
|  Chronic obstructive pulmonary disease | 26 (0.9) | 5 (8.9) | <0.001 |
|  Pneumonia | 31 (1.1) | 5 (8.9) | <0.001 |
|  Obstructive sleep apnea | 2 (0.1)  | 0 (0.0)  |  1.000 |
|  Cancer | 45 (1.6) | 4 (7.1) | 0.008 |
|  Alcoholism | 121 (4.3) | 3 (5.4) | 0.954 |
|  Smoker | 185 (6.6) | 5 (8.9) | 0.663 |

**Supplementary Table 5 Multivariable Cox regression analysis with backwards-stepwise (Likelihood Ratio) selection to show the independent predictors of mortality**

To further explore the potential risk factors for mortality, we performed a multivariable Cox regression analysis with backwards-stepwise selection to identify the predictors of mortality.

Multivariable Cox regression analysis with backwards-stepwise (Likelihood Ratio) selection method (p-entry = 0.05, p-exit = 0.1) was used to identify independent predictors of mortality. Candidate variables were selected based on clinical judgment, including age, sex, symptoms upon admission, heart rate, respiratory rate, medical history and medications prior to admission. The results of the analysis are presented as hazard ratios (HR) and 95% conﬁdence intervals (CI).

A total of 7 variables were identified, including fatigue, age, hypertension, myocardial infarction, renal failure, respiratory rate and chronic heart failure.

|  |  |  |
| --- | --- | --- |
| Variables | HR (95%CI) | P value |
| Fatigue | 3.76 (1.77-7.97) | 0.001 |
| Age (per year) | 1.06 (1.04-1.09) | <0.001 |
| Hypertension | 2.00 (1.13-3.54) | 0.018 |
| Myocardial infarction | 28.90 (10.64-78.51) | <0.001 |
| Renal failure | 10.84 (4.97-23.64) | <0.001 |
| Respiratory rate (per/min) | 1.21 (1.15-1.28) | <0.001 |
| Chronic heart failure | 3.3 (1.33-8.19) | 0.010 |

**Supplementary Figure 1 The relationship of Age and Respiratory rate and mortality**

Since age and respiratory rate are two continuous variables included in the regression formula, we used restricted cubic spline to explore their relationship with mortality. We found a linear relationship between age and mortality (Figure A, Hazard ratio increase 1.06 per year), and a U-shaped relationship between respiratory rate and mortality, with respiratory rate at 18 per/min at the lowest risk (Figure B).



**Supplementary Table 6 Laboratory results among patients with or without history of hypertension upon admission**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Hypertension (-)  | Hypertension (+) | Reference range | P value |
| **Blood routine** |  |  |  |  |
| Red blood cell (1012/L) | 4.05 (3.73, 4.4) | 3.96 (3.6, 4.34) | 4.3-5.8 | <0.001 |
| Hemoglobin (g/L) | 125 (115, 136) | 122 (112, 134) | 130-175 | <0.001 |
| White blood cell (109/L) | 5.6 (4.6, 7) | 5.9 (4.8, 7.2) | 3.5-9.5 | <0.001 |
| Neutrophil (109/L) | 3.41 (2.61, 4.53) | 3.7 (2.87, 5.0) | 1.8-6.3 | <0.001 |
| Lymphocyte percentage (%) | 27.6 (20.9, 33.8) | 25.1 (17.9, 31.3) | 20-50 | <0.001 |
| lymphocyte (109/L) | 1.51 (1.12, 1.89) | 1.4 (1.01, 1.78) | 1.1-3.2 | <0.001 |
| Basophils (109/L) | 0.02 (0.01, 0.03) | 0.02 (0.01, 0.03) | 0-0.06 | 0.299 |
| Eosnophils (109/L) | 0.1 (0.06, 0.17) | 0.1 (0.05, 0.17) | 0.02-0.52 | 0.227 |
| Monocyte (109/L) | 0.43 (0.34, 0.54) | 0.43 (0.33, 0.55) | 01-0.6 | 0.808 |
| Platelet (109/L) | 223 (181, 273.75) | 227 (184, 284) | 125-350 | 0.349 |
| **Liver and renal function** (IU/L) |  |  |  |  |
| Aminotransferase |  |  |  |  |
| Alanine  | 23.9 (14.65, 39.95) | 22.9 (15.2, 36.5) | 9-50 | 0.249 |
| Aspartate | 19.9 (15.7, 26.8) | 19.85 (15.7, 27.3) | 9-60 | 0.619 |
| Gamma glutamyl | 29.8 (19, 49.13) | 31.4 (21.4, 52.9) | 10-60 | 0.012 |
| Alkaline Phosphatase | 68.8 (57.1, 83.9) | 73.2 (60.6, 88.9) | 45-125 | <0.001 |
| Total bilirubin (μmol/L) | 9.3 (7.3, 12.2) | 9.5 (7.1, 12.6) | 0-26 | 0.429 |
| Direct bilirubin (μmol/L) | 3.3 (2.4, 4.3) | 3.4 (2.5, 4.7) | 0-8 | 0.021 |
| Indirect bilirubin (μmol/L) | 6.01 (4.6, 7.91) | 6.06 (4.5, 7.93) | 0-14 | 0.948 |
| Albumin (g/L) | 38 (35, 40.5) | 37.2 (34.2, 40.1) | 40-55 | 0.001 |
| Glucose (mmol/L) | 4.91 (4.47, 5.64) | 5.36 (4.72, 7.36) | 3.9-6.11 | <0.001 |
| Lactate dehydrogenase (IU/L) | 172.75 (148.9, 207.9) | 189 (159.8, 234.48) | 120-250 | <0.001 |
| Blood urea nitrogen (mmol/L) | 4.25 (3.51, 5.23) | 5.04 (4.03, 6.6) | 3.6-9.5 | <0.001 |
| Cysteine C (μmol/L) | 0.91 (0.82, 1.04) | 1.015 (0.9, 1.19) | 0.63-1.25 | <0.001 |
| Creatinine (μmol/L) | 65.3 (54.4, 75.8) | 69 (55.92, 82.83) | 57-111 | 0.057 |
| Sodium (mmol/L) | 141.9 (139.7, 143.2) | 141.4 (139.45, 142.95) | 137-147 | 0.328 |
| Potassium (mmol/L) | 4.34 (4.03, 4.59) | 4.2 (3.93, 4.59) | 3.5-5.3 | 0.291 |
| **Coagulation profiles** |  |  |  |  |
| PT (Sec) | 12.86 (12.25, 13.57) | 12.8 (12.18, 13.58) | 9.2-15 | 0.559 |
| APTT (Sec) | 28.09 (26.2, 30.19) | 27.85 (26, 30) | 21-37 | 0.136 |
| FIB (g/L) | 2.93 (2.58, 3.37) | 3.04 (2.71, 3.49) | 2-4 | <0.001 |
| D-dimer (ng/L) | 0.38 (0.18, 0.77) | 0.5 (0.28, 1.02) | 0-0.55 | <0.001 |
| Prothrombin activity (%) | 95.6 (92, 98.9) | 95.9 (92, 99.2) | 70-125 | 0.496 |
| INR | 1.07 (1.02, 1.13) | 1.07 (1.02, 1.13) | 0.8-1.25 | 0.653 |
| **Cardiac biomarkers** |  |  |  |  |
| Cardiac troponin I (ng/ml) | 0.01 (0.01, 0.01) | 0.01 (0.01, 0.02) | 0-0.04 | 0.03 |
| BNP (mg/L) | 0.01 (0.01, 24.13) | 11.73 (0.01, 50.09) | 0-100 | <0.001 |
| **Inflammatory biomarkers** |  |  |  |  |
| C Reactive Protein (pg/ml) | 2.05 (0.71, 6.9) | 3.01 (1.14, 12.18) | 0-4 | <0.001 |
| Interleukins (pg/ml) | 1.86 (1.5, 3.88) | 2.5 (1.5, 5.01) | ＜7 | <0.001 |

**Supplementary Table 7 Laboratory results among patients with or without treatment of hypertension upon admission**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Antihypertension (-) | Antihypertension (+) | Reference range | P value |
| **Blood routine** |  |  |  |  |
| Red blood cell (1012/L) | 4.04 (3.64,4.38) | 3.96 (3.6,4.33) | 4.3-5.8 | 0.314 |
| Hemoglobin (g/L) | 126 (114,135) | 122 (111,134) | 130-175 | 0.046 |
| White blood cell (109/L) | 5.8 (4.8,7.2) | 6 (4.8,7.2) | 3.5-9.5 | 0.718 |
| Neutrophil (109/L) | 3.66 (2.81,4.68) | 3.73 (2.9,5.01) | 1.8-6.3 | 0.623 |
| Lymphocyte percentage (%) | 25.9 (19.5,30.8) | 24.9 (17.875,31.625) | 20-50 | 0.565 |
| lymphocyte (109/L) | 1.46 (1.06,1.74) | 1.39 (1,1.78) | 1.1-3.2 | 0.695 |
| Basophils (109/L) | 0.02 (0.01,0.03) | 0.02 (0.01,0.03) | 0-0.06 | 0.068 |
| Eosnophils (109/L) | 0.1 (0.05,0.18) | 0.1 (0.05,0.17) | 0.02-0.52 | 0.723 |
| Monocyte (109/L) | 0.41 (0.32,0.53) | 0.44 (0.34,0.55) | 01-0.6 | 0.482 |
| Platelet (109/L) | 230 (193, 283) | 226 (182, 284) | 125-350 | 0.318 |
| **Liver and renal function** (IU/L) |  |  |  |  |
| Aminotransferase |  |  |  |  |
| Alanine  | 23.8 (15.85, 36.55) | 22.6 (15, 36.5) | 9-50 | 0.532 |
| Aspartate | 19.7 (16.4, 27.2) | 19.9 (15.6, 27.3) | 9-60 | 0.6 |
| Gamma glutamyl | 32.8 (21.2, 54.35) | 31 (21.45, 52.15) | 10-60 | 0.657 |
| Alkaline Phosphatase | 72 (59.1, 86) | 73.4 (61.3, 89) | 45-125 | 0.294 |
| Total bilirubin (μmol/L) | 9.2 (7.1, 13.05) | 9.6 (7.1, 12.45) | 0-26 | 0.791 |
| Direct bilirubin (μmol/L) | 3 (2.5, 4.8) | 3.4 (2.5, 4.65) | 0-8 | 0.478 |
| Indirect bilirubin (μmol/L) | 5.94 (4.49, 8.03) | 6.08 (4.5, 7.88) | 0-14 | 0.866 |
| Albumin (g/L) | 37.9 (35.45, 40.1) | 37.2 (34, 40) | 40-55 | 0.156 |
| Glucose (mmol/L) | 5.41 (4.71, 6.70) | 5.31 (4.74, 7.44) | 3.9-6.11 | 0.92 |
| Lactate dehydrogenase (IU/L) | 189.7 (164.6, 240.8) | 189 (159.4, 233.6) | 120-250 | 0.858 |
| Blood urea nitrogen (mmol/L) | 4.67 (3.82, 5.69) | 5.11 (4.11, 7.1) | 3.6-9.5 | 0.214 |
| Cysteine C (μmol/L) | 1.02 (0.91, 1.12) | 1.01 (0.9, 1.2) | 0.63-1.25 | 0.857 |
| Creatinine (μmol/L) | 67.1 (56.5, 83.95) | 69.6 (55.63, 82.73) | 57-111 | 0.878 |
| Sodium (mmol/L) | 141.6 (139.65, 142.5) | 141.25 (139.48, 143) | 137-147 | 0.524 |
| Potassium (mmol/L) | 4.22 (3.87, 4.67) | 4.19 (3.95, 4.59) | 3.5-5.3 | 0.841 |
| **Coagulation profiles** |  |  |  |  |
| PT (Sec) | 12.82 (12.27, 13.48) | 12.8 (12.18, 13.6) | 9.2-15 | 0.813 |
| APTT (Sec) | 27.99 (26.52, 29.62) | 27.78 (25.93, 30.07) | 21-37 | 0.518 |
| FIB (g/L) | 3.09 (2.78, 3.53) | 3.03 (2.69, 3.49) | 2-4 | 0.383 |
| D-dimer (ng/L) | 0.49 (0.32, 1.05) | 0.5 (0.27, 1.02) | 0-0.55 | 0.713 |
| Prothrombin activity (%) | 95.9 (92.7, 98.3) | 95.9 (91.9, 99.23) | 70-125 | 0.823 |
| INR | 1.07 (1.02, 1.12) | 1.07 (1.02, 1.13) | 0.8-1.25 | 0.928 |
| **Cardiac biomarkers** |  |  |  |  |
| Cardiac troponin I (ng/ml) | 0.01 (0.01, 0.02) | 0.01 (0.01, 0.02) | 0-0.04 | 0.688 |
| BNP (mg/L) | 3.6 (0.01, 35.61) | 12.35 (0.01, 52.69) | 0-100 | 0.373 |
| **Inflammatory biomarkers** |  |  |  |  |
| C Reactive Protein (pg/ml) | 2.96 (1.24, 12.86) | 3.03 (1.12, 12.18) | 0-4 | 0.554 |
| Interleukins (pg/ml) | 2.52 (1.5, 4.40) | 2.5 (1.5, 5.17) | ＜7 | 0.569 |

**Supplementary Table 8 Laboratory results among patients with RAAS inhibitors or Non-RAAS inhibitors for treating hypertension upon admission**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | RAASi (-) | RAASi (+) | Reference range | P value |
| **Blood routine** |  |  |  |  |
| Red blood cell (1012/L) | 3.93 (3.57,4.32) | 3.99 (3.68,4.35) | 4.3-5.8 | 0.168 |
| Hemoglobin (g/L) | 122 (110.5, 133) | 123 (112,134.75) | 130-175 | 0.353 |
| White blood cell (109/L) | 6 (4.8, 7.2) | 5.95 (4.7,7.2) | 3.5-9.5 | 0.858 |
| Neutrophil (109/L) | 3.73 (2.92, 5.02) | 3.79 (2.84,4.965) | 1.8-6.3 | 0.763 |
| Lymphocyte percentage (%) | 24.65 (17.4, 31.48) | 26.15 (18.6,32.075) | 20-50 | 0.282 |
| lymphocyte (109/L) | 1.38 (0.98, 1.77) | 1.43 (1.09, 1.79) | 1.1-3.2 | 0.227 |
| Basophils (109/L) | 0.02 (0.01, 0.03) | 0.02 (0.01, 0.03) | 0-0.06 | 0.681 |
| Eosnophils (109/L) | 0.1 (0.05, 0.17) | 0.1 (0.06, 0.18) | 0.02-0.52 | 0.36 |
| Monocyte (109/L) | 0.44 (0.34, 0.55) | 0.43 (0.33, 0.55) | 01-0.6 | 0.586 |
| Platelet (109/L) | 226 (182, 284.5) | 225 (181, 278.75) | 125-350 | 0.893 |
| **Liver and renal function** (IU/L) |  |  |  |  |
| Aminotransferase |  |  |  |  |
| Alanine  | 22.05 (15.08, 33.93) | 23.7 (14.95, 40.1) | 9-50 | 0.117 |
| Aspartate | 20 (15.7, 27.15) | 19.7 (15.15, 27.6) | 9-60 | 0.853 |
| Gamma glutamyl | 29.8 (20.5, 47.43) | 33.3 (23, 58.45) | 10-60 | 0.028 |
| Alkaline Phosphatase | 72.55 (60.63, 88.68) | 74.8 (63.1, 89.4) | 45-125 | 0.451 |
| Total bilirubin (μmol/L) | 9.4 (7.1, 12.2) | 9.7 (7.15, 12.95) | 0-26 | 0.477 |
| Direct bilirubin (μmol/L) | 3.4 (2.5, 4.6) | 3.6 (2.6, 4.9) | 0-8 | 0.361 |
| Indirect bilirubin (μmol/L) | 6 (4.41, 7.76) | 6.41 (4.78, 8.94) | 0-14 | 0.049 |
| Albumin (g/L) | 37.2 (34.05, 40) | 37.2 (33.8, 40.1) | 40-55 | 0.773 |
| Glucose (mmol/L) | 5.41 (4.77, 7.43) | 4.7 (4.3, 7.27) | 3.9-6.11 | 0.247 |
| Lactate dehydrogenase (IU/L) | 190.5 (159.8, 234.8) | 181.55 (157.43, 220.85) | 120-250 | 0.163 |
| Blood urea nitrogen (mmol/L) | 4.98 (4.07, 6.40) | 6.57 (4.64, 11.39) | 3.6-9.5 | 0.086 |
| Cysteine C (μmol/L) | 1 (0.89, 1.18) | 1.06 (1.01, 1.55) | 0.63-1.25 | 0.055 |
| Creatinine (μmol/L) | 67.7 (53.9, 81.55) | 75.5 (58.5, 100.55) | 57-111 | 0.158 |
| Sodium (mmol/L) | 141.2 (139.43, 142.98) | 141.8 (139.8, 142.9) | 137-147 | 0.644 |
| Potassium (mmol/L) | 4.16 (3.93, 4.56) | 4.49 (4.15, 4.63) | 3.5-5.3 | 0.084 |
| **Coagulation profiles** |  |  |  |  |
| PT (Sec) | 12.81 (12.17, 13.61) | 12.78 (12.28, 13.58) | 9.2-15 | 0.762 |
| APTT (Sec) | 27.76 (25.93, 30.09) | 27.9 (25.94, 29.90) | 21-37 | 0.769 |
| FIB (g/L) | 3.03 (2.72, 3.49) | 3.02 (2.65, 3.48) | 2-4 | 0.844 |
| D-dimer (ng/L) | 0.53 (0.27, 1.06) | 0.45 (0.27, 0.94) | 0-0.55 | 0.249 |
| Prothrombin activity (%) | 95.84 (91.8, 99.29) | 96 (92, 99.1) | 70-125 | 0.533 |
| INR | 1.07 (1.01, 1.13) | 1.07 (1.02, 1.13) | 0.8-1.25 | 0.686 |
| **Cardiac biomarkers** |  |  |  |  |
| Cardiac troponin I (ng/ml) | 0.01 (0.01, 0.02) | 0.01 (0.01, 0.02) | 0-0.04 | 0.991 |
| BNP (mg/L) | 13.47 (0.01, 56.52) | 0.01 (0.01, 34.72) | 0-100 | 0.217 |
| **Inflammatory biomarkers** |  |  |  |  |
| C Reactive Protein (pg/ml) | 3.18 (1.07, 12.29) | 2.72 (1.18, 11.67) | 0-4 | 0.869 |
| Interleukins (pg/ml) | 2.5 (1.5, 5.44) | 2.51 (1.5, 4.71) | ＜7 | 0.528 |

**References**

1. Elze MC, Gregson J, Baber U, Williamson E, Sartori S, Mehran R, Nichols M, Stone GW, Pocock SJ. Comparison of Propensity Score Methods and Covariate Adjustment: Evaluation in 4 Cardiovascular Studies. J Am Coll Cardiol 2017;69(3):345-357.

2. Little RJA, Rubin DB. *Statistical analysis with missing data*: John Wiley & Sons, Inc.; 1986.