

Supplementary material

The supplementary material was provided by the authors and some information may not have been peer reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by the Hong Kong Academy of Medicine and the Hong Kong Medical Association. The Hong Kong Academy of Medicine and the Hong Kong Medical Association disclaim all liability and responsibility arising from any reliance placed on the content.

Supplement to: Lau S, Shum HP, Chan CCY, et al. Prediction of hospital mortality among critically ill patients in a single centre in Asia: comparison of artificial neural networks and logistic regression–based model. Hong Kong Med J 2024 Apr;30(2):130-8 | Epub 28 Mar 2024. <https://doi.org/10.12809/hkmj2210235>.

Supplementary Table 1. Covariates/factors used for creation of development set

	Normalised importance
Demographic parameters	
Age, y	52.8%
Sex	2.8%
Presence of significant cardiovascular disease (NYHA class IV)	4.7%
Presence of significant respiratory manifestations (chronic restriction or obstruction, or vascular disease resulting in severe exercise restriction)	5.0%
Presence of significant renal disease (receiving chronic dialysis)	8.7%
Presence of liver failure (prior episode of hepatic failure/encephalopathy/coma)	4.6%
Presence of liver cirrhosis	5.1%
Presence of immunocompromised status: AIDS	5.2%
Presence of immunocompromised status: lymphoma	9.7%
Presence of immunocompromised status: metastatic carcinoma	15.2%
Presence of immunocompromised status: leukaemia or multiple myeloma	6.0%
Use of high-dose steroids or other immunosuppressive agents	17.3%
Disease category	15.7%
Glasgow Coma Scale	32.7%
Operational parameters	
ICU admission source	12.6%
Parent specialty	19.1%
Emergency or elective admission	14.9%
Postoperative or non-operative case	4.4%
Mechanical ventilation used	6.9%
Physiological parameters	
Core temp (high), °C	42.6%
Core temp (low), °C	38.8%
Heart rate (high), beats/min	63.3%
Heart rate (low), beats/min	28.9%
Respiratory rate (high), breaths/min	41.7%
Respiratory rate (low), breaths/min	48.3%

Mean blood pressure (high), mm Hg	42.8%
Mean blood pressure (low), mm Hg	54.8%
Urine output in 24 hours, mL	58.8%
Urine collection duration, hr	32.0%
Laboratory parameters	
Sodium (high), mmol/L	100%
Sodium (low), mmol/L	49.3%
Potassium (high), mmol/L	26.8%
Potassium (low), mmol/L	55.5%
Urea (high), mmol/L	65.6%
Creatinine (high), $\mu\text{mol/L}$	65.4%
Creatinine (low), $\mu\text{mol/L}$	59.8%
Albumin (high), g/L	33.2%
Albumin (low), g/L	28.4%
Bilirubin (high), $\mu\text{mol/L}$	98.8%
White cell count (high), $\times 10^9/\text{L}$	42.7%
White cell count (low), $\times 10^9/\text{L}$	92.9%
Hemoglobin (high), g/dL	40.8%
Hemoglobin (low), g/dL	14.1%
Haematocrit (high)	26.6%
Haematocrit (low)	30.3%
Platelet (high), $\times 10^9/\text{L}$	25.0%
Platelet (low), $\times 10^9/\text{L}$	32.9%
Glucose (high), mmol/L	33.5%
Glucose (low), mmol/L	33.9%
1 st pH	24.8%
1 st PaCO ₂ , mm Hg	30.6%
1 st PaO ₂ , mm Hg	20.2%
FiO ₂ use during 1 st blood gas test	17.8%

Abbreviations: AIDS = acquired immunodeficiency syndrome; FiO₂ = fraction of inspired oxygen; ICU = intensive care unit; NYHA = New York Heart Association; PaCO₂ = partial pressure of carbon dioxide; PaO₂ = partial pressure of oxygen

Supplementary Table 2. Covariates/factors used for creation of validation set*

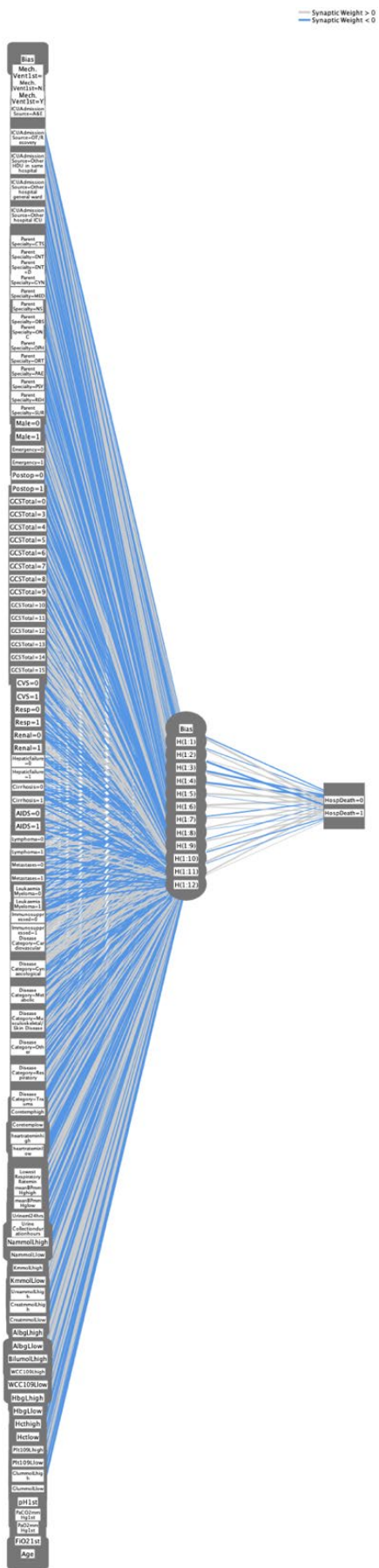
	Normalised importance
Demographic parameters	
Age, y	43.1%
Sex	12.4%
Presence of significant cardiovascular disease (NYHA class IV)	No case
Presence of significant respiratory manifestations (chronic restriction or obstruction, or vascular disease resulting in severe exercise restriction)	14.0%
Presence of significant renal disease (receiving chronic dialysis)	7.8%
Presence of liver failure (prior episode of hepatic failure/encephalopathy/coma)	12.4%
Presence of liver cirrhosis	11.5%
Presence of immunocompromised status: AIDS	19.2%
Presence of immunocompromised status: lymphoma	6.7%
Presence of immunocompromised status: metastatic carcinoma	7.7%
Presence of immunocompromised status: leukaemia or multiple myeloma	9.7%
Use of high-dose steroids or other immunosuppressive agents	9.6%
Disease category	25.9%
Glasgow Coma Scale	34.4%
Operational parameters	
ICU admission source	19.8%
Parent specialty	23.8%
Emergency or elective admission	8.3%
Postoperative or non-operative case	15.3%
Mechanical ventilation used	12.0%
Physiological parameters	
Core temp (high), °C	40.2%
Core temp (low), °C	78.6%
Heart rate (high), beats/min	73.0%
Heart rate (low), beats/min	42.3%
Respiratory rate (high), breaths/min	56.0%
Respiratory rate (low), breaths/min	71.3%

Mean blood pressure (high), mm Hg	55.1%
Mean blood pressure (low), mm Hg	73.7%
Urine output in 24 hours, mL	68.2%
Urine collection duration, hr	55.8%
Laboratory parameters	
Sodium (high), mmol/L	54.7%
Sodium (low), mmol/L	71.4%
Potassium (high), mmol/L	40.7%
Potassium (low), mmol/L	32.1%
Urea (high), mmol/L	76.4%
Creatinine (high), $\mu\text{mol/L}$	43.1%
Creatinine (low), $\mu\text{mol/L}$	71.8%
Albumin (high), g/L	45.0%
Albumin (low), g/L	41.9%
Bilirubin (high), $\mu\text{mol/L}$	100%
White cell count (high), $\times 10^9/\text{L}$	56.0%
White cell count (low), $\times 10^9/\text{L}$	80.3%
Hemoglobin (high), g/dL	30.9%
Hemoglobin (low), g/dL	27.1%
Haematocrit (high)	47.2%
Haematocrit (low)	53.7%
Platelet (high), $\times 10^9/\text{L}$	65.0%
Platelet (low), $\times 10^9/\text{L}$	43.7%
Glucose (high), mmol/L	49.5%
Glucose (low), mmol/L	87.4%
1 st pH	71.4%
1 st PaCO ₂ , mm Hg	52.0%
1 st PaO ₂ , mm Hg	28.0%
FiO ₂ use during 1 st blood gas test	54.6%

Abbreviations: AIDS = acquired immunodeficiency syndrome; FiO₂ = fraction of inspired oxygen; ICU = intensive care unit; NYHA = New York Heart Association; PaCO₂ = partial pressure of carbon dioxide; PaO₂ = partial pressure of oxygen

* Rescaling method for covariates: standardised

Supplementary Figure. Artificial neural network diagram



Hidden layer activation function: Hyperbolic tangent
 Output layer activation function: Softmax