Table S1. Variables with missing data

| Variables | N (%) |
| --- | --- |
| HR | 5 (0.20) |
| RR | 100 (3.98) |
| Temperature | 9 (0.36) |
| SpO2 | 4 (0.16) |
| WBC | 1 (0.04) |
| Platelet | 3 (0.12) |
| Cr | 7 (0.28) |
| BUN | 8 (0.32) |
| Glucose | 8 (0.32) |
| Ca | 98 (3.90) |
| Na | 4 (0.16) |
| K | 4 (0.16) |
| Chloride | 6 (0.24) |
| Bicarbonate | 7 (0.28) |
| PT | 238 (9.47) |
| SOFA | 3 (0.12) |
| GCS | 3 (0.12) |
| Urine output | 82 (3.26) |
| MAP | 3 (0.12) |
| AG | 8 (0.32) |

HR: heart rate, RR: respiratory rate, WBC: white blood cell, Cr: creatinine, BUN: blood urea nitrogen, Ca: calcium, Na: sodium, K: potassium, PT: prothrombin time, SOFA: the Sequential Organ-Failure Assessment, GCS: the Glasgow Coma Scale, MAP: mean arterial pressure, AG: anion gap.

Table S2. Characteristics of patients before and after the multiple interpolation of missing data

| Variables | After interpolation  (n=2512) | Before interpolation  (n=2512) | Statistics | *P* |
| --- | --- | --- | --- | --- |
| HR, bpm, Mean ± SD | 82.87 ± 17.64 | 82.84 ± 17.63 | t=0.06 | 0.951 |
| RR, insp/min, Mean ± SD | 18.64 ± 5.23 | 18.65 ± 5.19 | t=-0.05 | 0.958 |
| Temperature, ℃, Mean ± SD | 36.84 ± 0.65 | 36.84 ± 0.65 | t=-0.10 | 0.921 |
| SpO2, %, Mean ± SD | 97.38 ± 3.31 | 97.38 ± 3.31 | t=-0.03 | 0.974 |
| WBC, K/uL, M (Q1, Q3) | 10.25 (7.90, 13.20) | 10.30 (7.90, 13.20) | Z=0.022 | 0.982 |
| Platelet, K/uL, M (Q1, Q3) | 206.00 (161.00, 259.00) | 206.00 (161.00, 259.00) | Z=-0.009 | 0.993 |
| Cr, mg/dL, M (Q1, Q3) | 0.90 (0.70, 1.10) | 0.90 (0.70, 1.10) | Z=-0.082 | 0.934 |
| BUN, mg/dL, M (Q1, Q3) | 16.00 (12.00, 22.00) | 16.00 (12.00, 22.00) | Z=0.013 | 0.990 |
| Glucose, mg/dL, M (Q1, Q3) | 129.00 (107.00, 160.00) | 129.00 (107.00, 160.00) | Z=0.054 | 0.957 |
| Ca, mg/dL, Mean ± SD | 8.73 ± 0.73 | 8.74 ± 0.73 | t=-0.04 | 0.969 |
| AG, Mean ± SD | 16.31 ± 3.91 | 16.32 ± 3.91 | t=-0.02 | 0.984 |
| PT, sec, M (Q1, Q3) | 12.60 (11.80, 14.00) | 12.60 (11.70, 14.00) | Z=-0.135 | 0.893 |
| SOFA, M (Q1, Q3) | 1.00 (0.00, 2.00) | 1.00 (0.00, 2.00) | Z=-0.006 | 0.995 |
| GCS, Mean ± SD | 13.99 ± 2.04 | 13.99 ± 2.04 | t=0.01 | 0.989 |
| Urine output, ml, M (Q1, Q3) | 1550.00 (990.00, 2278.00) | 1555.00 (995.00, 2285.00) | Z=0.220 | 0.826 |
| MAP, mmHg, Mean ± SD | 96.23 ± 17.18 | 96.23 ± 17.19 | t=-0.01 | 0.990 |

HR: heart rate, SD: standard deviation, RR: respiratory rate, WBC: white blood cell, M: median, Q1: 1st quartile, Q3: 3rd quartile, Cr: creatinine, BUN: blood urea nitrogen, Ca: calcium, AG: anion gap, PT: prothrombin time, SOFA: the Sequential Organ-Failure Assessment, GCS: the Glasgow Coma Scale, MAP: mean arterial pressure.

Table S3. Characteristics of ICH patients in different ePVS level groups

| Variables | Total  (n=515) | ePVS levels | | | Statistics | *P* |
| --- | --- | --- | --- | --- | --- | --- |
| <4.63  (n=220) | [4.63-5.79)  (n=192) | ≥5.79  (n=103) |
| Age, years, Mean ± SD | 61.67 ± 11.41 | 61.26 ± 11.43 | 62.13 ± 10.87 | 62.13 ± 10.87 | F=0.298 | 0.742 |
| Gender, n (%) |  |  |  |  | χ2=3.900 | 0.142 |
| Female | 331 (64.27) | 152 (69.09) | 117 (60.94) | 62 (60.19) |  |  |
| Male | 184 (35.73) | 68 (30.91) | 75 (39.06) | 41 (39.81) |  |  |
| ICU types, n (%) |  |  |  |  | χ2=8.381 | 0.079 |
| Neuro intermediate/stepdown | 195 (37.86) | 72 (32.73) | 83 (43.23) | 40 (38.83) |  |  |
| SICU | 288 (55.92) | 138 (62.73) | 94 (48.96) | 56 (54.37) |  |  |
| Others | 199 (7.92) | 43 (5.19) | 43 (5.04) | 113 (13.61) |  |  |
| Cerebral infarction, n (%) |  |  |  |  | χ2=0.863 | 0.650 |
| No | 391 (75.92) | 163 (74.09) | 147 (76.56) | 81 (78.64) |  |  |
| Yes | 124 (24.08) | 57 (25.91) | 45 (23.44) | 22 (21.36) |  |  |
| DM, n (%) |  |  |  |  | χ2=1.408 | 0.495 |
| No | 405 (78.64) | 171 (77.73) | 156 (81.25) | 78 (75.73) |  |  |
| Yes | 110 (21.36) | 49 (22.27) | 36 (18.75) | 25 (24.27) |  |  |
| HF, n (%) |  |  |  |  | χ2=0.146 | 0.930 |
| No | 483 (93.79) | 206 (93.64) | 181 (94.27) | 96 (93.20) |  |  |
| Yes | 32 (6.21) | 14 (6.36) | 11 (5.73) | 7 (6.80) |  |  |
| AKI, n (%) |  |  |  |  | χ2=3.554 | 0.169 |
| No | 471 (91.46) | 206 (93.64) | 175 (91.15) | 90 (87.38) |  |  |
| Yes | 44 (8.54) | 14 (6.36) | 17 (8.85) | 13 (12.62) |  |  |
| Sepsis, n (%) |  |  |  |  | χ2=1.602 | 0.449 |
| No | 378 (73.40) | 158 (71.82) | 147 (76.56) | 73 (70.87) |  |  |
| Yes | 137 (26.60) | 62 (28.18) | 45 (23.44) | 30 (29.13) |  |  |
| HR, bpm, Mean ± SD | 84.92 ± 19.35 | 85.35 ± 21.16 | 83.63 ± 18.32 | 86.38 ± 17.09 | F=0.774 | 0.462 |
| MAP, mmHg, Mean ± SD | 97.38 ± 17.19 | 97.67 ± 17.71 | 97.49 ± 17.05 | 96.53 ± 16.44 | F=0.162 | 0.850 |
| RR, insp/min, Mean ± SD | 18.97 ± 5.56 | 19.23 ± 5.45 | 19.02 ± 5.58 | 18.34 ± 5.76 | F=0.905 | 0.405 |
| Temperature, ℃, Mean ± SD | 36.83 ± 0.65 | 36.78 ± 0.70 | 36.83 ± 0.58 | 36.93 ± 0.65 | F=1.781 | 0.189 |
| SpO2, %, Mean ± SD | 97.29 ± 4.08 | 97.46 ± 2.83 | 97.22 ± 5.40 | 97.05 ± 3.47 | F=0.394 | 0.675 |
| SOFA, M (Q1, Q3) | 1.00 (0.00, 2.00) | 1.00 (0.00, 3.00) | 1.00 (0.00, 2.00) | 1.00 (0.00, 3.00) | W=6.290 | 0.043 |
| GCS, Mean ± SD | 11.29 ± 4.13 | 11.85 ± 3.89 | 11.33 ± 4.03 | 9.98 ± 4.55 | F=7.408 | **<0.001** |
| CCI, M (Q1, Q3) | 3.00 (2.00, 5.00) | 3.00 (1.00, 5.00) | 3.00 (2.00, 5.00) | 4.00 (2.00, 5.00) | W=2.899 | 0.235 |
| WBC, K/uL, M (Q1, Q3) | 9.91 (7.19, 13.34) | 9.29 (6.70,12.77) | 9.76 (7.37,13.11) | 10.94 (7.62,15.34) | W=7.362 | **0.025** |
| Platelet, K/uL, M (Q1, Q3) | 209.00 (168.00, 260.00) | 210.50 (172.00,257.25) | 207.00 (166.00,259.25) | 209.00 (159.50,271.50) | W=0.215 | 0.898 |
| Cr, mg/dL, M (Q1, Q3) | 0.90 (0.70, 1.10) | 0.90 (0.70,1.10) | 0.90 (0.70, 1.10) | 0.90 (0.70, 1.20) | W=2.324 | 0.313 |
| BUN, mg/dL, M (Q1, Q3) | 6.20 (4.89, 8.20) | 6.00 (4.79,7.88) | 6.24 (4.83,8.10) | 6.61 (5.52,9.48) | W=7.107 | **0.029** |
| Glucose, mg/dL, M (Q1, Q3) | 127.00 (107.00, 149.50) | 126.50 (107.75, 147.00) | 126.00 (107.00, 155.50) | 128.00 (107.00, 149.50) | W=0.195 | 0.907 |
| Ca, mg/dL, Mean ± SD | 8.73 ± 0.80 | 8.72 ± 0.86 | 8.76 ± 0.77 | 8.69 ± 0.72 | F=0.268 | 0.765 |
| AG, Mean ± SD | 16.29 ± 3.99 | 16.23 ± 4.59 | 16.03 ± 3.35 | 16.91 ± 3.68 | F=1.692 | 0.185 |
| PT, sec, M (Q1, Q3) | 11.90 (11.20, 12.95) | 12.00 (11.30,13.03) | 11.90 (11.10,12.83) | 11.60 (11.10,12.50) | W=4.296 | 0.117 |
| Urine output, ml, M (Q1, Q3) | 1550.00 (1000.00, 2252.50) | 1590.00 (972.50,2293.75) | 1497.50 (991.50,2161.25) | 1550.00 (1100.00,2237.50) | W=0.724 | 0.696 |
| Brain surgery, n (%) |  |  |  |  | χ2=1.934 | 0.380 |
| No | 498 (96.70) | 215 (97.73) | 183 (95.31) | 100 (97.09) |  |  |
| Yes | 17 (3.30) | 5 (2.27) | 9 (4.69) | 3 (2.91) |  |  |
| RRT, n (%) |  |  |  |  | χ2=0.753 | 0.686 |
| No | 461 (89.51) | 197 (89.55) | 174 (90.62) | 90 (87.38) |  |  |
| Yes | 54 (10.49) | 23 (10.45) | 18 (9.38) | 13 (12.62) |  |  |
| Mechanical ventilation, n (%) |  |  |  |  | χ2=5.007 | 0.082 |
| No | 182 (35.34) | 71 (32.27) | 65 (33.85) | 46 (44.66) |  |  |
| Yes | 333 (64.66) | 149 (67.73) | 127 (66.15) | 57 (55.34) |  |  |
| Vasopressors, n (%) |  |  |  |  | χ2=0.766 | 0.682 |
| No | 410 (79.61) | 179 (81.36) | 151 (78.65) | 80 (77.67) |  |  |
| Yes | 105 (20.39) | 41 (18.64) | 41 (21.35) | 23 (22.33) |  |  |
| Mannitol, n (%) |  |  |  |  | χ2=0.844 | 0.656 |
| No | 469 (91.07) | 202 (91.82) | 172 (89.58) | 95 (92.23) |  |  |
| Yes | 46 (8.93) | 18 (8.18) | 20 (10.42) | 8 (7.77) |  |  |
| Furosemide, n (%) |  |  |  |  | χ2=6.288 | **0.043** |
| No | 400 (77.67) | 179 (81.36) | 150 (78.12) | 71 (68.93) |  |  |
| Yes | 115 (22.33) | 41 (18.64) | 42 (21.88) | 32 (31.07) |  |  |
| Transfusion, n (%) |  |  |  |  | χ2=10.023 | 0.311 |
| Non-transfusion | 454 (88.16) | 198 (90.00) | 166 (86.46) | 90 (87.38) |  |  |
| Plasma | 10 (1.94) | 2 (0.91) | 6 (3.12) | 2 (1.94) |  |  |
| Thrombocyte | 21 (4.08) | 8 (3.64) | 6 (3.12) | 7 (6.80) |  |  |
| RBC | 18 (3.50) | 9 (4.09) | 6 (3.12) | 3 (2.91) |  |  |
| Others | 12 (2.33) | 3 (1.36) | 8 (4.17) | 1 (0.97) |  |  |
| β-blockers, n (%) |  |  |  |  | χ2=0.198 | 0.906 |
| No | 149 (28.93) | 65 (29.55) | 56 (29.17) | 28 (27.18) |  |  |
| Yes | 366 (71.07) | 155 (70.45) | 136 (70.83) | 75 (72.82) |  |  |
| 30-day mortality, n (%) |  |  |  |  | χ2=36.963 | **<0.001** |
| No | 383 (74.37) | 185 (84.09) | 144 (75.00) | 54 (52.43) |  |  |
| Yes | 132 (25.63) | 35 (15.91) | 48 (25.00) | 49 (47.57) |  |  |
| 1-year mortality, n (%) |  |  |  |  | χ2=41.725 | **<0.001** |
| No | 227 (44.10) | 105 (47.70) | 105 (54.70) | 17 (16.50) |  |  |
| Yes | 288 (55.90) | 115 (52.30) | 87 (45.30) | 86 (83.50) |  |  |
| Follow-up time, days, M (Q1, Q3) | 30.00 (26.61, 30.00) | 30.00 (30.00, 30.00) | 30.00 (29.57, 30.00) | 30.00 (8.5, 30.00) | W=38.235 | **<0.001** |

F: ANOVA, W: Kruskal-Wallis H test, χ2: chi-square test.

The bold P values represented statistically significant.

ICH: intracerebral hemorrhage, ePVS: estimated plasma volume status, SD: standard deviation, ICU: intensive care unit, SICU: surgical intensive care unit, DM: diabetes mellitus, HF: heart failure, AKI: acute kidney injury, HR: heart rate, MAP: mean arterial pressure, RR: respiratory rate, SOFA: the Sequential Organ-Failure Assessment, M: median, Q1: 1st quartile, Q3: 3rd quartile, GCS: the Glasgow Coma Scale, CCI: the Charlson Comorbidity Index, WBC: white blood cell, Cr: creatinine, BUN: blood urea nitrogen, Ca: calcium, AG: anion gap, PT: prothrombin time, RRT: renal replacement therapy, RBC: red blood cell.

Table S4. Association between ePVS and 30-day mortality in different subgroups for MIMIC-IV

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Age <60  (n=772) | | Age ≥60  (n=1740) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.02 (0.95-1.09) | 0.559 | 1.05 (1.01-1.11) | **0.048** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.99 (0.63-1.57) | 0.974 | 1.05 (0.83-1.33) | 0.700 |
| ≥5.79 | 1.80 (1.13-2.86) | **0.013** | 1.28 (1.04-1.58) | **0.021** |
| Variables | GCS <13  (n=348) | | GCS ≥13  (n=2164) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.09 (0.94-1.26) | 0.240 | 1.05 (1.01-1.09) | **0.025** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.60 (0.96-2.66) | 0.073 | 0.90 (0.72-1.14) | 0.382 |
| ≥5.79 | 1.55 (0.95-2.53) | 0.081 | 1.35 (1.10-1.66) | **0.005** |
| Variables | SOFA <1  (n=1197) | | SOFA ≥1  (n=1315) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.12 (1.04-1.21) | **0.003** | 1.03 (0.98-1.08) | 0.209 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.94 (0.68-1.30) | 0.711 | 1.08 (0.82-1.43) | 0.569 |
| ≥5.79 | 1.29 (0.95-1.74) | 0.098 | 1.39 (1.09-1.79) | **0.009** |
| Variables | Non-AKI  (n=915) | | AKI  (n=1597) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.14 (1.02-1.28) | **0.022** | 1.03 (0.99-1.07) | 0.213 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.26 (0.83-1.90) | 0.282 | 0.93 (0.73-1.18) | 0.549 |
| ≥5.79 | 1.58 (1.11-2.24) | **0.011** | 1.26 (1.01-1.58) | **0.049** |
| Variables | Non-sepsis  (n=1836) | | Sepsis  (n=676) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.06 (1.01-1.11) | **0.021** | 1.03 (0.97-1.11) | 0.333 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.06 (0.83-1.36) | 0.650 | 0.86 (0.59-1.26) | 0.449 |
| ≥5.79 | 1.42 (1.13-1.79) | **0.003** | 1.21 (0.85-1.72) | 0.282 |
| Variables | Non-HF  (n=2158) | | HF  (n=354) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.06 (1.01-1.10) | **0.015** | 1.06 (0.98-1.16) | 0.165 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.03 (0.82-1.29) | 0.816 | 0.80 (0.46-1.37) | 0.411 |
| ≥5.79 | 1.46 (1.18-1.80) | **<0.001** | 0.99 (0.61-1.58) | 0.951 |

The bold numbers represented statistically significant.

ePVS: estimated plasma volume status, HR: hazard ratio, CI: confidence interval, Ref: reference, GCS: the Glasgow Coma Scale, SOFA: the Sequential Organ-Failure Assessment, AKI: acute kidney injury, HF: heart failure.

Model 1: unadjusted model;

Model 2 for age subgroups: adjusted for race, ICU types, HR, SpO2, SOFA, CCI, platelet, glucose, AG, urine output, mechanical ventilation, vasopressors, mannitol and β-blockers;

Model 2 for SOFA subgroups: adjusted for age, race, ICU types, HR, SpO2, CCI, platelet, glucose, AG, urine output, mechanical ventilation, vasopressors, mannitol and β-blockers;

Model 2 for GCS, AKI, sepsis and HF subgroups: adjusted for age, race, ICU types, HR, SpO2, SOFA, CCI, platelet, glucose, AG, urine output, mechanical ventilation, vasopressors, mannitol and β-blockers.

Table S5. Association between ePVS and 1-year mortality in different subgroups for MIMIC-IV

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Age <60  (n=772) | | Age ≥60  (n=1740) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.07 (1.02-1.11) | **0.005** | 1.11 (1.07-1.15) | **<0.001** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.62 (0.47-0.83) | **0.001** | 0.73 (0.61-0.86) | **<0.001** |
| ≥5.79 | 1.15 (0.87-1.51) | 0.323 | 1.25 (1.08-1.44) | **0.003** |
| Variables | GCS <13  (n=348) | | GCS ≥13  (n=2164) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.12 (1.01-1.24) | **0.035** | 1.05 (1.01-1.09) | **0.025** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.73 (0.49-1.09) | 0.120 | 0.70 (0.60-0.82) | **<0.001** |
| ≥5.79 | 1.25 (0.89-1.76) | 0.203 | 1.25 (1.08-1.44) | **0.002** |
| Variables | SOFA <1  (n=1197) | | SOFA ≥1  (n=1315) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.13 (1.08-1.19) | **<0.001** | 1.08 (1.04-1.12) | **<0.001** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.67 (0.54-0.83) | **<0.001** | 0.77 (0.63-0.95) | **0.013** |
| ≥5.79 | 1.27 (1.04-1.54) | **0.020** | 1.26 (1.06-1.50) | **0.008** |
| Variables | Non-AKI  (n=915) | | AKI  (n=1597) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.15 (1.07-1.23) | **<0.001** | 1.09 (1.06-1.12) | <0.001 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.67 (0.51-0.87) | **0.003** | 0.74 (0.62-0.89) | **0.001** |
| ≥5.79 | 1.36 (1.09-1.70) | **0.007** | 1.20 (1.02-1.41) | **0.025** |
| Variables | Non-sepsis  (n=1836) | | Sepsis  (n=676) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.11 (1.08-1.15) | **<0.001** | 1.08 (1.02-1.13) | **0.004** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.68 (0.57-0.81) | **<0.001** | 0.73 (0.54-0.98) | **0.034** |
| ≥5.79 | 1.24 (1.06-1.45) | **0.006** | 1.30 (1.00-1.70) | 0.053 |
| Variables | Non-HF  (n=2158) | | HF  (n=354) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.10 (1.07-1.14) | **<0.001** | 1.09 (1.03-1.16) | **0.002** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.70 (0.60-0.82) | **<0.001** | 0.73 (0.49-1.09) | 0.118 |
| ≥5.79 | 1.31 (1.14-1.51) | **<0.001** | 0.94 (0.67-1.33) | 0.736 |

The bold numbers represented statistically significant.

ePVS: estimated plasma volume status, HR: hazard ratio, CI: confidence interval, Ref: reference, GCS: the Glasgow Coma Scale, SOFA: the Sequential Organ-Failure Assessment, AKI: acute kidney injury, HF: heart failure.

The subgroup analysis adjusted for age, race, ICU types, HR, SpO2, SOFA, CCI, platelet, glucose, AG, brain surgery, mechanical ventilation, vasopressors, mannitol and transfusion, but excluded subgroup variables.

Table S6. Association between ePVS and 30-day mortality in different subgroups for HIS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Age <60  (n=200) | | Age ≥60  (n=315) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.28 (1.15-1.42) | **<0.001** | 1.55 (1.35-1.79) | **<0.001** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.67 (0.29-1.54) | 0.348 | 0.59 (0.35-0.99) | **0.045** |
| ≥5.79 | 2.72 (1.27-5.81) | **0.010** | 2.25 (1.40-3.63) | **0.001** |
| Variables | GCS <13  (n=221) | | GCS ≥13  (n=294) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.22 (1.13-1.31) | **<0.001** | 1.05 (1.01-1.09) | **0.025** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.69 (0.43-1.10) | 0.123 | 0.31 (0.08-1.20) | 0.090 |
| ≥5.79 | 2.23 (1.44-3.45) | **<0.001** | 1.77 (0.55-5.67) | 0.340 |
| Variables | SOFA <1  (n=205) | | SOFA ≥1  (n=310) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.56 (1.28-1.91) | **<0.001** | 1.30 (1.19-1.41) | <0.001 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.48 (0.24-0.95) | **0.035** | 0.80 (0.44-1.43) | 0.447 |
| ≥5.79 | 1.90 (1.01-3.56) | **0.046** | 2.76 (1.61-4.75) | **<0.001** |
| Variables | Non-AKI  (n=471) | | AKI  (n=44) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.14 (1.02-1.28) | **0.022** | 1.74 (1.21-2.50) | **0.003** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.34 (1.24-1.45) | **<0.001** | 0.51 (0.08-3.24) | 0.474 |
| ≥5.79 | 2.20 (1.43-3.40) | **<0.001** | 3.47 (0.71-17.08) | 0.126 |
| Variables | Non-sepsis  (n=378) | | Sepsis  (n=137) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.57 (1.37-1.79) | **<0.001** | 1.29 (1.14-1.46) | **<0.001** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.55 (0.32-0.96) | **0.035** | 0.78 (0.37-1.65) | 0.520 |
| ≥5.79 | 2.36 (1.46-3.81) | **<0.001** | 2.91 (1.36-6.25) | **0.006** |
| Variables | Non-HF  (n=483) | | HF  (n=32) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.31 (1.22-1.42) | **<0.001** | - | 0.702 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.66 (0.42-1.04) | 0.071 | - | 0.382 |
| ≥5.79 | 2.27 (1.50-3.45) | **<0.001** | - | 0.275 |

The bold numbers represented statistically significant.

ePVS: estimated plasma volume status, HR: hazard ratio, CI: confidence interval, Ref: reference, GCS: the Glasgow Coma Scale, SOFA: the Sequential Organ-Failure Assessment, AKI: acute kidney injury, HF: heart failure.

Model 1: unadjusted model;

Model 2 for age subgroups: adjusted for ICU types, HR, SpO2, SOFA, CCI, platelet, glucose, AG, urine output, mechanical ventilation, vasopressors, mannitol and β-blockers;

Model 2 for SOFA subgroups: adjusted for age, ICU types, HR, SpO2, CCI, platelet, glucose, AG, urine output, mechanical ventilation, vasopressors, mannitol and β-blockers;

Model 2 for GCS, AKI, sepsis and HF subgroups: adjusted for age, ICU types, HR, SpO2, SOFA, CCI, platelet, glucose, AG, urine output, mechanical ventilation, vasopressors, mannitol and β-blockers.

Table S7. Association between ePVS and 1-year mortality in different subgroups for HIS

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variables | Age <60  (n=200) | | Age ≥60  (n=315) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.25 (1.14-1.38) | **<0.001** | 1.32 (1.17-1.48) | **<0.001** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.35 (0.84-2.17) | 0.212 | 0.92 (0.69-1.38) | 0.872 |
| ≥5.79 | 3.59 (2.14-6.01) | **<0.001** | 2.40 (1.65-3.49) | **<0.001** |
| Variables | GCS <13  (n=221) | | GCS ≥13  (n=294) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.15 (1.06-1.25) | **0.001** | 1.35 (1.16-1.58) | **<0.001** |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 0.79 (0.55-1.14) | 0.206 | 1.79 (1.13-2.83) | **0.012** |
| ≥5.79 | 1.67 (1.14-2.41) | **0.008** | 4.57 (2.73-7.65) | **<0.001** |
| Variables | SOFA <1  (n=205) | | SOFA ≥1  (n=310) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.34 (1.15-1.58) | **<0.001** | 1.03 (0.98-1.08) | 0.209 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.10 (0.73-1.68) | 0.642 | 1.11 (0.76-1.62) | 0.583 |
| ≥5.79 | 2.63 (1.63-4.25) | **<0.001** | 2.85 (1.92-4.25) | **<0.001** |
| Variables | Non-AKI  (n=471) | | AKI  (n=44) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.27 (1.18-1.36) | **<0.001** | 1.49 (0.96-2.30) | 0.073 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.06 (0.80-1.42) | 0.683 | 2.23 (0.53-9.37) | 0.274 |
| ≥5.79 | 2.82 (2.05-3.88) | **<0.001** | 5.72 (1.19-27.50) | **0.030** |
| Variables | Non-sepsis  (n=378) | | Sepsis  (n=137) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.31 (1.18-1.46) | **<0.001** | 1.21 (1.10-1.33) | <0.001 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.19 (0.87-1.65) | 0.278 | 0.82 (0.47-1.45) | 0.497 |
| ≥5.79 | 2.67 (1.87-3.82) | **<0.001** | 2.82 (1.59-4.99) | **<0.001** |
| Variables | Non-HF  (n=483) | | HF  (n=32) | |
| HR (95% CI) | *P* | HR (95% CI) | *P* |
| ePVS | 1.26 (1.17-1.35) | **<0.001** | 1.53 (0.79-2.97) | 0.206 |
| ePVS levels |  |  |  |  |
| [4.63-5.79) | Ref |  | Ref |  |
| <4.63 | 1.08 (0.81-1.44) | 0.591 | 1.45 (0.24-8.71) | 0.685 |
| ≥5.79 | 2.73 (2.00-3.73) | **<0.001** | 5.94 (0.35-101.551) | 0.219 |

The bold numbers represented statistically significant.

ePVS: estimated plasma volume status, HR: hazard ratio, CI: confidence interval, Ref: reference, GCS: the Glasgow Coma Scale, SOFA: the Sequential Organ-Failure Assessment, AKI: acute kidney injury, HF: heart failure.

The subgroup analysis adjusted for age, ICU types, HR, SpO2, SOFA, CCI, platelet, glucose, AG, brain surgery, mechanical ventilation, vasopressors, mannitol and transfusion, but excluded subgroup variables.