**Table S1** Variables required for each scores in this study

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **SSS** | **APACHE II** | **APACHE III** | **APACHE IV** | **SAPS II** | **SAPS 3** |
| Age |  | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| Sex |  |  |  | 🗸 |  |  |
| Co-morbidities (n) |  | 🗸 (5) | 🗸 (7) | 🗸 (8) | 🗸 (3) | 🗸 (6) |
| Type of ICU admission |  | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| ICU admission source | 🗸 |  | 🗸 | 🗸 |  | 🗸 |
| LOS before ICU admission |  |  | 🗸 | 🗸 |  | 🗸 |
| Geographic region | 🗸 |  |  |  |  | 🗸 |
| Reasons for ICU admission (n) |  | 🗸 (50) | 🗸 (78) | 🗸 (116) |  | 🗸 (11) |
| Sites of infection | 🗸 |  |  | 🗸 |  | 🗸 |
| Vasopressor therapy | 🗸 |  |  |  |  | 🗸 |
| Mechanical ventilation | 🗸 |  | 🗸 | 🗸 | 🗸 |  |
| **Physiological variables** |  |  |  |  |  |  |
| Temperature | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| Heart rate |  | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| Respiratory rate | 🗸 | 🗸 | 🗸 | 🗸 |  |  |
| Blood pressure | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| Hematocrit |  | 🗸 | 🗸 | 🗸 |  |  |
| White blood cells | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| Platelets | 🗸 |  |  |  |  | 🗸 |
| Albumin |  |  | 🗸 | 🗸 |  |  |
| Bilirubin | 🗸 |  | 🗸 | 🗸 | 🗸 | 🗸 |
| Glucose | 🗸 |  | 🗸 | 🗸 |  |  |
| Serum Na |  | 🗸 | 🗸 | 🗸 | 🗸 |  |
| Serum K |  | 🗸 |  | 🗸 | 🗸 |  |
| Serum HCO3 |  | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| BUN |  |  | 🗸 | 🗸 | 🗸 |  |
| Creatinine | 🗸 | 🗸 | 🗸 | 🗸 |  | 🗸 |
| Urine output | 🗸 |  | 🗸 | 🗸 | 🗸 |  |
| ABG | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |
| Lactate | 🗸 |  |  |  |  |  |
| Glasgow Coma Score | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 | 🗸 |

ABG: arterial blood gas; APACHE: Acute Physiology and Chronic Health Evaluation; BUN: blood urea nitrogen; ICU: intensive care unit; LOS: length of stay; SAPS: Simplified Acute Physiology Score; SSS: Sepsis Severity Score

**Table S2** Sepsis Severity Score components

|  |  |  |
| --- | --- | --- |
| **Variables** | **Coefficient** | **Point values** |
| Sepsis origin |  |  |
| - Emergency department (referent) | 0.000 | 0 |
| - Ward | 0.422 | 10 |
| - ICU | 0.457 | 11 |
| Geographic region |  |  |
| - North America (referent) | 0.000 | 0 |
| - Europe | 0.263 | 9 |
| - South America | 0.826 | 14 |
| Cardiovascular failure | 0.224 | 8 |
| Lactate > 4 mmol/L | 1.249 | 18 |
| Cardiovascular failure with lactate > 4 mmol/L | -0.594 | 0 |
| No hypotension (referent) | 0.000 | 0 |
| Unresponsive hypotension | 0.385 | 10 |
| Responsive hypotension | 0.271 | 9 |
| Received ≥ 20 mL/kg of crystalloid or equivalent | -0.493 | 1 |
| Received vasopressors | 0.340 | 9 |
| Site of infections |  |  |
| **-** Pneumonia | 0.340 | 9 |
| - Urinary tract | -0.121 | 5 |
| - Abdominal | 0.178 | 8 |
| - Meningitis | -0.428 | 2 |
| - Catheter | 0.275 | 9 |
| - Device | 0.387 | 10 |
| - Other infection | 0.236 | 8 |
| Renal failure | 0.256 | 9 |
| Hepatic failure | 0.156 | 8 |
| Hematologic failure | 0.385 | 10 |
| No MV and no respiratory failure (referent) | 0.000 | 0 |
| No MV and respiratory failure | 0.198 | 8 |
| MV with plateau pressure < 30 cmH2O  and no respiratory failure | 0.817 | 14 |
| MV with plateau pressure < 30 cmH2O  and respiratory failure | 0.771 | 14 |
| MV with plateau pressure ≥ 30 cmH2O  independent of respiratory failure | 1.099 | 17 |
| Hyperthermia (>38.3°C) | -0.375 | 2 |
| Hypothermia (<36°C) | 0.322 | 9 |
| Chill with rigor | -0.399 | 2 |
| Tachypnea (>20 beats/min) | 0.120 | 7 |
| Leukopenia (Wbc <4,000/uL) | 0.254 | 9 |
| Hyperglycemia (plasma glucose > 120 mg/dL) | -0.188 | 4 |
| Acutely alter mental status | 0.164 | 8 |
| Constant | -2.416 |  |

MV: mechanical ventilation; Unresponsive hypotension: mean arterial pressure (MAP)< 65 mmHg despite 20 cc/kg fluid challenge; Responsive hypotension: MAP ≥ 65 mmHg after 20 cc/kg fluid challenge; Wbc: white blood cells

SSS Logit = -2.8334 + (SSS×0.0366)

SSS probability hospital mortality = elogit/(1+elogit)

**Table S3** Comparison of the area under a receiver operating characteristic curve for Sepsis Severity Score and other severity scores according to subgroups of sepsis patients

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subgroup of sepsis | SSS | APACHE II | APACHE III | APACHE IV | SAPS II | SAPS 3 |
| Sepsis (exclude septic shock) (Sepsis-3) (n=437) | 0.864  (0.821-0.907) | 0.872  (0.832-0.912)  P=0.72 | 0.884  (0.843-0.924)  P=0.35 | 0.909  (0.873-0.944)  P=0.02 | 0.861  (0.819-0.903)  P=0.87 | 0.855  (0.808-0.901)  P=0.64 |
| Septic shock (Sepsis-3) (n=476) | 0.864  (0.839-0.897) | 0.917  (0.892-0.942)  P=0.006 | 0.940  (0.921-0.959)  P<0.0001 | 0.959  (0.943-0.974)  P<0.0001 | 0.921  (0.897-0.944)  P=0.002 | 0.917  (0.892-0.941)  P=0.002 |
| Severe sepsis (Sepsis-2) (n=111) | 0.604  (0.402-.0806) | 0.752  (0.598-0.906)  P=0.07 | 0.796  (0.570-0.968)  P=0.02 | 0.800  (0.640-0.960)  P=0.007 | 0.797  (0.651-0.943)  P=0.01 | 0.716  (0.519-0.913)  P=0.08 |
| Septic shock (Sepsis-2) (n=802) | 0.890  (0.868-0.912) | 0.919  (0.90-0.938)  P=0.02 | 0.929  (0.912-0.947)  P=0.001 | 0.949  (0.934-0.964)  P<0.0001 | 0.908  (0.888-0.928)  P=0.15 | 0.907  (0.885-0.928)  P=0.16 |
| Community-acquired  infection (n=641) | 0.882  (0.854-0.911) | 0.915  (0.891-0.939)  P=0.02 | 0.920  (0.896-0.945)  P=0.005 | 0.939  (0.919-0.96)  P<0.0001 | 0.912  (0.887-0.936)  P=0.03 | 0.902  (0.874-0.929)  P=0.13 |
| Nosocomial-acquired  infection (n=272) | 0.860  (0.813-0.907) | 0.896  (0.857-0.935)  P=0.17 | 0.935  (0.907-0.962)  P=0.003 | 0.942  (0.916-0.969)  P=0.0006 | 0.904  (0.87-0.938)  P=0.07 | 0.900  (0.864-0.936)  P=0.10 |
| Admitted from ED  (n=434) | 0.895  (0.863-0.927) | 0.928  (0.903-0.953)  P=0.04 | 0.936  (0.91-0.961)  P=0.006 | 0.950  (0.928-0.971)  P=0.0002 | 0.923  (0.895-0.95)  P=0.06 | 0.908  (0.874-0.942)  P=0.39 |
| Admitted from wards  (n=400) | 0.886  (0.854-0.918) | 0.910  (0.882-0.937)  P=0.15 | 0.929  (0.904-0.953)  P=0.008 | 0.944  (0.922-0.966)  P=0.0001 | 0.907  (0.879-0.935)  P=0.21 | 0.909  (0.881-0.937)  P=0.17 |
| Respiratory tract infection (n=448) | 0.882  (0.852-0.913) | 0.919  (0.894-0.944)  P=0.03 | 0.936  (0.914-0.958)  P=0.0007 | 0.956  (0.938-0.973)  P<0.0001 | 0.902  (0.874-0.93)  P=0.2 | 0.904  (0.875-0.933)  P=0.19 |
| Age<=60 yrs  (n=435) | 0.878  (0.845-0.912) | 0.932  (0.908-0.956)  P=0.001 | 0.942  (0.919-0.965)  P=0.001 | 0.950  (0.929-0.971)  P<0.0001 | 0.921  (0.896-0.947)  P=0.009 | 0.918  (0.89-0.947)  P=0.009 |
| Age>60 yrs  (n=478) | 0.903  (0.877-0.93) | 0.903  (0.876-0.930)  P=0.98 | 0.919  (0.894-0.943)  P=0.3 | 0.946  (0.926-0.966)  P=0.001 | 0.909  (0.882-0.936)  P=0.7 | 0.902  (0.873-0.93)  P=0.9 |
| Exclude patients were transferred from other hospitals (n=834) | 0.898  (0.877-0.919) | 0.913  (0.894-0.932)  P=0.09 | 0.931  (0.913-0.948)  P=0.002 | 0.949  (0.934-0.964)  P<0.0001 | 0.915  (0.896-0.935)  P=0.12 | 0.913  (0.892-0.933)  P=0.17 |

P-value compare with the Sepsis Severity Score (SSS)

APACHE: Acute Physiology and Chronic Health Evaluation; ED: Emergency Department; SAPS: Simplified Acute Physiology Score; SSS: Sepsis Severity Score

**Table S**4 The overall performance of the prognostic scores for various subgroups analysis of sepsis patients

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | SSS | APACHE II | APACHE III | APACHE IV | SAPS II | SAPS 3 |
| Sepsis (exclude septic shock)  (Sepsis-3) (n=437) | 0.130 | 0.125 | 0.111 | 0.097 | 0.130 | 0.148 |
| Septic shock (Sepsis-3) (n=476) | 0.171 | 0.124 | 0.119 | 0.095 | 0.118 | 0.133 |
| Severe sepsis (Sepsis-2) (n=111) | 0.090 | 0.114 | 0.090 | 0.080 | 0.089 | 0.118 |
| Septic shock (Sepsis-2) (n=802) | 0.158 | 0.126 | 0.124 | 0.098 | 0.128 | 0.143 |
| Commnity-acquired  infection (n=641) | 0.139 | 0.122 | 0.109 | 0.094 | 0.125 | 0.145 |
| Nosocomial-acquired  infection (n=272) | 0.176 | 0.13 | 0.146 | 0.100 | 0.119 | 0.129 |
| Admitted from ED (n=434) | 0.137 | 0.119 | 0.104 | 0.088 | 0.118 | 0.139 |
| Admitted from wards  (n=400) | 0.162 | 0.129 | 0.138 | 0.102 | 0.124 | 0.133 |
| Respiratory tract infection (n=448) | 0.161 | 0.125 | 0.160 | 0.097 | 0.129 | 0.142 |
| Age<=60 (n=435) | 0.153 | 0.114 | 0.110 | 0.090 | 0.110 | 0.120 |
| Age>60 (n=478) | 0.150 | 0.134 | 0.150 | 0.100 | 0.136 | 0.158 |
| Exclude patients were transferred from other hospital (n=834) | 0.149 | 0.124 | 0.120 | 0.095 | 0.121 | 0.137 |

APACHE: Acute Physiology and Chronic Health Evaluation; ED: Emergency Department; SAPS: Simplified Acute Physiology Score; SSS: Sepsis Severity Score

**Figure S1** Calibration curves for Sepsis Severity Score and Simplified Acute Physiology Score II and 3

