## Supplementary Table 1. Basic demographic characteristics of the original cohort

|  | **Optimal TWA-MAP (N=1995) 1** | **Low TWA-MAP (N=1081) 2** | **High TWA-MAP (N=372) 3** | **p-value** | **SMD (Compare to Optimal TWA-MAP, respectively)** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- | --- |
| Age | **67.70 (13.80)** | **70.27 (13.92)** | **64.55 (15.68)** | **<0.001** | **[ 0.185 , 0.213 ]** | **0.00** |
| Gender (Female) | **696 (34.89%)** | **463 (42.83%)** | **150 (40.32%)** | **<0.001** | **[ 0.164 , 0.112 ]** | **0.00** |
| Weight | 82.76 (20.90) | 82.44 (21.70) | 81.39 (22.37) | 0.16 | [ 0.015 , 0.063 ] | 0.49 |
| SAPS II | **33.94 (12.66)** | **35.73 (13.72)** | **32.97 (12.73)** | **<0.001** | **[ 0.136 , 0.076 ]** | **0.00** |
| SOFA score | **6.23 (3.12)** | **6.69 (3.60)** | **5.76 (2.90)** | **<0.001** | **[ 0.135 , 0.157 ]** | **0.00** |
| Charlson comorbidity index | **5.30 (2.41)** | **5.84 (2.38)** | **4.88 (2.52)** | **<0.001** | **[ 0.224 , 0.172 ]** | **0.00** |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** | | | | | |  |
| Mechanical ventilation (YES) | **1709 (85.66%)** | **776 (71.79%)** | **313 (84.14%)** | **<0.001** | **[ 0.344 , 0.043 ]** | **0.00** |
| Sedative therapy (YES) | **1549 (77.64%)** | **687 (63.55%)** | **276 (74.19%)** | **<0.001** | **[ 0.313 , 0.081 ]** | **0.00** |
| Length of vasopressor therapy | **39.66 (58.09)** | **43.15 (60.30)** | **23.75 (37.51)** | **<0.001** | **[ 0.059 , 0.326 ]** | **0.00** |
| **Comorbidities (boolean)** | | | | | |  |
| HF (YES) | **773 (38.75%)** | **499 (46.16%)** | **125 (33.60%)** | **<0.001** | **[ 0.150 , 0.107 ]** | **0.00** |
| Hypertension (YES) | **1141 (57.19%)** | **553 (51.16%)** | **208 (55.91%)** | **<0.01** | **[ 0.121 , 0.026 ]** | **0.00** |
| AFIB (YES) | **753 (37.74%)** | **442 (40.89%)** | **119 (31.99%)** | **<0.01** | **[ 0.064 , 0.121 ]** | **0.00** |
| Renal (YES) | **138 (6.92%)** | **128 (11.84%)** | **16 (4.30%)** | **<0.001** | **[ 0.169 , 0.114 ]** | **0.00** |
| Liver (YES) | **60 (3.01%)** | **84 (7.77%)** | **12 (3.23%)** | **<0.001** | **[ 0.212 , 0.013 ]** | **0.00** |
| COPD (YES) | 277 (13.88%) | 152 (14.06%) | 36 (9.68%) | 0.07 | [ 0.005 , 0.131 ] | 0.00 |
| CAD (YES) | **917 (45.96%)** | **461 (42.65%)** | **126 (33.87%)** | **<0.001** | **[ 0.067 , 0.249 ]** | **0.00** |
| Stroke (YES) | **108 (5.41%)** | **57 (5.27%)** | **45 (12.10%)** | **<0.001** | **[ 0.006 , 0.238 ]** | **0.00** |
| Malignancy (YES) | 266 (13.33%) | 157 (14.52%) | 46 (12.37%) | 0.5 | [ 0.034 , 0.029 ] | 0.00 |
| **Vital signs (1st 24 h)** | | | | | |  |
| MAP | **76.95 (15.53)** | **69.59 (14.41)** | **84.96 (17.04)** | **<0.001** | **[ 0.491 , 0.492 ]** | **0.00** |
| Temperature | 36.14 (2.71) | 36.16 (2.67) | 35.98 (3.25) | 0.74 | [ 0.010 , 0.051 ] | 0.00 |
| Heart rate | **91.31 (18.85)** | **88.53 (18.70)** | **89.65 (20.12)** | **<0.001** | **[ 0.148 , 0.085 ]** | **0.00** |
| **Laboratory tests (1st 24 h)** | | | | | |  |
| pH | 7.36 (0.10) | 7.36 (0.10) | 7.35 (0.10) | 0.87 | [ 0.008 , 0.030 ] | 7.83 |
| PO2 | **241.07 (131.40)** | **228.06 (135.42)** | **231.92 (130.88)** | **<0.05** | **[ 0.098 , 0.070 ]** | **8.96** |
| PCO2 | **42.91 (11.56)** | **42.33 (11.20)** | **40.95 (11.60)** | **<0.001** | **[ 0.051 , 0.170 ]** | **8.96** |
| Lactate | 2.83 (2.23) | 2.95 (2.54) | 3.17 (2.74) | 0.54 | [ 0.049 , 0.134 ] | 38.86 |
| Creatinine | **1.36 (1.36)** | **1.87 (4.36)** | **1.34 (1.24)** | **<0.001** | **[ 0.158 , 0.015 ]** | **0.17** |
| WBC | 14.16 (9.27) | 14.21 (7.98) | 14.31 (7.63) | 0.77 | [ 0.005 , 0.017 ] | 0.58 |
| Hemoglobin | **10.28 (1.97)** | **10.00 (1.85)** | **10.73 (2.18)** | **<0.001** | **[ 0.147 , 0.215 ]** | **0.44** |
| Platelet | **193.76 (110.08)** | **194.92 (119.97)** | **208.31 (118.05)** | **<0.05** | **[ 0.010 , 0.128 ]** | **0.52** |
| **Outcomes (boolean)** | | | | | |  |
| 28-day mortality (Death) | **348 (17.44%)** | **285 (26.36%)** | **75 (20.16%)** | **<0.001** | **[ 0.217 , 0.070 ]** | **0.00** |
| ICU mortality (Death) | **239 (11.98%)** | **197 (18.22%)** | **48 (12.90%)** | **<0.001** | **[ 0.175 , 0.028 ]** | **0.00** |
| **Length of Stay (days)** | | | | | |  |
| ICU LOS | **6.26 (8.25)** | **5.29 (6.45)** | **5.51 (5.77)** | **<0.05** | **[ 0.131 , 0.106 ]** | **0.00** |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | | |
| 2Low TWA-MAP: TWA-MAP < 70 (mm Hg) | | | | | | |
| 3High TWA-MAP: 83 ≤ TWA-MAP (mm Hg) | | | | | | |

## Supplementary Table 2. Standardized mean difference (SMD) of covariates before and after propensity score matching of cohort 1

| Characteristic | Before matcing | After matcing |
| --- | --- | --- |
| SMD ≤ 0.1 | 13 | 29 |
| SMD > 0.1 | 16 | 0 |
| Total number of covariates | 29 | 29 |

## Supplementary Table 3. Baseline characteristics before propensity score matching of cohort 1

|  | **Optimal TWA-MAP (N=1995) 1** | **Low TWA-MAP (N=1081) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | **67.70 (13.80)** | **70.27 (13.92)** | **<0.001** | **0.185** | **0** |
| Gender (Female) | **696 (34.89%)** | **463 (42.83%)** | **<0.001** | **0.164** | **0** |
| Weight | 82.76 (20.89) | 82.49 (21.70) | 0.46 | 0.013 | 0 |
| SAPS II | **33.94 (12.66)** | **35.73 (13.72)** | **<0.001** | **0.136** | **0** |
| SOFA score | **6.23 (3.12)** | **6.69 (3.60)** | **<0.01** | **0.135** | **0** |
| Charlson comorbidity index | **5.30 (2.41)** | **5.84 (2.38)** | **<0.001** | **0.224** | **0** |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | **1709 (85.66%)** | **776 (71.79%)** | **<0.001** | **0.344** | **0** |
| Sedative therapy (YES) | **1549 (77.64%)** | **687 (63.55%)** | **<0.001** | **0.313** | **0** |
| Length of vasopressor therapy | **39.66 (58.09)** | **43.15 (60.30)** | **<0.01** | **0.059** | **0** |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | **773 (38.75%)** | **499 (46.16%)** | **<0.001** | **0.15** | **0** |
| Hypertension (YES) | **1141 (57.19%)** | **553 (51.16%)** | **<0.01** | **0.121** | **0** |
| AFIB (YES) | 753 (37.74%) | 442 (40.89%) | 0.1 | 0.064 | 0 |
| Renal (YES) | **138 (6.92%)** | **128 (11.84%)** | **<0.001** | **0.169** | **0** |
| Liver (YES) | **60 (3.01%)** | **84 (7.77%)** | **<0.001** | **0.212** | **0** |
| COPD (YES) | 277 (13.88%) | 152 (14.06%) | 0.94 | 0.005 | 0 |
| CAD (YES) | 917 (45.96%) | 461 (42.65%) | 0.08 | 0.067 | 0 |
| Stroke (YES) | 108 (5.41%) | 57 (5.27%) | 0.94 | 0.006 | 0 |
| Malignancy (YES) | 266 (13.33%) | 157 (14.52%) | 0.39 | 0.034 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | **76.95 (15.53)** | **69.59 (14.41)** | **<0.001** | **0.491** | **0** |
| Temperature | 36.14 (2.71) | 36.16 (2.67) | 0.66 | 0.01 | 0 |
| Heart rate | **91.31 (18.85)** | **88.53 (18.70)** | **<0.001** | **0.148** | **0** |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.36 (0.10) | 7.36 (0.10) | 0.88 | <0.001 | 0 |
| PO2 | **240.07 (131.04)** | **226.78 (133.76)** | **<0.01** | **0.1** | **0** |
| PCO2 | 42.96 (11.81) | 42.47 (11.36) | 0.42 | 0.042 | 0 |
| Lactate | 2.73 (2.07) | 2.85 (2.37) | 0.89 | 0.053 | 0 |
| Creatinine | **1.36 (1.36)** | **1.87 (4.36)** | **<0.001** | **0.158** | **0** |
| WBC | 14.18 (9.25) | 14.19 (7.96) | 0.77 | 0.002 | 0 |
| Hemoglobin | **10.28 (1.97)** | **10.01 (1.85)** | **<0.001** | **0.144** | **0** |
| Platelet | 193.91 (109.96) | 194.83 (119.80) | 0.45 | 0.008 | 0 |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | **348 (17.44%)** | **285 (26.36%)** | **<0.001** | **0.217** | **0** |
| ICU mortality (Death) | **239 (11.98%)** | **197 (18.22%)** | **<0.001** | **0.175** | **0** |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | **6.26 (8.25)** | **5.29 (6.45)** | **<0.05** | **0.131** | **0** |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2Low TWA-MAP: TWA-MAP < 70 (mm Hg) | | | | | |

## Supplementary Table 4. Baseline characteristics after propensity score matching of cohort 1

|  | **Optimal TWA-MAP (N=969) 1** | **Low TWA-MAP (N=969) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | 69.72 (13.33) | 70.02 (13.97) | 0.34 | 0.022 | 0 |
| Gender (Female) | 395 (40.76%) | 393 (40.56%) | 0.96 | 0.004 | 0 |
| Weight | 81.97 (20.79) | 82.38 (21.45) | 0.95 | 0.019 | 0 |
| SAPS II | 35.49 (12.57) | 35.41 (13.89) | 0.92 | 0.006 | 0 |
| SOFA score | 6.55 (3.13) | 6.50 (3.55) | 0.17 | 0.014 | 0 |
| Charlson comorbidity index | 5.69 (2.34) | 5.71 (2.38) | 0.58 | 0.009 | 0 |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | 737 (76.06%) | 754 (77.81%) | 0.39 | 0.042 | 0 |
| Sedative therapy (YES) | 650 (67.08%) | 668 (68.94%) | 0.41 | 0.04 | 0 |
| Length of vasopressor therapy | 40.38 (59.41) | 41.66 (55.89) | 0.08 | 0.022 | 0 |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | 428 (44.17%) | 426 (43.96%) | 0.96 | 0.004 | 0 |
| Hypertension (YES) | 519 (53.56%) | 519 (53.56%) | 1 | <0.001 | 0 |
| AFIB (YES) | 383 (39.53%) | 404 (41.69%) | 0.35 | 0.044 | 0 |
| Renal (YES) | 99 (10.22%) | 97 (10.01%) | 0.94 | 0.007 | 0 |
| Liver (YES) | 53 (5.47%) | 52 (5.37%) | 1 | 0.005 | 0 |
| COPD (YES) | 138 (14.24%) | 139 (14.34%) | 1 | 0.003 | 0 |
| CAD (YES) | 426 (43.96%) | 429 (44.27%) | 0.93 | 0.006 | 0 |
| Stroke (YES) | 52 (5.37%) | 52 (5.37%) | 1 | <0.001 | 0 |
| Malignancy (YES) | 136 (14.04%) | 137 (14.14%) | 1 | 0.003 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | 71.41 (14.68) | 71.11 (14.10) | 0.36 | 0.021 | 0 |
| Temperature | 36.17 (2.69) | 36.15 (2.80) | 0.58 | 0.01 | 0 |
| Heart rate | 90.24 (18.62) | 89.44 (18.68) | 0.21 | 0.043 | 0 |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.36 (0.10) | 7.36 (0.10) | 0.57 | 0.005 | 0 |
| PO2 | 230.91 (133.63) | 233.82 (133.59) | 0.64 | 0.022 | 0 |
| PCO2 | 42.49 (11.41) | 42.61 (11.46) | 0.69 | 0.01 | 0 |
| Lactate | 2.81 (2.16) | 2.88 (2.41) | 0.68 | 0.028 | 0 |
| Creatinine | 1.61 (1.66) | 1.58 (1.45) | 0.59 | 0.017 | 0 |
| WBC | 14.26 (8.81) | 14.16 (7.79) | 0.66 | 0.011 | 0 |
| Hemoglobin | 10.02 (1.95) | 10.03 (1.88) | 0.94 | 0.005 | 0 |
| Platelet | 193.41 (112.65) | 194.76 (117.51) | 0.78 | 0.012 | 0 |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | **194 (20.02%)** | **238 (24.56%)** | **<0.05** | **0.109** | **0** |
| ICU mortality (Death) | **118 (12.18%)** | **175 (18.06%)** | **<0.001** | **0.165** | **0** |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | **6.16 (7.00)** | **5.30 (6.53)** | **<0.01** | **0.127** | **0** |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2Low TWA-MAP: TWA-MAP < 70 (mm Hg) | | | | | |

## Supplementary Table 5. Standardized mean difference (SMD) of covariates before and after propensity score matching of cohort 2

| Characteristic | Before matcing | After matcing |
| --- | --- | --- |
| SMD ≤ 0.1 | 14 | 28 |
| SMD > 0.1 | 15 | 1 |
| Total number of covariates | 29 | 29 |

## Supplementary Table 6. Baseline characteristics before propensity score matching of cohort 2

|  | **Optimal TWA-MAP (N=1995) 1** | **High TWA-MAP (N=372) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | **67.70 (13.80)** | **64.55 (15.68)** | **<0.001** | **0.213** | **0** |
| Gender (Female) | 696 (34.89%) | 150 (40.32%) | 0.05 | 0.112 | 0 |
| Weight | 82.76 (20.89) | 81.39 (22.37) | 0.06 | 0.063 | 0 |
| SAPS II | 33.94 (12.66) | 32.97 (12.73) | 0.22 | 0.076 | 0 |
| SOFA score | **6.23 (3.12)** | **5.76 (2.90)** | **<0.05** | **0.157** | **0** |
| Charlson comorbidity index | **5.30 (2.41)** | **4.88 (2.52)** | **<0.01** | **0.172** | **0** |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | 1709 (85.66%) | 313 (84.14%) | 0.49 | 0.043 | 0 |
| Sedative therapy (YES) | 1549 (77.64%) | 276 (74.19%) | 0.17 | 0.081 | 0 |
| Length of vasopressor therapy | **39.66 (58.09)** | **23.75 (37.51)** | **<0.001** | **0.326** | **0** |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | 773 (38.75%) | 125 (33.60%) | 0.07 | 0.107 | 0 |
| Hypertension (YES) | 1141 (57.19%) | 208 (55.91%) | 0.69 | 0.026 | 0 |
| AFIB (YES) | **753 (37.74%)** | **119 (31.99%)** | **<0.05** | **0.121** | **0** |
| Renal (YES) | 138 (6.92%) | 16 (4.30%) | 0.08 | 0.114 | 0 |
| Liver (YES) | 60 (3.01%) | 12 (3.23%) | 0.95 | 0.013 | 0 |
| COPD (YES) | **277 (13.88%)** | **36 (9.68%)** | **<0.05** | **0.131** | **0** |
| CAD (YES) | **917 (45.96%)** | **126 (33.87%)** | **<0.001** | **0.249** | **0** |
| Stroke (YES) | **108 (5.41%)** | **45 (12.10%)** | **<0.001** | **0.238** | **0** |
| Malignancy (YES) | 266 (13.33%) | 46 (12.37%) | 0.67 | 0.029 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | **76.95 (15.53)** | **84.96 (17.04)** | **<0.001** | **0.492** | **0** |
| Temperature | 36.14 (2.71) | 35.98 (3.25) | 0.62 | 0.051 | 0 |
| Heart rate | 91.31 (18.85) | 89.65 (20.12) | 0.32 | 0.085 | 0 |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.36 (0.10) | 7.35 (0.10) | 0.7 | 0.019 | 0 |
| PO2 | 240.07 (131.04) | 230.76 (130.58) | 0.26 | 0.071 | 0 |
| PCO2 | **42.96 (11.81)** | **41.03 (11.59)** | **<0.001** | **0.165** | **0** |
| Lactate | 2.73 (2.07) | 2.88 (2.42) | 0.94 | 0.067 | 0 |
| Creatinine | 1.36 (1.36) | 1.34 (1.24) | 0.66 | 0.014 | 0 |
| WBC | 14.18 (9.25) | 14.30 (7.62) | 0.55 | 0.015 | 0 |
| Hemoglobin | **10.28 (1.97)** | **10.73 (2.17)** | **<0.001** | **0.213** | **0** |
| Platelet | **193.91 (109.96)** | **208.06 (117.98)** | **<0.05** | **0.124** | **0** |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | 348 (17.44%) | 75 (20.16%) | 0.24 | 0.07 | 0 |
| ICU mortality (Death) | 239 (11.98%) | 48 (12.90%) | 0.68 | 0.028 | 0 |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | 6.26 (8.25) | 5.51 (5.77) | 0.16 | 0.106 | 0 |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2High TWA-MAP: 83 ≤ TWA-MAP (mm Hg) | | | | | |

## Supplementary Table 7. Baseline characteristics after propensity score matching of cohort 2

|  | **Optimal TWA-MAP (N=371) 1** | **High TWA-MAP (N=371) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | 63.32 (14.91) | 64.58 (15.69) | 0.14 | 0.082 | 0 |
| Gender (Female) | 135 (36.39%) | 150 (40.43%) | 0.29 | 0.083 | 0 |
| Weight | 81.29 (20.41) | 81.35 (22.39) | 0.38 | 0.003 | 0 |
| SAPS II | 32.98 (12.75) | 33.00 (12.74) | 0.93 | 0.001 | 0 |
| SOFA score | 6.09 (3.16) | 5.76 (2.91) | 0.25 | 0.109 | 0 |
| Charlson comorbidity index | 4.87 (2.55) | 4.88 (2.52) | 0.7 | 0.004 | 0 |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | 304 (81.94%) | 312 (84.10%) | 0.49 | 0.057 | 0 |
| Sedative therapy (YES) | 271 (73.05%) | 275 (74.12%) | 0.8 | 0.024 | 0 |
| Length of vasopressor therapy | **25.07 (28.70)** | **23.80 (37.55)** | **<0.001** | **0.038** | **0** |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | 127 (34.23%) | 125 (33.69%) | 0.94 | 0.011 | 0 |
| Hypertension (YES) | 197 (53.10%) | 207 (55.80%) | 0.51 | 0.054 | 0 |
| AFIB (YES) | 104 (28.03%) | 119 (32.08%) | 0.26 | 0.088 | 0 |
| Renal (YES) | 12 (3.23%) | 16 (4.31%) | 0.56 | 0.057 | 0 |
| Liver (YES) | 15 (4.04%) | 12 (3.23%) | 0.69 | 0.043 | 0 |
| COPD (YES) | 38 (10.24%) | 36 (9.70%) | 0.9 | 0.018 | 0 |
| CAD (YES) | 118 (31.81%) | 126 (33.96%) | 0.58 | 0.046 | 0 |
| Stroke (YES) | 44 (11.86%) | 44 (11.86%) | 1 | <0.001 | 0 |
| Malignancy (YES) | 54 (14.56%) | 46 (12.40%) | 0.45 | 0.063 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | 85.58 (17.98) | 84.87 (16.98) | 0.87 | 0.041 | 0 |
| Temperature | 36.06 (3.55) | 35.98 (3.25) | 0.56 | 0.022 | 0 |
| Heart rate | 91.27 (20.37) | 89.65 (20.14) | 0.48 | 0.08 | 0 |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.35 (0.11) | 7.35 (0.10) | 0.34 | 0.077 | 0 |
| PO2 | 222.00 (133.15) | 231.07 (130.61) | 0.28 | 0.069 | 0 |
| PCO2 | 41.91 (11.73) | 41.06 (11.59) | 0.1 | 0.073 | 0 |
| Lactate | 2.98 (2.40) | 2.89 (2.42) | 0.19 | 0.036 | 0 |
| Creatinine | 1.46 (1.51) | 1.34 (1.24) | 0.73 | 0.091 | 0 |
| WBC | 13.96 (8.52) | 14.32 (7.62) | 0.35 | 0.044 | 0 |
| Hemoglobin | 10.81 (2.16) | 10.72 (2.17) | 0.6 | 0.041 | 0 |
| Platelet | 200.53 (108.31) | 208.37 (118.00) | 0.58 | 0.069 | 0 |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | 72 (19.41%) | 74 (19.95%) | 0.93 | 0.014 | 0 |
| ICU mortality (Death) | 45 (12.13%) | 47 (12.67%) | 0.91 | 0.016 | 0 |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | 5.72 (7.11) | 5.51 (5.77) | 0.94 | 0.033 | 0 |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2High TWA-MAP: 83 ≤ TWA-MAP (mm Hg) | | | | | |

## Supplementary Table 8. Generalized additive model for 28-day mortality of cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.38 | 1.13, 1.70 | 0.002 |
| Age | 0.99 | 0.98, 1.00 | 0.061 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.04 | 0.84, 1.28 | 0.7 |
| Weight | 0.99 | 0.99, 1.00 | <0.001 |
| SAPS II | 1.04 | 1.03, 1.06 | <0.001 |
| SOFA score | 1.17 | 1.12, 1.22 | <0.001 |
| Charlson comorbidity index | 1.18 | 1.12, 1.23 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.72 | 1.35, 2.19 | <0.001 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 9. Piece-wise exponential additive mixed model for 28-day mortality of cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.45 | 1.23, 1.70 | <0.001 |
| Age | 1.00 | 0.99, 1.00 | 0.4 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.08 | 0.91, 1.28 | 0.4 |
| Weight | 0.99 | 0.99, 1.00 | <0.001 |
| SAPS II | 1.03 | 1.02, 1.04 | <0.001 |
| SOFA score | 1.16 | 1.13, 1.20 | <0.001 |
| Charlson comorbidity index | 1.15 | 1.12, 1.19 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.39 | 1.15, 1.67 | <0.001 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | <0.001 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 10. Survey-weighted generalised linear model with all covariates using IPW for 28-day mortality of cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.57 | 1.23, 2.00 | <0.001 |
| Age | 1.01 | 0.99, 1.02 | 0.3 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.17 | 0.92, 1.48 | 0.2 |
| Weight | 0.99 | 0.98, 1.00 | 0.002 |
| SAPS II | 1.03 | 1.02, 1.05 | <0.001 |
| SOFA score | 1.11 | 1.06, 1.17 | <0.001 |
| Charlson comorbidity index | 1.12 | 1.05, 1.19 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.72 | 0.48, 1.06 | 0.10 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.84 | 1.29, 2.62 | <0.001 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.01 | <0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.03 | 0.81, 1.32 | 0.8 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.20 | 0.95, 1.52 | 0.12 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.98 | 0.76, 1.26 | 0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.50, 1.02 | 0.066 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.57 | 0.36, 0.91 | 0.018 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.79 | 0.58, 1.07 | 0.13 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.52 | 1.90, 3.33 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.51 | 0.32, 0.81 | 0.004 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.58 | 0.42, 0.80 | <0.001 |
| MAP | 1.00 | 0.99, 1.00 | 0.2 |
| Temperature | 1.00 | 0.97, 1.03 | 0.8 |
| Heart rate | 1.01 | 1.01, 1.02 | <0.001 |
| pH | 0.69 | 0.17, 2.84 | 0.6 |
| PO2 | 1.00 | 1.00, 1.00 | 0.016 |
| PCO2 | 1.00 | 0.99, 1.01 | 0.8 |
| Lactate | 1.05 | 1.00, 1.11 | 0.044 |
| Creatinine | 1.01 | 0.99, 1.03 | 0.3 |
| WBC | 0.99 | 0.98, 1.00 | 0.14 |
| Hemoglobin | 1.06 | 1.00, 1.13 | 0.049 |
| Platelet | 1.00 | 1.00, 1.00 | 0.086 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 11. Proportional hazards assumption for survey-weighted Cox model using IPW for 28-day mortality of cohort 1

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 0.99 |
| Age | 0.98 |
| Gender | 0.99 |
| Weight | 0.98 |
| SAPS II | 1.00 |
| SOFA score | 0.97 |
| Charlson comorbidity index | 0.96 |
| Mechanical ventilation | 0.95 |
| Sedative therapy | 0.98 |
| Length of vasopressor therapy | 0.89 |
| HF | 0.98 |
| Hypertension | 1.00 |
| AFIB | 0.99 |
| Renal | 0.99 |
| Liver | 0.97 |
| COPD | 0.99 |
| CAD | 1.00 |
| Stroke | 0.99 |
| Malignancy | 0.97 |
| MAP | 0.98 |
| Temperature | 0.99 |
| Heart rate | 0.98 |
| pH | 0.99 |
| PO2 | 1.00 |
| PCO2 | 0.96 |
| Lactate | 0.95 |
| Creatinine | 0.99 |
| WBC | 0.99 |
| Hemoglobin | 0.95 |
| Platelet | 0.99 |
| GLOBAL | 1.00 |

## Supplementary Table 12. Survey-weighted Cox model with all covariates using IPW for 28-day mortality of cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.56 | 1.30, 1.89 | <0.001 |
| Age | 1.01 | 1.00, 1.01 | 0.15 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.10 | 0.92, 1.31 | 0.3 |
| Weight | 0.99 | 0.99, 1.00 | 0.004 |
| SAPS II | 1.02 | 1.01, 1.03 | 0.001 |
| SOFA score | 1.10 | 1.06, 1.14 | <0.001 |
| Charlson comorbidity index | 1.10 | 1.06, 1.15 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.66 | 0.49, 0.89 | 0.007 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.58 | 1.22, 2.06 | <0.001 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.06 | 0.88, 1.27 | 0.6 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.13 | 0.94, 1.35 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.96 | 0.80, 1.17 | 0.7 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.74 | 0.57, 0.95 | 0.019 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.70 | 0.51, 0.96 | 0.028 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.86 | 0.68, 1.09 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.23 | 1.75, 2.84 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.69 | 0.51, 0.95 | 0.022 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.57, 0.89 | 0.003 |
| MAP | 1.00 | 0.99, 1.00 | 0.3 |
| Temperature | 0.99 | 0.97, 1.01 | 0.4 |
| Heart rate | 1.01 | 1.01, 1.01 | <0.001 |
| pH | 0.93 | 0.32, 2.74 | >0.9 |
| PO2 | 1.00 | 1.00, 1.00 | 0.008 |
| PCO2 | 1.00 | 0.99, 1.01 | 0.9 |
| Lactate | 1.04 | 1.01, 1.08 | 0.023 |
| Creatinine | 1.01 | 0.99, 1.03 | 0.5 |
| WBC | 0.99 | 0.99, 1.00 | 0.2 |
| Hemoglobin | 1.05 | 1.00, 1.10 | 0.036 |
| Platelet | 1.00 | 1.00, 1.00 | 0.028 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 13. Cox model with all covariates using IPW for 28-day mortality of cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.56 | 1.30, 1.86 | <0.001 |
| Age | 1.01 | 1.00, 1.01 | 0.13 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.10 | 0.92, 1.32 | 0.3 |
| Weight | 0.99 | 0.99, 1.00 | 0.004 |
| SAPS II | 1.02 | 1.01, 1.03 | <0.001 |
| SOFA score | 1.10 | 1.06, 1.14 | <0.001 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.53 | 1.18, 1.98 | 0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.07 | 0.89, 1.28 | 0.5 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.13 | 0.95, 1.36 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.97 | 0.80, 1.17 | 0.8 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.74 | 0.58, 0.95 | 0.019 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.52, 0.97 | 0.033 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.87 | 0.68, 1.10 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.24 | 1.75, 2.86 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.70 | 0.51, 0.95 | 0.020 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.72 | 0.57, 0.90 | 0.004 |
| MAP | 1.00 | 0.99, 1.00 | 0.3 |
| Temperature | 0.99 | 0.97, 1.01 | 0.2 |
| Heart rate | 1.01 | 1.01, 1.01 | <0.001 |
| pH | 0.92 | 0.30, 2.82 | 0.9 |
| PO2 | 1.00 | 1.00, 1.00 | 0.014 |
| Creatinine | 1.01 | 0.99, 1.02 | 0.4 |
| WBC | 1.00 | 0.99, 1.00 | 0.2 |
| Platelet | 1.00 | 1.00, 1.00 | 0.034 |
| tt(Charlson comorbidity index) | 1.03 | 1.02, 1.04 | <0.001 |
| tt(Mechanical ventilation) | 0.90 | 0.83, 0.98 | 0.016 |
| tt(Length of vasopressor therapy) | 1.00 | 1.00, 1.00 | <0.001 |
| tt(PCO2) | 1.00 | 1.00, 1.00 | >0.9 |
| tt(Lactate) | 1.01 | 1.00, 1.02 | 0.035 |
| tt(Hemoglobin) | 1.01 | 1.00, 1.03 | 0.058 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 14. Generalized additive model for 28-day mortality of cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.52 | 1.11, 2.07 | 0.008 |
| Age | 0.99 | 0.98, 1.00 | 0.009 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.02 | 0.80, 1.31 | 0.9 |
| Weight | 0.99 | 0.99, 1.00 | 0.003 |
| SAPS II | 1.05 | 1.03, 1.06 | <0.001 |
| SOFA score | 1.11 | 1.06, 1.17 | <0.001 |
| Charlson comorbidity index | 1.15 | 1.09, 1.21 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.84 | 1.37, 2.49 | <0.001 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 15. Piece-wise exponential additive mixed model for 28-day mortality of cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.47 | 1.14, 1.91 | 0.003 |
| Age | 0.99 | 0.98, 1.00 | 0.068 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.03 | 0.84, 1.27 | 0.8 |
| Weight | 0.99 | 0.99, 1.00 | 0.003 |
| SAPS II | 1.03 | 1.02, 1.04 | <0.001 |
| SOFA score | 1.11 | 1.07, 1.16 | <0.001 |
| Charlson comorbidity index | 1.13 | 1.09, 1.18 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.44 | 1.13, 1.83 | 0.003 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | <0.001 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 16. Survey-weighted generalised linear model with all covariates using IPW for 28-day mortality of cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.55 | 1.01, 2.39 | 0.045 |
| Age | 1.00 | 0.99, 1.01 | 0.8 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.06 | 0.80, 1.41 | 0.7 |
| Weight | 0.99 | 0.99, 1.00 | 0.060 |
| SAPS II | 1.03 | 1.02, 1.05 | <0.001 |
| SOFA score | 1.05 | 0.99, 1.12 | 0.081 |
| Charlson comorbidity index | 1.10 | 1.02, 1.18 | 0.015 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.87 | 0.54, 1.40 | 0.6 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.77 | 1.20, 2.62 | 0.004 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.01 | <0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.14 | 0.85, 1.52 | 0.4 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.24 | 0.94, 1.65 | 0.13 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.97 | 0.72, 1.31 | 0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.74 | 0.45, 1.21 | 0.2 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.88 | 0.47, 1.65 | 0.7 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.49, 1.03 | 0.069 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.61 | 1.83, 3.71 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.49 | 0.30, 0.79 | 0.004 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.61 | 0.42, 0.88 | 0.009 |
| MAP | 1.00 | 0.99, 1.01 | 0.8 |
| Temperature | 1.00 | 0.97, 1.03 | >0.9 |
| Heart rate | 1.01 | 1.01, 1.02 | <0.001 |
| pH | 1.27 | 0.23, 6.96 | 0.8 |
| PO2 | 1.00 | 1.00, 1.00 | 0.004 |
| PCO2 | 1.00 | 0.99, 1.01 | 0.9 |
| Lactate | 1.08 | 1.02, 1.15 | 0.010 |
| Creatinine | 1.05 | 0.96, 1.15 | 0.3 |
| WBC | 0.99 | 0.98, 1.00 | 0.12 |
| Hemoglobin | 1.05 | 0.97, 1.12 | 0.2 |
| Platelet | 1.00 | 1.00, 1.00 | 0.2 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 17. Proportional hazards assumption for survey-weighted Cox model using IPW for 28-day mortality of cohort 2

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 0.96 |
| Age | 0.95 |
| Gender | 1.00 |
| Weight | 0.99 |
| SAPS II | 0.99 |
| SOFA score | 0.98 |
| Charlson comorbidity index | 0.95 |
| Mechanical ventilation | 0.95 |
| Sedative therapy | 0.99 |
| Length of vasopressor therapy | 0.90 |
| HF | 0.96 |
| Hypertension | 1.00 |
| AFIB | 0.98 |
| Renal | 0.99 |
| Liver | 1.00 |
| COPD | 0.98 |
| CAD | 0.99 |
| Stroke | 1.00 |
| Malignancy | 1.00 |
| MAP | 0.97 |
| Temperature | 0.99 |
| Heart rate | 0.97 |
| pH | 0.99 |
| PO2 | 1.00 |
| PCO2 | 0.96 |
| Lactate | 0.94 |
| Creatinine | 0.97 |
| WBC | 0.99 |
| Hemoglobin | 0.95 |
| Platelet | 0.99 |
| GLOBAL | 1.00 |

## Supplementary Table 18. Survey-weighted Cox model with all covariates using IPW for 28-day mortality of cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.50 | 1.06, 2.12 | 0.023 |
| Age | 1.00 | 0.99, 1.01 | 0.5 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.02 | 0.82, 1.27 | 0.9 |
| Weight | 1.00 | 0.99, 1.00 | 0.089 |
| SAPS II | 1.02 | 1.01, 1.03 | 0.006 |
| SOFA score | 1.06 | 1.01, 1.11 | 0.012 |
| Charlson comorbidity index | 1.09 | 1.04, 1.15 | 0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.74 | 0.51, 1.09 | 0.13 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.64 | 1.20, 2.24 | 0.002 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | <0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.15 | 0.91, 1.44 | 0.2 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.14 | 0.91, 1.44 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.95 | 0.74, 1.21 | 0.7 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.75 | 0.52, 1.09 | 0.13 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.84 | 0.53, 1.34 | 0.5 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.78 | 0.58, 1.06 | 0.11 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.38 | 1.73, 3.28 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.64 | 0.45, 0.91 | 0.013 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.54, 0.93 | 0.013 |
| MAP | 1.00 | 0.99, 1.01 | >0.9 |
| Temperature | 1.00 | 0.97, 1.02 | 0.8 |
| Heart rate | 1.01 | 1.00, 1.02 | <0.001 |
| pH | 1.38 | 0.37, 5.14 | 0.6 |
| PO2 | 1.00 | 1.00, 1.00 | 0.009 |
| PCO2 | 1.00 | 0.99, 1.01 | 0.9 |
| Lactate | 1.06 | 1.02, 1.11 | 0.009 |
| Creatinine | 1.03 | 0.97, 1.09 | 0.4 |
| WBC | 0.99 | 0.98, 1.00 | 0.2 |
| Hemoglobin | 1.05 | 0.99, 1.11 | 0.11 |
| Platelet | 1.00 | 1.00, 1.00 | 0.091 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 19. Cox model with all covariates using IPW for 28-day mortality of cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.02 | 0.82, 1.27 | 0.8 |
| Weight | 1.00 | 0.99, 1.00 | 0.11 |
| SAPS II | 1.02 | 1.01, 1.03 | <0.001 |
| SOFA score | 1.06 | 1.01, 1.12 | 0.015 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.59 | 1.17, 2.17 | 0.003 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.15 | 0.91, 1.45 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.97 | 0.75, 1.24 | 0.8 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.77 | 0.54, 1.10 | 0.15 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.84 | 0.53, 1.32 | 0.5 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.80 | 0.59, 1.08 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.40 | 1.73, 3.32 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.64 | 0.46, 0.89 | 0.008 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.54, 0.93 | 0.013 |
| MAP | 1.00 | 0.99, 1.01 | >0.9 |
| Temperature | 1.00 | 0.98, 1.01 | 0.6 |
| Heart rate | 1.01 | 1.00, 1.02 | <0.001 |
| pH | 1.36 | 0.35, 5.32 | 0.7 |
| PO2 | 1.00 | 1.00, 1.00 | 0.013 |
| Creatinine | 1.03 | 0.97, 1.08 | 0.4 |
| WBC | 0.99 | 0.99, 1.00 | 0.2 |
| Platelet | 1.00 | 1.00, 1.00 | 0.11 |
| tt(Group) | 1.12 | 1.02, 1.24 | 0.019 |
| tt(Age) | 1.00 | 1.00, 1.00 | 0.4 |
| tt(Charlson comorbidity index) | 1.03 | 1.01, 1.04 | <0.001 |
| tt(Mechanical ventilation) | 0.93 | 0.84, 1.04 | 0.2 |
| tt(Length of vasopressor therapy) | 1.00 | 1.00, 1.00 | <0.001 |
| tt(HF) | 1.04 | 0.97, 1.11 | 0.3 |
| tt(PCO2) | 1.00 | 1.00, 1.00 | >0.9 |
| tt(Lactate) | 1.02 | 1.00, 1.03 | 0.012 |
| tt(Hemoglobin) | 1.01 | 1.00, 1.03 | 0.14 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 20. Generalized additive model for ICU mortality of cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.46 | 1.15, 1.85 | 0.002 |
| Age | 0.99 | 0.98, 1.00 | 0.018 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.93 | 0.73, 1.18 | 0.5 |
| Weight | 1.00 | 0.99, 1.00 | 0.4 |
| SAPS II | 1.04 | 1.03, 1.06 | <0.001 |
| SOFA score | 1.18 | 1.13, 1.24 | <0.001 |
| Charlson comorbidity index | 1.12 | 1.06, 1.18 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.76 | 0.56, 1.04 | 0.084 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 21. Piece-wise exponential additive mixed model for ICU mortality of cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.67 | 1.37, 2.04 | <0.001 |
| Age | 1.00 | 0.99, 1.00 | 0.4 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.98 | 0.80, 1.20 | 0.8 |
| Weight | 1.00 | 0.99, 1.00 | 0.4 |
| SAPS II | 1.02 | 1.01, 1.03 | <0.001 |
| SOFA score | 1.12 | 1.08, 1.17 | <0.001 |
| Charlson comorbidity index | 1.11 | 1.07, 1.16 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.06 | 0.82, 1.38 | 0.7 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.001 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 22. Survey-weighted generalised linear model with all covariates using IPW for ICU mortality of cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.91 | 1.43, 2.54 | <0.001 |
| Age | 1.00 | 0.98, 1.01 | 0.6 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.01 | 0.77, 1.32 | >0.9 |
| Weight | 1.00 | 0.99, 1.01 | >0.9 |
| SAPS II | 1.03 | 1.02, 1.05 | <0.001 |
| SOFA score | 1.12 | 1.06, 1.18 | <0.001 |
| Charlson comorbidity index | 1.09 | 1.01, 1.17 | 0.020 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.32 | 0.20, 0.50 | <0.001 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.87 | 1.29, 2.72 | 0.001 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.11 | 0.83, 1.48 | 0.5 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.12 | 0.85, 1.47 | 0.4 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.91 | 0.68, 1.22 | 0.5 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.78 | 0.52, 1.18 | 0.2 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 1.13 | 0.68, 1.90 | 0.6 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.79 | 0.54, 1.15 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.36 | 1.67, 3.34 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.50 | 0.31, 0.82 | 0.006 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.72 | 0.50, 1.04 | 0.079 |
| MAP | 1.00 | 0.99, 1.01 | 0.8 |
| Temperature | 0.99 | 0.96, 1.02 | 0.5 |
| Heart rate | 1.02 | 1.01, 1.02 | <0.001 |
| pH | 0.57 | 0.11, 2.85 | 0.5 |
| PO2 | 1.00 | 1.00, 1.00 | <0.001 |
| PCO2 | 0.99 | 0.98, 1.01 | 0.3 |
| Lactate | 1.07 | 1.02, 1.13 | 0.011 |
| Creatinine | 1.01 | 0.98, 1.03 | 0.6 |
| WBC | 0.99 | 0.97, 1.00 | 0.056 |
| Hemoglobin | 1.07 | 1.00, 1.15 | 0.041 |
| Platelet | 1.00 | 1.00, 1.00 | 0.2 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 23. Proportional hazards assumption for survey-weighted Cox model using IPW for ICU mortality of cohort 1

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 1.00 |
| Age | 0.98 |
| Gender | 0.99 |
| Weight | 0.99 |
| SAPS II | 0.97 |
| SOFA score | 0.94 |
| Charlson comorbidity index | 0.97 |
| Mechanical ventilation | 0.98 |
| Sedative therapy | 1.00 |
| Length of vasopressor therapy | 0.92 |
| HF | 0.98 |
| Hypertension | 0.98 |
| AFIB | 1.00 |
| Renal | 1.00 |
| Liver | 1.00 |
| COPD | 1.00 |
| CAD | 0.97 |
| Stroke | 0.99 |
| Malignancy | 0.99 |
| MAP | 1.00 |
| Temperature | 1.00 |
| Heart rate | 0.96 |
| pH | 0.98 |
| PO2 | 0.98 |
| PCO2 | 0.98 |
| Lactate | 0.93 |
| Creatinine | 0.98 |
| WBC | 0.99 |
| Hemoglobin | 0.96 |
| Platelet | 0.99 |
| GLOBAL | 1.00 |

## Supplementary Table 24. Survey-weighted Cox model with all covariates using IPW for ICU mortality of cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 2.03 | 1.61, 2.54 | <0.001 |
| Age | 1.01 | 0.99, 1.02 | 0.3 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.98 | 0.79, 1.22 | 0.9 |
| Weight | 1.00 | 0.99, 1.00 | 0.7 |
| SAPS II | 1.01 | 1.00, 1.02 | 0.2 |
| SOFA score | 1.09 | 1.03, 1.14 | <0.001 |
| Charlson comorbidity index | 1.10 | 1.04, 1.16 | 0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.65 | 0.44, 0.96 | 0.031 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.47 | 1.11, 1.95 | 0.008 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.005 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.14 | 0.91, 1.43 | 0.2 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 0.98 | 0.78, 1.23 | 0.8 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 1.02 | 0.81, 1.29 | 0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.76 | 0.55, 1.05 | 0.10 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.91 | 0.61, 1.35 | 0.6 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.90 | 0.66, 1.22 | 0.5 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 1.62 | 1.21, 2.18 | 0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.82 | 0.58, 1.16 | 0.3 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.74 | 0.56, 0.98 | 0.038 |
| MAP | 1.00 | 0.99, 1.01 | 0.7 |
| Temperature | 0.98 | 0.95, 1.00 | 0.033 |
| Heart rate | 1.01 | 1.00, 1.01 | <0.001 |
| pH | 0.75 | 0.22, 2.53 | 0.6 |
| PO2 | 1.00 | 1.00, 1.00 | 0.057 |
| PCO2 | 0.99 | 0.98, 1.00 | 0.2 |
| Lactate | 1.04 | 0.99, 1.08 | 0.11 |
| Creatinine | 1.02 | 1.00, 1.04 | 0.068 |
| WBC | 0.99 | 0.98, 1.00 | 0.3 |
| Hemoglobin | 1.07 | 1.02, 1.14 | 0.010 |
| Platelet | 1.00 | 1.00, 1.00 | 0.3 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 25. Cox model with all covariates using IPW for ICU mortality of cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 2.03 | 1.63, 2.51 | <0.001 |
| Age | 1.00 | 0.99, 1.01 | 0.4 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.99 | 0.80, 1.22 | >0.9 |
| Weight | 1.00 | 0.99, 1.00 | 0.7 |
| SAPS II | 1.01 | 1.00, 1.02 | 0.032 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.64 | 0.44, 0.93 | 0.020 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.47 | 1.10, 1.95 | 0.008 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.15 | 0.92, 1.45 | 0.2 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 0.98 | 0.79, 1.23 | 0.9 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 1.03 | 0.81, 1.31 | 0.8 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.75 | 0.55, 1.03 | 0.078 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.89 | 0.60, 1.33 | 0.6 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.91 | 0.67, 1.23 | 0.5 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.83 | 0.58, 1.18 | 0.3 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.75 | 0.57, 0.99 | 0.045 |
| MAP | 1.00 | 1.00, 1.01 | 0.6 |
| Temperature | 0.98 | 0.96, 0.99 | 0.008 |
| pH | 0.66 | 0.18, 2.38 | 0.5 |
| PO2 | 1.00 | 1.00, 1.00 | 0.054 |
| PCO2 | 0.99 | 0.98, 1.00 | 0.14 |
| Creatinine | 1.02 | 1.00, 1.03 | 0.012 |
| WBC | 1.00 | 0.99, 1.00 | 0.3 |
| Platelet | 1.00 | 1.00, 1.00 | 0.4 |
| tt(SOFA score) | 1.02 | 1.01, 1.04 | 0.004 |
| tt(Charlson comorbidity index) | 1.03 | 1.01, 1.04 | <0.001 |
| tt(Length of vasopressor therapy) | 1.00 | 1.00, 1.00 | 0.029 |
| tt(CAD) | 1.16 | 1.06, 1.27 | 0.001 |
| tt(Heart rate) | 1.00 | 1.00, 1.00 | <0.001 |
| tt(Lactate) | 1.01 | 1.00, 1.02 | 0.2 |
| tt(Hemoglobin) | 1.02 | 1.00, 1.04 | 0.010 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 26. Generalized additive model for ICU mortality of cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.45 | 1.01, 2.08 | 0.046 |
| Age | 0.99 | 0.97, 1.00 | 0.012 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.88 | 0.66, 1.17 | 0.4 |
| Weight | 1.00 | 0.99, 1.01 | 0.6 |
| SAPS II | 1.04 | 1.02, 1.05 | <0.001 |
| SOFA score | 1.18 | 1.11, 1.25 | <0.001 |
| Charlson comorbidity index | 1.09 | 1.02, 1.16 | 0.006 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.83 | 0.56, 1.24 | 0.4 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 27. Piece-wise exponential additive mixed model for ICU mortality of cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.42 | 1.03, 1.96 | 0.033 |
| Age | 1.00 | 0.99, 1.01 | 0.4 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.92 | 0.72, 1.18 | 0.5 |
| Weight | 1.00 | 0.99, 1.00 | 0.4 |
| SAPS II | 1.02 | 1.00, 1.03 | 0.007 |
| SOFA score | 1.11 | 1.06, 1.17 | <0.001 |
| Charlson comorbidity index | 1.08 | 1.03, 1.14 | 0.003 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.07 | 0.74, 1.53 | 0.7 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.072 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 28. Survey-weighted generalised linear model with all covariates using IPW for ICU mortality of cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.31 | 0.80, 2.14 | 0.3 |
| Age | 1.00 | 0.98, 1.01 | 0.7 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.88 | 0.64, 1.21 | 0.4 |
| Weight | 1.00 | 0.99, 1.01 | 0.6 |
| SAPS II | 1.02 | 1.01, 1.04 | 0.012 |
| SOFA score | 1.11 | 1.04, 1.19 | 0.002 |
| Charlson comorbidity index | 1.06 | 0.97, 1.15 | 0.2 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.37 | 0.21, 0.66 | <0.001 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.84 | 1.22, 2.79 | 0.004 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.24 | 0.87, 1.77 | 0.2 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.13 | 0.82, 1.57 | 0.5 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.89 | 0.62, 1.27 | 0.5 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.74 | 0.41, 1.32 | 0.3 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 1.69 | 0.76, 3.74 | 0.2 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.69 | 0.44, 1.08 | 0.10 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.37 | 1.52, 3.72 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.45 | 0.27, 0.76 | 0.003 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.65 | 0.42, 1.00 | 0.052 |
| MAP | 1.01 | 1.00, 1.01 | 0.2 |
| Temperature | 0.99 | 0.96, 1.03 | 0.6 |
| Heart rate | 1.01 | 1.01, 1.02 | <0.001 |
| pH | 0.44 | 0.07, 2.95 | 0.4 |
| PO2 | 1.00 | 1.00, 1.00 | 0.002 |
| PCO2 | 0.99 | 0.98, 1.01 | 0.2 |
| Lactate | 1.08 | 1.01, 1.14 | 0.018 |
| Creatinine | 1.04 | 0.95, 1.14 | 0.4 |
| WBC | 0.98 | 0.96, 1.00 | 0.028 |
| Hemoglobin | 1.03 | 0.95, 1.12 | 0.4 |
| Platelet | 1.00 | 1.00, 1.00 | 0.3 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 29. Proportional hazards assumption for survey-weighted Cox model using IPW for ICU mortality of cohort 2

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 0.98 |
| Age | 0.96 |
| Gender | 0.99 |
| Weight | 0.98 |
| SAPS II | 0.99 |
| SOFA score | 0.96 |
| Charlson comorbidity index | 0.96 |
| Mechanical ventilation | 0.98 |
| Sedative therapy | 0.98 |
| Length of vasopressor therapy | 0.94 |
| HF | 0.95 |
| Hypertension | 0.98 |
| AFIB | 0.98 |
| Renal | 0.99 |
| Liver | 0.97 |
| COPD | 0.99 |
| CAD | 0.98 |
| Stroke | 0.99 |
| Malignancy | 1.00 |
| MAP | 1.00 |
| Temperature | 0.99 |
| Heart rate | 0.94 |
| pH | 0.99 |
| PO2 | 0.98 |
| PCO2 | 0.99 |
| Lactate | 0.94 |
| Creatinine | 0.96 |
| WBC | 0.98 |
| Hemoglobin | 0.96 |
| Platelet | 1.00 |
| GLOBAL | 1.00 |

## Supplementary Table 30. Survey-weighted Cox model with all covariates using IPW for ICU mortality of cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.47 | 0.95, 2.25 | 0.081 |
| Age | 1.01 | 0.99, 1.02 | 0.3 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.88 | 0.68, 1.15 | 0.4 |
| Weight | 1.00 | 0.99, 1.01 | 0.8 |
| SAPS II | 1.00 | 0.99, 1.02 | 0.6 |
| SOFA score | 1.08 | 1.02, 1.15 | 0.012 |
| Charlson comorbidity index | 1.06 | 0.99, 1.13 | 0.075 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.66 | 0.39, 1.12 | 0.12 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.46 | 1.03, 2.06 | 0.035 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.073 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.30 | 0.98, 1.73 | 0.073 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 0.88 | 0.66, 1.17 | 0.4 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.99 | 0.73, 1.35 | >0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.78 | 0.48, 1.25 | 0.3 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 1.04 | 0.55, 1.97 | >0.9 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.79 | 0.54, 1.15 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 1.53 | 1.03, 2.28 | 0.035 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.79 | 0.54, 1.14 | 0.2 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.68 | 0.48, 0.97 | 0.033 |
| MAP | 1.00 | 1.00, 1.01 | 0.2 |
| Temperature | 0.97 | 0.95, 1.00 | 0.021 |
| Heart rate | 1.01 | 1.00, 1.02 | 0.020 |
| pH | 0.49 | 0.12, 2.09 | 0.3 |
| PO2 | 1.00 | 1.00, 1.00 | 0.068 |
| PCO2 | 0.99 | 0.98, 1.00 | 0.078 |
| Lactate | 1.05 | 0.99, 1.11 | 0.087 |
| Creatinine | 1.04 | 0.97, 1.12 | 0.3 |
| WBC | 0.99 | 0.98, 1.01 | 0.3 |
| Hemoglobin | 1.05 | 0.98, 1.12 | 0.2 |
| Platelet | 1.00 | 1.00, 1.00 | 0.6 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 31. Cox model with all covariates using IPW for ICU mortality of cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.48 | 0.97, 2.25 | 0.066 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.88 | 0.68, 1.14 | 0.3 |
| Weight | 1.00 | 0.99, 1.01 | 0.8 |
| SAPS II | 1.01 | 0.99, 1.02 | 0.4 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.66 | 0.40, 1.09 | 0.10 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.44 | 1.01, 2.07 | 0.044 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 0.89 | 0.67, 1.17 | 0.4 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 1.01 | 0.74, 1.37 | >0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.78 | 0.50, 1.22 | 0.3 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 1.02 | 0.55, 1.90 | >0.9 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.80 | 0.55, 1.18 | 0.3 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 1.56 | 1.05, 2.32 | 0.028 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.79 | 0.54, 1.15 | 0.2 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.68 | 0.49, 0.95 | 0.025 |
| MAP | 1.00 | 1.00, 1.01 | 0.2 |
| Temperature | 0.97 | 0.95, 0.99 | 0.002 |
| pH | 0.45 | 0.10, 2.02 | 0.3 |
| PO2 | 1.00 | 1.00, 1.00 | 0.066 |
| PCO2 | 0.99 | 0.98, 1.00 | 0.065 |
| WBC | 0.99 | 0.98, 1.00 | 0.2 |
| Platelet | 1.00 | 1.00, 1.00 | 0.7 |
| tt(Age) | 1.00 | 1.00, 1.01 | 0.3 |
| tt(SOFA score) | 1.02 | 1.00, 1.04 | 0.025 |
| tt(Charlson comorbidity index) | 1.02 | 1.00, 1.04 | 0.045 |
| tt(Length of vasopressor therapy) | 1.00 | 1.00, 1.00 | 0.14 |
| tt(HF) | 1.08 | 0.98, 1.18 | 0.11 |
| tt(Heart rate) | 1.00 | 1.00, 1.00 | 0.037 |
| tt(Lactate) | 1.01 | 1.00, 1.03 | 0.12 |
| tt(Creatinine) | 1.01 | 0.99, 1.04 | 0.3 |
| tt(Hemoglobin) | 1.01 | 0.99, 1.03 | 0.2 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 32. Basic demographic characteristics of the subgroup original cohort

|  | **Optimal TWA-MAP (N=1071) 1** | **Low TWA-MAP (N=1025) 2** | **High TWA-MAP (N=335) 3** | **p-value** | **SMD (Compare to Optimal TWA-MAP, respectively)** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- | --- |
| Age | **66.15 (13.86)** | **70.26 (13.99)** | **64.17 (15.80)** | **<0.001** | **[ 0.296 , 0.133 ]** | **0.00** |
| Gender (Female) | **338 (31.56%)** | **446 (43.51%)** | **130 (38.81%)** | **<0.001** | **[ 0.249 , 0.152 ]** | **0.00** |
| Weight | **84.13 (21.34)** | **82.35 (21.72)** | **81.43 (21.96)** | **<0.01** | **[ 0.083 , 0.125 ]** | **0.58** |
| SAPS II | **32.42 (12.29)** | **35.82 (13.69)** | **32.56 (12.72)** | **<0.001** | **[ 0.261 , 0.012 ]** | **0.00** |
| SOFA score | **6.01 (3.10)** | **6.69 (3.58)** | **5.73 (2.91)** | **<0.001** | **[ 0.203 , 0.093 ]** | **0.00** |
| Charlson comorbidity index | **5.11 (2.52)** | **5.85 (2.39)** | **4.89 (2.60)** | **<0.001** | **[ 0.304 , 0.084 ]** | **0.00** |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** | | | | | |  |
| Mechanical ventilation (YES) | **917 (85.62%)** | **732 (71.41%)** | **279 (83.28%)** | **<0.001** | **[ 0.351 , 0.065 ]** | **0.00** |
| Sedative therapy (YES) | **839 (78.34%)** | **648 (63.22%)** | **246 (73.43%)** | **<0.001** | **[ 0.337 , 0.115 ]** | **0.00** |
| Length of vasopressor therapy | **32.37 (48.23)** | **44.19 (61.45)** | **24.53 (39.08)** | **<0.001** | **[ 0.214 , 0.179 ]** | **0.00** |
| **Comorbidities (boolean)** | | | | | |  |
| HF (YES) | **402 (37.54%)** | **473 (46.15%)** | **112 (33.43%)** | **<0.001** | **[ 0.175 , 0.086 ]** | **0.00** |
| Hypertension (YES) | **602 (56.21%)** | **525 (51.22%)** | **190 (56.72%)** | **<0.05** | **[ 0.10 , 0.01 ]** | **0.00** |
| AFIB (YES) | **368 (34.36%)** | **426 (41.56%)** | **105 (31.34%)** | **<0.001** | **[ 0.149 , 0.064 ]** | **0.00** |
| Renal (YES) | **72 (6.72%)** | **121 (11.80%)** | **15 (4.48%)** | **<0.001** | **[ 0.176 , 0.098 ]** | **0.00** |
| Liver (YES) | **27 (2.52%)** | **80 (7.80%)** | **11 (3.28%)** | **<0.001** | **[ 0.241 , 0.045 ]** | **0.00** |
| COPD (YES) | 149 (13.91%) | 143 (13.95%) | 34 (10.15%) | 0.17 | [ 0.001 , 0.116 ] | 0.00 |
| CAD (YES) | **503 (46.97%)** | **439 (42.83%)** | **111 (33.13%)** | **<0.001** | **[ 0.083 , 0.285 ]** | **0.00** |
| Stroke (YES) | **55 (5.14%)** | **56 (5.46%)** | **44 (13.13%)** | **<0.001** | **[ 0.015 , 0.280 ]** | **0.00** |
| Malignancy (YES) | 129 (12.04%) | 150 (14.63%) | 39 (11.64%) | 0.15 | [ 0.076 , 0.012 ] | 0.00 |
| **Vital signs (1st 24 h)** | | | | | |  |
| MAP | **77.60 (14.83)** | **69.42 (14.36)** | **84.81 (16.96)** | **<0.001** | **[ 0.560 , 0.453 ]** | **0.00** |
| Temperature | 36.14 (2.67) | 36.14 (2.73) | 36.18 (2.21) | 0.83 | [ 0.002 , 0.018 ] | 0.00 |
| Heart rate | **90.96 (18.10)** | **88.11 (18.48)** | **89.71 (20.53)** | **<0.01** | **[ 0.156 , 0.065 ]** | **0.00** |
| **Laboratory tests (1st 24 h)** | | | | | |  |
| pH | 7.36 (0.10) | 7.35 (0.10) | 7.36 (0.10) | 0.65 | [ 0.035 , 0.004 ] | 8.80 |
| PO2 | **249.28 (130.47)** | **228.00 (135.83)** | **233.18 (130.59)** | **<0.01** | **[ 0.160 , 0.124 ]** | **10.16** |
| PCO2 | **42.87 (11.13)** | **42.37 (11.24)** | **40.86 (11.74)** | **<0.001** | **[ 0.045 , 0.176 ]** | **10.16** |
| Lactate | 2.83 (2.30) | 2.93 (2.54) | 3.20 (2.80) | 0.4 | [ 0.040 , 0.146 ] | 40.23 |
| Creatinine | **1.27 (1.18)** | **1.88 (4.47)** | **1.34 (1.26)** | **<0.001** | **[ 0.187 , 0.062 ]** | **0.25** |
| WBC | 14.19 (8.16) | 14.22 (8.05) | 14.28 (7.42) | 0.89 | [ 0.004 , 0.012 ] | 0.49 |
| Hemoglobin | **10.40 (2.00)** | **9.99 (1.84)** | **10.76 (2.20)** | **<0.001** | **[ 0.213 , 0.172 ]** | **0.41** |
| Platelet | **193.53 (106.62)** | **194.65 (119.57)** | **208.12 (119.42)** | **<0.05** | **[ 0.010 , 0.129 ]** | **0.45** |
| **Outcomes (boolean)** | | | | | |  |
| 28-day mortality (Death) | **151 (14.10%)** | **268 (26.15%)** | **71 (21.19%)** | **<0.001** | **[ 0.304 , 0.187 ]** | **0.00** |
| ICU mortality (Death) | **99 (9.24%)** | **183 (17.85%)** | **46 (13.73%)** | **<0.001** | **[ 0.254 , 0.141 ]** | **0.00** |
| **Length of Stay (days)** | | | | | |  |
| ICU LOS | 5.42 (6.44) | 5.40 (6.58) | 5.52 (5.87) | 0.4 | [ 0.004 , 0.016 ] | 0.00 |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | | |
| 2Low TWA-MAP: TWA-MAP < 70 (mm Hg) | | | | | | |
| 3High TWA-MAP: 83 ≤ TWA-MAP (mm Hg) | | | | | | |

## Supplementary Table 33. Standardized mean difference (SMD) of covariates before and after propensity score matching of subgroup cohort 1

| Characteristic | Before matcing | After matcing |
| --- | --- | --- |
| SMD ≤ 0.1 | 11 | 29 |
| SMD > 0.1 | 18 | 0 |
| Total number of covariates | 29 | 29 |

## Supplementary Table 34. Baseline characteristics before propensity score matching of subgroup cohort 1

|  | **Optimal TWA-MAP (N=1071) 1** | **Low TWA-MAP (N=1025) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | **66.15 (13.86)** | **70.26 (13.99)** | **<0.001** | **0.296** | **0** |
| Gender (Female) | **338 (31.56%)** | **446 (43.51%)** | **<0.001** | **0.249** | **0** |
| Weight | **84.10 (21.34)** | **82.33 (21.69)** | **<0.05** | **0.082** | **0** |
| SAPS II | **32.42 (12.29)** | **35.82 (13.69)** | **<0.001** | **0.261** | **0** |
| SOFA score | **6.01 (3.10)** | **6.69 (3.58)** | **<0.001** | **0.203** | **0** |
| Charlson comorbidity index | **5.11 (2.52)** | **5.85 (2.39)** | **<0.001** | **0.304** | **0** |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | **917 (85.62%)** | **732 (71.41%)** | **<0.001** | **0.351** | **0** |
| Sedative therapy (YES) | **839 (78.34%)** | **648 (63.22%)** | **<0.001** | **0.337** | **0** |
| Length of vasopressor therapy | **32.37 (48.23)** | **44.19 (61.45)** | **<0.001** | **0.214** | **0** |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | **402 (37.54%)** | **473 (46.15%)** | **<0.001** | **0.175** | **0** |
| Hypertension (YES) | **602 (56.21%)** | **525 (51.22%)** | **<0.05** | **0.1** | **0** |
| AFIB (YES) | **368 (34.36%)** | **426 (41.56%)** | **<0.001** | **0.149** | **0** |
| Renal (YES) | **72 (6.72%)** | **121 (11.80%)** | **<0.001** | **0.176** | **0** |
| Liver (YES) | **27 (2.52%)** | **80 (7.80%)** | **<0.001** | **0.241** | **0** |
| COPD (YES) | 149 (13.91%) | 143 (13.95%) | 1 | 0.001 | 0 |
| CAD (YES) | 503 (46.97%) | 439 (42.83%) | 0.06 | 0.083 | 0 |
| Stroke (YES) | 55 (5.14%) | 56 (5.46%) | 0.81 | 0.015 | 0 |
| Malignancy (YES) | 129 (12.04%) | 150 (14.63%) | 0.09 | 0.076 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | **77.60 (14.83)** | **69.42 (14.36)** | **<0.001** | **0.56** | **0** |
| Temperature | 36.14 (2.67) | 36.14 (2.73) | 0.56 | 0.002 | 0 |
| Heart rate | **90.96 (18.10)** | **88.11 (18.48)** | **<0.001** | **0.156** | **0** |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.36 (0.10) | 7.35 (0.10) | 0.4 | 0.026 | 0 |
| PO2 | **246.18 (130.97)** | **228.88 (135.66)** | **<0.01** | **0.13** | **0** |
| PCO2 | 42.76 (11.11) | 42.39 (11.09) | 0.48 | 0.033 | 0 |
| Lactate | 2.67 (2.08) | 2.77 (2.22) | 0.45 | 0.045 | 0 |
| Creatinine | **1.39 (4.22)** | **1.88 (4.46)** | **<0.001** | **0.112** | **0** |
| WBC | 14.18 (8.14) | 14.21 (8.04) | 0.97 | 0.003 | 0 |
| Hemoglobin | **10.40 (2.00)** | **9.99 (1.83)** | **<0.001** | **0.213** | **0** |
| Platelet | 193.59 (106.39) | 194.54 (119.48) | 0.33 | 0.008 | 0 |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | **151 (14.10%)** | **268 (26.15%)** | **<0.001** | **0.304** | **0** |
| ICU mortality (Death) | **99 (9.24%)** | **183 (17.85%)** | **<0.001** | **0.254** | **0** |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | 5.42 (6.44) | 5.40 (6.58) | 0.17 | 0.004 | 0 |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2Low TWA-MAP: TWA-MAP < 70 (mm Hg) | | | | | |

## Supplementary Table 35. Baseline characteristics after propensity score matching of subgroup cohort 1

|  | **Optimal TWA-MAP (N=707) 1** | **Low TWA-MAP (N=707) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | 68.35 (13.34) | 68.36 (14.23) | 0.69 | <0.001 | 0 |
| Gender (Female) | 256 (36.21%) | 247 (34.94%) | 0.66 | 0.027 | 0 |
| Weight | 82.82 (20.37) | 83.89 (22.04) | 0.57 | 0.051 | 0 |
| SAPS II | 33.91 (12.35) | 33.91 (14.05) | 0.83 | <0.001 | 0 |
| SOFA score | 6.23 (3.12) | 6.19 (3.46) | 0.33 | 0.012 | 0 |
| Charlson comorbidity index | 5.44 (2.45) | 5.50 (2.44) | 0.39 | 0.023 | 0 |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | 574 (81.19%) | 572 (80.91%) | 0.95 | 0.007 | 0 |
| Sedative therapy (YES) | 513 (72.56%) | 516 (72.98%) | 0.9 | 0.01 | 0 |
| Length of vasopressor therapy | **34.30 (47.33)** | **35.92 (47.72)** | **<0.05** | **0.034** | **0** |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | 293 (41.44%) | 292 (41.30%) | 1 | 0.003 | 0 |
| Hypertension (YES) | 378 (53.47%) | 387 (54.74%) | 0.67 | 0.026 | 0 |
| AFIB (YES) | 276 (39.04%) | 280 (39.60%) | 0.87 | 0.012 | 0 |
| Renal (YES) | 63 (8.91%) | 53 (7.50%) | 0.38 | 0.052 | 0 |
| Liver (YES) | 26 (3.68%) | 27 (3.82%) | 1 | 0.007 | 0 |
| COPD (YES) | 106 (14.99%) | 106 (14.99%) | 1 | <0.001 | 0 |
| CAD (YES) | 322 (45.54%) | 338 (47.81%) | 0.42 | 0.045 | 0 |
| Stroke (YES) | 37 (5.23%) | 42 (5.94%) | 0.64 | 0.031 | 0 |
| Malignancy (YES) | 95 (13.44%) | 90 (12.73%) | 0.75 | 0.021 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | 73.49 (13.61) | 73.88 (13.54) | 0.52 | 0.029 | 0 |
| Temperature | 36.22 (2.13) | 36.10 (2.91) | 0.37 | 0.047 | 0 |
| Heart rate | 90.24 (17.41) | 89.30 (18.66) | 0.26 | 0.052 | 0 |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.35 (0.10) | 7.36 (0.10) | 0.47 | 0.047 | 0 |
| PO2 | 238.59 (133.63) | 242.56 (134.58) | 0.6 | 0.03 | 0 |
| PCO2 | 42.80 (11.39) | 42.52 (11.10) | 0.68 | 0.025 | 0 |
| Lactate | 2.78 (2.23) | 2.70 (2.03) | 0.81 | 0.034 | 0 |
| Creatinine | 1.55 (5.14) | 1.54 (1.54) | 0.18 | 0.001 | 0 |
| WBC | 14.48 (8.71) | 14.32 (7.95) | 0.84 | 0.02 | 0 |
| Hemoglobin | 10.17 (1.96) | 10.10 (1.88) | 0.41 | 0.034 | 0 |
| Platelet | 191.09 (104.86) | 193.43 (116.49) | 0.57 | 0.021 | 0 |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | 111 (15.70%) | 139 (19.66%) | 0.06 | 0.104 | 0 |
| ICU mortality (Death) | **68 (9.62%)** | **103 (14.57%)** | **<0.01** | **0.152** | **0** |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | 5.61 (6.58) | 5.03 (6.36) | 0.14 | 0.091 | 0 |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2Low TWA-MAP: TWA-MAP < 70 (mm Hg) | | | | | |

## Supplementary Table 36. Standardized mean difference (SMD) of covariates before and after propensity score matching of subgroup cohort 2

| Characteristic | Before matcing | After matcing |
| --- | --- | --- |
| SMD ≤ 0.1 | 15 | 29 |
| SMD > 0.1 | 14 | 0 |
| Total number of covariates | 29 | 29 |

## Supplementary Table 37. Baseline characteristics before propensity score matching of subgroup cohort 2

|  | **Optimal TWA-MAP (N=1071) 1** | **High TWA-MAP (N=335) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | 66.15 (13.86) | 64.17 (15.80) | 0.1 | 0.133 | 0 |
| Gender (Female) | **338 (31.56%)** | **130 (38.81%)** | **<0.05** | **0.152** | **0** |
| Weight | **84.10 (21.34)** | **81.43 (21.96)** | **<0.01** | **0.124** | **0** |
| SAPS II | 32.42 (12.29) | 32.56 (12.72) | 0.87 | 0.012 | 0 |
| SOFA score | 6.01 (3.10) | 5.73 (2.91) | 0.23 | 0.093 | 0 |
| Charlson comorbidity index | 5.11 (2.52) | 4.89 (2.60) | 0.33 | 0.084 | 0 |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | 917 (85.62%) | 279 (83.28%) | 0.34 | 0.065 | 0 |
| Sedative therapy (YES) | 839 (78.34%) | 246 (73.43%) | 0.07 | 0.115 | 0 |
| Length of vasopressor therapy | **32.37 (48.23)** | **24.53 (39.08)** | **<0.001** | **0.179** | **0** |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | 402 (37.54%) | 112 (33.43%) | 0.2 | 0.086 | 0 |
| Hypertension (YES) | 602 (56.21%) | 190 (56.72%) | 0.92 | 0.01 | 0 |
| AFIB (YES) | 368 (34.36%) | 105 (31.34%) | 0.34 | 0.064 | 0 |
| Renal (YES) | 72 (6.72%) | 15 (4.48%) | 0.17 | 0.098 | 0 |
| Liver (YES) | 27 (2.52%) | 11 (3.28%) | 0.58 | 0.045 | 0 |
| COPD (YES) | 149 (13.91%) | 34 (10.15%) | 0.09 | 0.116 | 0 |
| CAD (YES) | **503 (46.97%)** | **111 (33.13%)** | **<0.001** | **0.285** | **0** |
| Stroke (YES) | **55 (5.14%)** | **44 (13.13%)** | **<0.001** | **0.28** | **0** |
| Malignancy (YES) | 129 (12.04%) | 39 (11.64%) | 0.92 | 0.012 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | **77.60 (14.83)** | **84.81 (16.96)** | **<0.001** | **0.453** | **0** |
| Temperature | 36.14 (2.67) | 36.18 (2.21) | 0.72 | 0.018 | 0 |
| Heart rate | 90.96 (18.10) | 89.71 (20.53) | 0.49 | 0.065 | 0 |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.36 (0.10) | 7.36 (0.10) | 0.82 | 0.015 | 0 |
| PO2 | 246.18 (130.97) | 230.85 (130.69) | 0.09 | 0.117 | 0 |
| PCO2 | **42.76 (11.11)** | **40.93 (11.88)** | **<0.001** | **0.159** | **0** |
| Lactate | 2.67 (2.08) | 2.96 (2.56) | 0.26 | 0.124 | 0 |
| Creatinine | 1.39 (4.22) | 1.34 (1.26) | 0.28 | 0.015 | 0 |
| WBC | 14.18 (8.14) | 14.27 (7.41) | 0.67 | 0.011 | 0 |
| Hemoglobin | **10.40 (2.00)** | **10.76 (2.20)** | **<0.05** | **0.17** | **0** |
| Platelet | 193.59 (106.39) | 207.81 (119.37) | 0.05 | 0.126 | 0 |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | **151 (14.10%)** | **71 (21.19%)** | **<0.01** | **0.187** | **0** |
| ICU mortality (Death) | **99 (9.24%)** | **46 (13.73%)** | **<0.05** | **0.141** | **0** |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | 5.42 (6.44) | 5.52 (5.87) | 0.61 | 0.016 | 0 |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2High TWA-MAP: 83 ≤ TWA-MAP (mm Hg) | | | | | |

## Supplementary Table 38. Baseline characteristics after propensity score matching of subgroup cohort 2

|  | **Optimal TWA-MAP (N=306) 1** | **High TWA-MAP (N=306) 2** | **p-value** | **SMD** | **Missing data (%)** |
| --- | --- | --- | --- | --- | --- |
| Age | 63.34 (14.95) | 64.32 (15.85) | 0.27 | 0.064 | 0 |
| Gender (Female) | 106 (34.64%) | 119 (38.89%) | 0.31 | 0.088 | 0 |
| Weight | 82.08 (21.03) | 81.76 (22.23) | 0.38 | 0.015 | 0 |
| SAPS II | 32.13 (12.49) | 32.20 (12.66) | 0.97 | 0.005 | 0 |
| SOFA score | 5.99 (3.10) | 5.71 (2.94) | 0.35 | 0.091 | 0 |
| Charlson comorbidity index | 4.78 (2.54) | 4.84 (2.57) | 0.65 | 0.021 | 0 |
| **Interventions (boolean for 1st 24 h, hours for vasopressor therapy)** |  |  |  |  |  |
| Mechanical ventilation (YES) | 258 (84.31%) | 257 (83.99%) | 1 | 0.009 | 0 |
| Sedative therapy (YES) | 226 (73.86%) | 227 (74.18%) | 1 | 0.007 | 0 |
| Length of vasopressor therapy | **24.02 (27.45)** | **25.31 (40.32)** | **<0.001** | **0.037** | **0** |
| **Comorbidities (boolean)** |  |  |  |  |  |
| HF (YES) | 101 (33.01%) | 104 (33.99%) | 0.86 | 0.021 | 0 |
| Hypertension (YES) | 161 (52.61%) | 168 (54.90%) | 0.63 | 0.046 | 0 |
| AFIB (YES) | 83 (27.12%) | 95 (31.05%) | 0.33 | 0.086 | 0 |
| Renal (YES) | 12 (3.92%) | 15 (4.90%) | 0.69 | 0.048 | 0 |
| Liver (YES) | 11 (3.59%) | 9 (2.94%) | 0.82 | 0.037 | 0 |
| COPD (YES) | 39 (12.75%) | 33 (10.78%) | 0.53 | 0.061 | 0 |
| CAD (YES) | 99 (32.35%) | 107 (34.97%) | 0.55 | 0.055 | 0 |
| Stroke (YES) | 33 (10.78%) | 34 (11.11%) | 1 | 0.01 | 0 |
| Malignancy (YES) | 37 (12.09%) | 35 (11.44%) | 0.9 | 0.02 | 0 |
| **Vital signs (1st 24 h)** |  |  |  |  |  |
| MAP | 83.79 (16.10) | 83.32 (16.36) | 0.97 | 0.029 | 0 |
| Temperature | 36.18 (2.32) | 36.18 (2.30) | 0.82 | 0.001 | 0 |
| Heart rate | 91.25 (18.61) | 90.20 (19.73) | 0.53 | 0.055 | 0 |
| **Laboratory tests (1st 24 h)** |  |  |  |  |  |
| pH | 7.35 (0.10) | 7.36 (0.09) | 0.22 | 0.095 | 0 |
| PO2 | 229.59 (132.37) | 236.04 (130.75) | 0.51 | 0.049 | 0 |
| PCO2 | 41.29 (10.25) | 41.41 (12.15) | 0.39 | 0.01 | 0 |
| Lactate | 2.82 (2.35) | 2.85 (2.41) | 0.8 | 0.014 | 0 |
| Creatinine | 1.71 (7.68) | 1.30 (1.14) | 0.54 | 0.075 | 0 |
| WBC | 14.02 (7.34) | 14.45 (7.48) | 0.51 | 0.058 | 0 |
| Hemoglobin | 10.74 (2.10) | 10.67 (2.19) | 0.58 | 0.032 | 0 |
| Platelet | 203.33 (111.10) | 207.27 (120.26) | 0.98 | 0.034 | 0 |
| **Outcomes (boolean)** |  |  |  |  |  |
| 28-day mortality (Death) | 50 (16.34%) | 65 (21.24%) | 0.15 | 0.126 | 0 |
| ICU mortality (Death) | 31 (10.13%) | 43 (14.05%) | 0.17 | 0.121 | 0 |
| **Length of Stay (days)** |  |  |  |  |  |
| ICU LOS | 5.51 (6.94) | 5.57 (6.00) | 0.92 | 0.01 | 0 |
| Values are presented as mean (standard deviation) for continuous variables and number (percentage) for categorical variables. Variables in bold have p values < 0.05. | | | | | |
| 1Optimal TWA-MAP: 70 ≤ TWA-MAP < 83 (mm Hg) | | | | | |
| 2High TWA-MAP: 83 ≤ TWA-MAP (mm Hg) | | | | | |

## Supplementary Table 39. Generalized additive model for 28-day mortality of subgroup cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.48 | 1.14, 1.93 | 0.004 |
| Age | 1.00 | 0.99, 1.01 | >0.9 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.08 | 0.83, 1.42 | 0.6 |
| Weight | 0.99 | 0.98, 1.00 | 0.001 |
| SAPS II | 1.05 | 1.04, 1.07 | <0.001 |
| SOFA score | 1.20 | 1.14, 1.26 | <0.001 |
| Charlson comorbidity index | 1.17 | 1.10, 1.24 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.74 | 1.30, 2.34 | <0.001 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 40. Piece-wise exponential additive mixed model for 28-day mortality of subgroup cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.47 | 1.19, 1.81 | <0.001 |
| Age | 1.00 | 0.99, 1.01 | 0.5 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.18 | 0.96, 1.46 | 0.12 |
| Weight | 0.99 | 0.99, 1.00 | <0.001 |
| SAPS II | 1.04 | 1.02, 1.05 | <0.001 |
| SOFA score | 1.18 | 1.14, 1.23 | <0.001 |
| Charlson comorbidity index | 1.15 | 1.11, 1.20 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.48 | 1.18, 1.85 | <0.001 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | <0.001 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 41. Survey-weighted generalised linear model with all covariates using IPW for 28-day mortality of subgroup cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.54 | 1.12, 2.12 | 0.008 |
| Age | 1.02 | 1.00, 1.03 | 0.011 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.24 | 0.91, 1.68 | 0.2 |
| Weight | 0.99 | 0.98, 1.00 | 0.002 |
| SAPS II | 1.04 | 1.02, 1.06 | <0.001 |
| SOFA score | 1.14 | 1.07, 1.22 | <0.001 |
| Charlson comorbidity index | 1.07 | 0.99, 1.15 | 0.10 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.82 | 0.49, 1.36 | 0.4 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.59 | 0.99, 2.56 | 0.053 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 0.89 | 0.65, 1.23 | 0.5 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.26 | 0.94, 1.70 | 0.12 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 1.05 | 0.76, 1.43 | 0.8 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.62 | 0.41, 0.96 | 0.032 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.36 | 0.21, 0.64 | <0.001 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.78 | 0.53, 1.16 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.52 | 1.78, 3.58 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.44 | 0.24, 0.78 | 0.005 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.54 | 0.37, 0.80 | 0.002 |
| MAP | 1.00 | 0.99, 1.01 | 0.5 |
| Temperature | 1.00 | 0.96, 1.04 | >0.9 |
| Heart rate | 1.01 | 1.00, 1.02 | 0.034 |
| pH | 0.24 | 0.04, 1.53 | 0.13 |
| PO2 | 1.00 | 1.00, 1.00 | 0.032 |
| PCO2 | 0.99 | 0.98, 1.01 | 0.3 |
| Lactate | 1.03 | 0.97, 1.10 | 0.3 |
| Creatinine | 1.01 | 0.99, 1.03 | 0.5 |
| WBC | 0.99 | 0.97, 1.00 | 0.13 |
| Hemoglobin | 1.07 | 0.99, 1.16 | 0.082 |
| Platelet | 1.00 | 1.00, 1.00 | 0.022 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 42. Proportional hazards assumption for survey-weighted Cox model using IPW for 28-day mortality of subgroup cohort 1

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 0.99 |
| Age | 1.00 |
| Gender | 0.99 |
| Weight | 0.96 |
| SAPS II | 1.00 |
| SOFA score | 0.99 |
| Charlson comorbidity index | 0.96 |
| Mechanical ventilation | 0.95 |
| Sedative therapy | 0.98 |
| Length of vasopressor therapy | 0.89 |
| HF | 1.00 |
| Hypertension | 0.99 |
| AFIB | 1.00 |
| Renal | 0.97 |
| Liver | 0.95 |
| COPD | 1.00 |
| CAD | 1.00 |
| Stroke | 0.98 |
| Malignancy | 0.96 |
| MAP | 0.99 |
| Temperature | 0.98 |
| Heart rate | 0.98 |
| pH | 1.00 |
| PO2 | 1.00 |
| PCO2 | 0.98 |
| Lactate | 0.96 |
| Creatinine | 0.99 |
| WBC | 0.99 |
| Hemoglobin | 0.96 |
| Platelet | 1.00 |
| GLOBAL | 1.00 |

## Supplementary Table 43. Survey-weighted Cox model with all covariates using IPW for 28-day mortality of subgroup cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.50 | 1.18, 1.92 | <0.001 |
| Age | 1.01 | 1.00, 1.02 | 0.013 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.18 | 0.93, 1.49 | 0.2 |
| Weight | 0.99 | 0.99, 1.00 | 0.003 |
| SAPS II | 1.02 | 1.01, 1.04 | <0.001 |
| SOFA score | 1.12 | 1.06, 1.18 | <0.001 |
| Charlson comorbidity index | 1.08 | 1.03, 1.15 | 0.004 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.80 | 0.55, 1.17 | 0.3 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.33 | 0.94, 1.90 | 0.11 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.019 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 0.90 | 0.71, 1.13 | 0.4 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.16 | 0.93, 1.46 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 1.00 | 0.80, 1.25 | >0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.73 | 0.55, 0.97 | 0.030 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.58 | 0.39, 0.87 | 0.008 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.87 | 0.65, 1.16 | 0.3 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.20 | 1.65, 2.95 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.64 | 0.43, 0.96 | 0.031 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.74 | 0.56, 0.98 | 0.037 |
| MAP | 1.00 | 0.99, 1.00 | 0.2 |
| Temperature | 1.00 | 0.97, 1.02 | 0.8 |
| Heart rate | 1.01 | 1.00, 1.01 | 0.028 |
| pH | 0.56 | 0.15, 2.15 | 0.4 |
| PO2 | 1.00 | 1.00, 1.00 | 0.009 |
| PCO2 | 1.00 | 0.99, 1.01 | 0.5 |
| Lactate | 1.03 | 0.98, 1.09 | 0.2 |
| Creatinine | 1.00 | 0.97, 1.03 | >0.9 |
| WBC | 0.99 | 0.98, 1.00 | 0.2 |
| Hemoglobin | 1.06 | 1.00, 1.12 | 0.062 |
| Platelet | 1.00 | 1.00, 1.00 | 0.045 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 44. Cox model with all covariates using IPW for 28-day mortality of subgroup cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.48 | 1.18, 1.87 | <0.001 |
| Age | 1.01 | 1.00, 1.02 | 0.012 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.18 | 0.94, 1.49 | 0.2 |
| SAPS II | 1.03 | 1.01, 1.04 | <0.001 |
| SOFA score | 1.12 | 1.06, 1.18 | <0.001 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.28 | 0.92, 1.79 | 0.14 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 0.90 | 0.72, 1.13 | 0.4 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.16 | 0.92, 1.45 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 1.00 | 0.80, 1.25 | >0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.73 | 0.54, 0.98 | 0.035 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.87 | 0.65, 1.16 | 0.3 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.20 | 1.63, 2.96 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.65 | 0.43, 0.96 | 0.031 |
| MAP | 1.00 | 0.99, 1.00 | 0.3 |
| Temperature | 1.00 | 0.97, 1.02 | 0.7 |
| Heart rate | 1.01 | 1.00, 1.01 | 0.009 |
| pH | 0.51 | 0.13, 2.07 | 0.3 |
| PO2 | 1.00 | 1.00, 1.00 | 0.016 |
| PCO2 | 1.00 | 0.99, 1.01 | 0.5 |
| Creatinine | 1.00 | 0.97, 1.02 | >0.9 |
| WBC | 0.99 | 0.98, 1.00 | 0.3 |
| Platelet | 1.00 | 1.00, 1.00 | 0.048 |
| tt(Weight) | 1.00 | 1.00, 1.00 | 0.001 |
| tt(Charlson comorbidity index) | 1.02 | 1.01, 1.04 | 0.004 |
| tt(Mechanical ventilation) | 0.95 | 0.85, 1.07 | 0.4 |
| tt(Length of vasopressor therapy) | 1.00 | 1.00, 1.00 | 0.001 |
| tt(Liver) | 0.84 | 0.75, 0.95 | 0.005 |
| tt(Malignancy) | 0.91 | 0.83, 0.99 | 0.033 |
| tt(Lactate) | 1.01 | 0.99, 1.02 | 0.3 |
| tt(Hemoglobin) | 1.01 | 1.00, 1.03 | 0.10 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 45. Generalized additive model for 28-day mortality of subgroup cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.95 | 1.37, 2.79 | <0.001 |
| Age | 1.00 | 0.98, 1.01 | 0.7 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.05 | 0.74, 1.48 | 0.8 |
| Weight | 0.99 | 0.98, 1.00 | 0.062 |
| SAPS II | 1.06 | 1.04, 1.08 | <0.001 |
| SOFA score | 1.12 | 1.04, 1.20 | 0.002 |
| Charlson comorbidity index | 1.11 | 1.03, 1.19 | 0.004 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.74 | 1.15, 2.64 | 0.009 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 46. Piece-wise exponential additive mixed model for 28-day mortality of subgroup cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.79 | 1.34, 2.40 | <0.001 |
| Age | 1.00 | 0.99, 1.01 | 0.8 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.10 | 0.82, 1.46 | 0.5 |
| Weight | 0.99 | 0.99, 1.00 | 0.065 |
| SAPS II | 1.05 | 1.03, 1.07 | <0.001 |
| SOFA score | 1.11 | 1.05, 1.18 | <0.001 |
| Charlson comorbidity index | 1.10 | 1.04, 1.17 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.38 | 0.98, 1.95 | 0.065 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.01 | <0.001 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 47. Survey-weighted generalised linear model with all covariates using IPW for 28-day mortality of subgroup cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.99 | 1.25, 3.15 | 0.004 |
| Age | 1.01 | 0.99, 1.03 | 0.2 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.12 | 0.75, 1.68 | 0.6 |
| Weight | 0.99 | 0.98, 1.00 | 0.085 |
| SAPS II | 1.05 | 1.03, 1.08 | <0.001 |
| SOFA score | 1.06 | 0.96, 1.15 | 0.2 |
| Charlson comorbidity index | 1.04 | 0.94, 1.15 | 0.5 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.98 | 0.49, 1.98 | >0.9 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.44 | 0.81, 2.57 | 0.2 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | 0.005 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.16 | 0.77, 1.74 | 0.5 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.29 | 0.86, 1.92 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 1.02 | 0.67, 1.55 | >0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.73 | 0.35, 1.51 | 0.4 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.64 | 0.25, 1.63 | 0.4 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.69 | 0.42, 1.15 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 3.06 | 1.81, 5.16 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.39 | 0.20, 0.74 | 0.004 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.59 | 0.35, 1.00 | 0.048 |
| MAP | 1.00 | 0.99, 1.01 | >0.9 |
| Temperature | 1.02 | 0.97, 1.09 | 0.4 |
| Heart rate | 1.01 | 1.00, 1.02 | 0.3 |
| pH | 0.47 | 0.04, 5.60 | 0.6 |
| PO2 | 1.00 | 1.00, 1.00 | 0.015 |
| PCO2 | 1.00 | 0.98, 1.02 | 0.9 |
| Lactate | 1.06 | 0.98, 1.15 | 0.2 |
| Creatinine | 0.99 | 0.97, 1.01 | 0.4 |
| WBC | 0.99 | 0.97, 1.01 | 0.3 |
| Hemoglobin | 1.02 | 0.93, 1.13 | 0.6 |
| Platelet | 1.00 | 1.00, 1.00 | 0.5 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 48. Proportional hazards assumption for survey-weighted Cox model using IPW for 28-day mortality of subgroup cohort 2

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 0.96 |
| Age | 0.96 |
| Gender | 0.98 |
| Weight | 0.96 |
| SAPS II | 0.99 |
| SOFA score | 0.98 |
| Charlson comorbidity index | 0.95 |
| Mechanical ventilation | 0.93 |
| Sedative therapy | 0.98 |
| Length of vasopressor therapy | 0.93 |
| HF | 0.96 |
| Hypertension | 0.98 |
| AFIB | 1.00 |
| Renal | 0.95 |
| Liver | 0.99 |
| COPD | 0.98 |
| CAD | 0.99 |
| Stroke | 1.00 |
| Malignancy | 1.00 |
| MAP | 0.99 |
| Temperature | 0.99 |
| Heart rate | 0.95 |
| pH | 0.97 |
| PO2 | 1.00 |
| PCO2 | 0.96 |
| Lactate | 0.95 |
| Creatinine | 0.98 |
| WBC | 0.98 |
| Hemoglobin | 0.96 |
| Platelet | 1.00 |
| GLOBAL | 1.00 |

## Supplementary Table 49. Survey-weighted Cox model with all covariates using IPW for 28-day mortality of subgroup cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.90 | 1.34, 2.71 | <0.001 |
| Age | 1.01 | 0.99, 1.02 | 0.3 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.08 | 0.78, 1.51 | 0.6 |
| Weight | 0.99 | 0.99, 1.00 | 0.2 |
| SAPS II | 1.04 | 1.02, 1.06 | <0.001 |
| SOFA score | 1.06 | 0.99, 1.15 | 0.11 |
| Charlson comorbidity index | 1.06 | 0.99, 1.14 | 0.11 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.86 | 0.49, 1.52 | 0.6 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.35 | 0.84, 2.18 | 0.2 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.004 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.27 | 0.92, 1.75 | 0.15 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.20 | 0.87, 1.65 | 0.3 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.97 | 0.69, 1.36 | 0.8 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.84 | 0.49, 1.44 | 0.5 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.69 | 0.34, 1.40 | 0.3 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.77 | 0.52, 1.15 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.77 | 1.74, 4.40 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.56 | 0.35, 0.89 | 0.013 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.73 | 0.49, 1.08 | 0.11 |
| MAP | 1.00 | 0.99, 1.01 | 0.8 |
| Temperature | 1.01 | 0.97, 1.05 | 0.7 |
| Heart rate | 1.00 | 1.00, 1.01 | 0.3 |
| pH | 1.43 | 0.21, 9.54 | 0.7 |
| PO2 | 1.00 | 1.00, 1.00 | 0.023 |
| PCO2 | 1.00 | 0.99, 1.01 | 0.9 |
| Lactate | 1.05 | 0.99, 1.11 | 0.11 |
| Creatinine | 0.99 | 0.95, 1.02 | 0.5 |
| WBC | 1.00 | 0.98, 1.01 | 0.7 |
| Hemoglobin | 1.04 | 0.97, 1.13 | 0.3 |
| Platelet | 1.00 | 1.00, 1.00 | 0.7 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 50. Cox model with all covariates using IPW for 28-day mortality of subgroup cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.92 | 1.36, 2.71 | <0.001 |
| Age | 1.01 | 0.99, 1.02 | 0.3 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.08 | 0.77, 1.51 | 0.7 |
| Weight | 0.99 | 0.99, 1.00 | 0.2 |
| SAPS II | 1.04 | 1.02, 1.06 | <0.001 |
| SOFA score | 1.07 | 0.98, 1.16 | 0.11 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.30 | 0.81, 2.09 | 0.3 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.28 | 0.92, 1.77 | 0.14 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.22 | 0.87, 1.70 | 0.3 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.96 | 0.67, 1.38 | 0.8 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.70 | 0.35, 1.37 | 0.3 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.78 | 0.52, 1.18 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.78 | 1.75, 4.42 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.57 | 0.37, 0.87 | 0.010 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.73 | 0.49, 1.09 | 0.12 |
| MAP | 1.00 | 0.99, 1.01 | 0.8 |
| Temperature | 1.01 | 0.98, 1.04 | 0.5 |
| pH | 1.37 | 0.19, 9.86 | 0.8 |
| PO2 | 1.00 | 1.00, 1.00 | 0.038 |
| PCO2 | 1.00 | 0.99, 1.02 | 0.9 |
| Creatinine | 0.99 | 0.95, 1.02 | 0.4 |
| WBC | 1.00 | 0.98, 1.01 | 0.7 |
| Hemoglobin | 1.04 | 0.97, 1.13 | 0.3 |
| Platelet | 1.00 | 1.00, 1.00 | 0.8 |
| tt(Charlson comorbidity index) | 1.02 | 1.00, 1.04 | 0.094 |
| tt(Mechanical ventilation) | 0.98 | 0.83, 1.15 | 0.8 |
| tt(Length of vasopressor therapy) | 1.00 | 1.00, 1.00 | <0.001 |
| tt(Renal) | 0.94 | 0.81, 1.10 | 0.5 |
| tt(Heart rate) | 1.00 | 1.00, 1.00 | 0.3 |
| tt(Lactate) | 1.01 | 0.99, 1.03 | 0.2 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 51. Generalized additive model for ICU mortality of subgroup cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.57 | 1.15, 2.14 | 0.004 |
| Age | 1.00 | 0.99, 1.01 | >0.9 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.99 | 0.73, 1.36 | >0.9 |
| Weight | 1.00 | 0.99, 1.00 | 0.5 |
| SAPS II | 1.05 | 1.04, 1.07 | <0.001 |
| SOFA score | 1.19 | 1.12, 1.26 | <0.001 |
| Charlson comorbidity index | 1.10 | 1.03, 1.17 | 0.005 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.68 | 0.46, 0.99 | 0.043 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 52. Piece-wise exponential additive mixed model for ICU mortality of subgroup cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.58 | 1.22, 2.05 | <0.001 |
| Age | 1.00 | 0.99, 1.01 | 0.5 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.07 | 0.82, 1.38 | 0.6 |
| Weight | 1.00 | 0.99, 1.00 | 0.3 |
| SAPS II | 1.03 | 1.02, 1.05 | <0.001 |
| SOFA score | 1.13 | 1.08, 1.19 | <0.001 |
| Charlson comorbidity index | 1.11 | 1.05, 1.17 | <0.001 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 1.10 | 0.79, 1.53 | 0.6 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.024 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 53. Survey-weighted generalised linear model with all covariates using IPW for ICU mortality of subgroup cohort 1

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.92 | 1.32, 2.78 | <0.001 |
| Age | 1.01 | 0.99, 1.03 | 0.3 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.10 | 0.78, 1.57 | 0.6 |
| Weight | 1.00 | 0.99, 1.01 | 0.5 |
| SAPS II | 1.05 | 1.03, 1.07 | <0.001 |
| SOFA score | 1.14 | 1.06, 1.23 | <0.001 |
| Charlson comorbidity index | 1.05 | 0.96, 1.15 | 0.3 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.33 | 0.18, 0.59 | <0.001 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.78 | 1.07, 2.97 | 0.027 |
| Length of vasopressor therapy | 1.01 | 1.01, 1.01 | <0.001 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 0.96 | 0.67, 1.39 | 0.8 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.23 | 0.87, 1.75 | 0.2 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.94 | 0.65, 1.37 | 0.8 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.86 | 0.52, 1.43 | 0.6 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.79 | 0.41, 1.53 | 0.5 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.87 | 0.54, 1.40 | 0.6 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.74 | 1.78, 4.20 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.41 | 0.22, 0.78 | 0.007 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.75 | 0.47, 1.19 | 0.2 |
| MAP | 1.00 | 0.99, 1.01 | >0.9 |
| Temperature | 1.00 | 0.96, 1.04 | 0.9 |
| Heart rate | 1.01 | 1.00, 1.02 | 0.009 |
| pH | 0.51 | 0.06, 4.16 | 0.5 |
| PO2 | 1.00 | 1.00, 1.00 | 0.009 |
| PCO2 | 0.99 | 0.98, 1.01 | 0.2 |
| Lactate | 1.07 | 1.00, 1.15 | 0.064 |
| Creatinine | 1.01 | 0.98, 1.03 | 0.7 |
| WBC | 0.99 | 0.97, 1.01 | 0.2 |
| Hemoglobin | 1.10 | 1.01, 1.21 | 0.028 |
| Platelet | 1.00 | 1.00, 1.00 | 0.036 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 54. Proportional hazards assumption for survey-weighted Cox model using IPW for ICU mortality of subgroup cohort 1

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 0.99 |
| Age | 0.98 |
| Gender | 0.98 |
| Weight | 0.98 |
| SAPS II | 1.00 |
| SOFA score | 0.96 |
| Charlson comorbidity index | 0.97 |
| Mechanical ventilation | 0.96 |
| Sedative therapy | 0.98 |
| Length of vasopressor therapy | 0.92 |
| HF | 1.00 |
| Hypertension | 1.00 |
| AFIB | 0.99 |
| Renal | 0.99 |
| Liver | 0.98 |
| COPD | 0.98 |
| CAD | 0.96 |
| Stroke | 0.98 |
| Malignancy | 0.98 |
| MAP | 0.99 |
| Temperature | 0.99 |
| Heart rate | 0.97 |
| pH | 0.95 |
| PO2 | 0.97 |
| PCO2 | 0.99 |
| Lactate | 0.94 |
| Creatinine | 0.98 |
| WBC | 1.00 |
| Hemoglobin | 0.96 |
| Platelet | 0.99 |
| GLOBAL | 1.00 |

## Supplementary Table 55. Survey-weighted Cox model with all covariates using IPW for ICU mortality of subgroup cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.72 | 1.28, 2.31 | <0.001 |
| Age | 1.01 | 1.00, 1.02 | 0.11 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.06 | 0.80, 1.40 | 0.7 |
| Weight | 1.00 | 0.99, 1.00 | 0.4 |
| SAPS II | 1.02 | 1.01, 1.04 | 0.004 |
| SOFA score | 1.09 | 1.02, 1.17 | 0.007 |
| Charlson comorbidity index | 1.08 | 1.01, 1.16 | 0.025 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.73 | 0.45, 1.17 | 0.2 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.53 | 1.05, 2.24 | 0.028 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.024 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.01 | 0.76, 1.34 | >0.9 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.09 | 0.82, 1.44 | 0.5 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.98 | 0.74, 1.30 | 0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.85 | 0.59, 1.24 | 0.4 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.78 | 0.47, 1.28 | 0.3 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 1.02 | 0.70, 1.49 | >0.9 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 1.70 | 1.18, 2.44 | 0.004 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.45, 1.12 | 0.14 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.80 | 0.56, 1.14 | 0.2 |
| MAP | 1.00 | 0.99, 1.01 | 0.7 |
| Temperature | 0.98 | 0.95, 1.01 | 0.15 |
| Heart rate | 1.01 | 1.00, 1.01 | 0.042 |
| pH | 1.04 | 0.21, 5.12 | >0.9 |
| PO2 | 1.00 | 1.00, 1.00 | 0.12 |
| PCO2 | 0.99 | 0.98, 1.00 | 0.2 |
| Lactate | 1.03 | 0.97, 1.10 | 0.3 |
| Creatinine | 1.02 | 1.00, 1.03 | 0.12 |
| WBC | 1.00 | 0.98, 1.01 | 0.7 |
| Hemoglobin | 1.08 | 1.01, 1.16 | 0.035 |
| Platelet | 1.00 | 1.00, 1.00 | 0.3 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 56. Cox model with all covariates using IPW for ICU mortality of subgroup cohort 1

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| TWA-MAP < 70 (mm Hg) | 1.69 | 1.27, 2.24 | <0.001 |
| Age | 1.01 | 1.00, 1.02 | 0.14 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.07 | 0.81, 1.41 | 0.6 |
| Weight | 1.00 | 0.99, 1.00 | 0.4 |
| SAPS II | 1.03 | 1.01, 1.04 | 0.002 |
| Charlson comorbidity index | 1.08 | 1.01, 1.15 | 0.030 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.51 | 1.04, 2.18 | 0.029 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.01 | 0.76, 1.34 | >0.9 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.09 | 0.83, 1.44 | 0.5 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.99 | 0.74, 1.31 | >0.9 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 0.84 | 0.57, 1.23 | 0.4 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 0.77 | 0.46, 1.31 | 0.3 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 1.02 | 0.71, 1.47 | >0.9 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 1.71 | 1.18, 2.48 | 0.004 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.71 | 0.45, 1.13 | 0.15 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.79 | 0.56, 1.13 | 0.2 |
| MAP | 1.00 | 0.99, 1.01 | 0.7 |
| Temperature | 0.98 | 0.96, 1.00 | 0.057 |
| Heart rate | 1.01 | 1.00, 1.01 | 0.019 |
| PO2 | 1.00 | 1.00, 1.00 | 0.14 |
| PCO2 | 0.99 | 0.98, 1.00 | 0.3 |
| Creatinine | 1.02 | 1.00, 1.03 | 0.067 |
| WBC | 1.00 | 0.98, 1.01 | 0.7 |
| Platelet | 1.00 | 1.00, 1.00 | 0.4 |
| tt(SOFA score) | 1.02 | 1.00, 1.05 | 0.024 |
| tt(Mechanical ventilation) | 0.92 | 0.79, 1.07 | 0.3 |
| tt(Length of vasopressor therapy) | 1.00 | 1.00, 1.00 | 0.10 |
| tt(pH) | 1.04 | 0.61, 1.77 | 0.9 |
| tt(Lactate) | 1.01 | 0.99, 1.03 | 0.4 |
| tt(Hemoglobin) | 1.02 | 1.00, 1.04 | 0.043 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 57. Generalized additive model for ICU mortality of subgroup cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.96 | 1.29, 2.98 | 0.002 |
| Age | 1.00 | 0.99, 1.02 | 0.6 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.95 | 0.63, 1.44 | 0.8 |
| Weight | 1.00 | 0.99, 1.01 | >0.9 |
| SAPS II | 1.05 | 1.03, 1.07 | <0.001 |
| SOFA score | 1.18 | 1.09, 1.28 | <0.001 |
| Charlson comorbidity index | 1.01 | 0.93, 1.10 | 0.8 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.65 | 0.35, 1.18 | 0.2 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | <0.001 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 58. Piece-wise exponential additive mixed model for ICU mortality of subgroup cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.65 | 1.15, 2.37 | 0.007 |
| Age | 1.01 | 1.00, 1.02 | 0.14 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.03 | 0.72, 1.47 | 0.9 |
| Weight | 1.00 | 0.99, 1.00 | 0.3 |
| SAPS II | 1.03 | 1.01, 1.05 | 0.002 |
| SOFA score | 1.13 | 1.05, 1.22 | 0.001 |
| Charlson comorbidity index | 1.02 | 0.94, 1.10 | 0.6 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.96 | 0.55, 1.68 | 0.9 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.3 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 59. Survey-weighted generalised linear model with all covariates using IPW for ICU mortality of subgroup cohort 2

| Characteristic | OR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.75 | 1.02, 2.98 | 0.042 |
| Age | 1.01 | 0.99, 1.03 | 0.2 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 0.97 | 0.60, 1.56 | >0.9 |
| Weight | 1.00 | 0.99, 1.01 | 0.8 |
| SAPS II | 1.04 | 1.01, 1.06 | 0.013 |
| SOFA score | 1.14 | 1.02, 1.27 | 0.026 |
| Charlson comorbidity index | 1.00 | 0.88, 1.14 | >0.9 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.26 | 0.11, 0.63 | 0.003 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.76 | 0.94, 3.28 | 0.078 |
| Length of vasopressor therapy | 1.01 | 1.00, 1.01 | 0.005 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.42 | 0.86, 2.35 | 0.2 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 1.12 | 0.69, 1.82 | 0.6 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.82 | 0.49, 1.37 | 0.4 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 1.31 | 0.44, 3.92 | 0.6 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 1.45 | 0.41, 5.16 | 0.6 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.66 | 0.35, 1.26 | 0.2 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 3.93 | 1.94, 7.99 | <0.001 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.34 | 0.17, 0.71 | 0.004 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.76 | 0.40, 1.43 | 0.4 |
| MAP | 1.00 | 0.99, 1.02 | 0.6 |
| Temperature | 1.00 | 0.95, 1.06 | 0.9 |
| Heart rate | 1.01 | 1.00, 1.02 | 0.2 |
| pH | 0.32 | 0.02, 6.00 | 0.4 |
| PO2 | 1.00 | 1.00, 1.00 | 0.025 |
| PCO2 | 0.99 | 0.97, 1.01 | 0.4 |
| Lactate | 1.09 | 1.00, 1.19 | 0.044 |
| Creatinine | 0.97 | 0.85, 1.11 | 0.7 |
| WBC | 0.98 | 0.96, 1.01 | 0.2 |
| Hemoglobin | 1.00 | 0.90, 1.12 | >0.9 |
| Platelet | 1.00 | 1.00, 1.00 | 0.4 |
| 1OR = Odds Ratio, CI = Confidence Interval | | | |

## Supplementary Table 60. Proportional hazards assumption for survey-weighted Cox model using IPW for ICU mortality of subgroup cohort 2

| Covariate | p-value of PH assumption |
| --- | --- |
| Group | 0.98 |
| Age | 0.94 |
| Gender | 0.96 |
| Weight | 0.97 |
| SAPS II | 0.97 |
| SOFA score | 0.99 |
| Charlson comorbidity index | 0.96 |
| Mechanical ventilation | 0.96 |
| Sedative therapy | 0.99 |
| Length of vasopressor therapy | 0.97 |
| HF | 0.96 |
| Hypertension | 0.99 |
| AFIB | 1.00 |
| Renal | 1.00 |
| Liver | 0.96 |
| COPD | 1.00 |
| CAD | 0.99 |
| Stroke | 0.99 |
| Malignancy | 0.99 |
| MAP | 0.98 |
| Temperature | 0.97 |
| Heart rate | 0.95 |
| pH | 0.99 |
| PO2 | 0.97 |
| PCO2 | 1.00 |
| Lactate | 0.97 |
| Creatinine | 0.98 |
| WBC | 0.97 |
| Hemoglobin | 0.98 |
| Platelet | 0.97 |
| GLOBAL | 1.00 |

## Supplementary Table 61. Survey-weighted Cox model with all covariates using IPW for ICU mortality of subgroup cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.82 | 1.18, 2.81 | 0.006 |
| Age | 1.02 | 1.00, 1.03 | 0.044 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.06 | 0.71, 1.57 | 0.8 |
| Weight | 1.00 | 0.99, 1.01 | 0.4 |
| SAPS II | 1.02 | 1.00, 1.04 | 0.10 |
| SOFA score | 1.12 | 1.01, 1.23 | 0.026 |
| Charlson comorbidity index | 1.04 | 0.95, 1.15 | 0.4 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.51 | 0.24, 1.06 | 0.072 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.58 | 0.97, 2.57 | 0.067 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.2 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.52 | 1.04, 2.24 | 0.032 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 0.84 | 0.57, 1.26 | 0.4 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.91 | 0.60, 1.38 | 0.7 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 1.57 | 0.66, 3.76 | 0.3 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 1.14 | 0.39, 3.29 | 0.8 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.85 | 0.50, 1.45 | 0.6 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.06 | 1.09, 3.88 | 0.025 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.62 | 0.37, 1.03 | 0.064 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.85 | 0.52, 1.38 | 0.5 |
| MAP | 1.00 | 0.99, 1.02 | 0.6 |
| Temperature | 0.96 | 0.93, 1.00 | 0.039 |
| Heart rate | 1.01 | 1.00, 1.02 | 0.2 |
| pH | 0.79 | 0.09, 6.87 | 0.8 |
| PO2 | 1.00 | 1.00, 1.00 | 0.2 |
| PCO2 | 0.99 | 0.98, 1.01 | 0.3 |
| Lactate | 1.06 | 0.99, 1.12 | 0.088 |
| Creatinine | 0.97 | 0.85, 1.11 | 0.6 |
| WBC | 1.00 | 0.98, 1.02 | >0.9 |
| Hemoglobin | 1.03 | 0.94, 1.13 | 0.5 |
| Platelet | 1.00 | 1.00, 1.00 | 0.8 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |

## Supplementary Table 62. Cox model with all covariates using IPW for ICU mortality of subgroup cohort 2

| Characteristic | HR1 | 95% CI1 | p-value |
| --- | --- | --- | --- |
| Group |  |  |  |
| 70 ≤ TWA-MAP < 83 (mm Hg) | — | — |  |
| 83 ≤ TWA-MAP (mm Hg) | 1.83 | 1.19, 2.83 | 0.006 |
| Gender |  |  |  |
| Female | — | — |  |
| Male | 1.05 | 0.69, 1.61 | 0.8 |
| Weight | 1.00 | 0.99, 1.01 | 0.5 |
| SAPS II | 1.02 | 0.99, 1.04 | 0.12 |
| SOFA score | 1.12 | 1.01, 1.24 | 0.029 |
| Charlson comorbidity index | 1.04 | 0.95, 1.15 | 0.4 |
| Mechanical ventilation |  |  |  |
| YES | — | — |  |
| NO | 0.51 | 0.24, 1.08 | 0.079 |
| Sedative therapy |  |  |  |
| YES | — | — |  |
| NO | 1.57 | 0.96, 2.57 | 0.072 |
| Length of vasopressor therapy | 1.00 | 1.00, 1.00 | 0.2 |
| HF |  |  |  |
| YES | — | — |  |
| NO | 1.53 | 1.02, 2.28 | 0.039 |
| Hypertension |  |  |  |
| YES | — | — |  |
| NO | 0.84 | 0.57, 1.26 | 0.4 |
| AFIB |  |  |  |
| YES | — | — |  |
| NO | 0.93 | 0.61, 1.42 | 0.7 |
| Renal |  |  |  |
| YES | — | — |  |
| NO | 1.58 | 0.71, 3.49 | 0.3 |
| Liver |  |  |  |
| YES | — | — |  |
| NO | 1.13 | 0.41, 3.09 | 0.8 |
| COPD |  |  |  |
| YES | — | — |  |
| NO | 0.85 | 0.49, 1.46 | 0.6 |
| CAD |  |  |  |
| YES | — | — |  |
| NO | 2.06 | 1.09, 3.89 | 0.027 |
| Stroke |  |  |  |
| YES | — | — |  |
| NO | 0.62 | 0.37, 1.03 | 0.067 |
| Malignancy |  |  |  |
| YES | — | — |  |
| NO | 0.84 | 0.53, 1.33 | 0.5 |
| MAP | 1.00 | 0.99, 1.02 | 0.6 |
| Temperature | 0.96 | 0.94, 0.99 | 0.006 |
| Heart rate | 1.01 | 1.00, 1.02 | 0.2 |
| pH | 0.79 | 0.07, 8.85 | 0.8 |
| PO2 | 1.00 | 1.00, 1.00 | 0.2 |
| PCO2 | 0.99 | 0.98, 1.01 | 0.3 |
| Lactate | 1.06 | 0.99, 1.13 | 0.10 |
| Creatinine | 0.97 | 0.85, 1.10 | 0.6 |
| WBC | 1.00 | 0.98, 1.02 | >0.9 |
| Hemoglobin | 1.03 | 0.94, 1.12 | 0.5 |
| Platelet | 1.00 | 1.00, 1.00 | 0.8 |
| tt(Age) | 1.01 | 1.00, 1.01 | 0.046 |
| 1HR = Hazard Ratio, CI = Confidence Interval | | | |