

Supplementary Table SI. Characteristics of imputed variables with missingness (Multi dataset and MIMIC IV dataset)

Preoperative variables	No. missing	Percent missing
Body mass index	256	26.81%
Creatinine	9	0.94%
Glucose	9	0.94%
Aspartate aminotransferase	7	0.73%
Alanine aminotransferase	8	0.84%
Bilirubin	8	0.84%
Albumin	4	0.42%
K ⁺	10	1.05%
Platelet	1	0.10%

There was no significant difference between imputed data and original data, with the distribution roughly the same.

Supplementary Table SII. Baseline information of patients between the imputed data and original data

Parameter	KNN	Raw	P-value
BMI [kg/m ²] M (P25, P75)	23.60 (21.56, 25.93)	23.44 (20.79, 26.32)	0.275
Albumin [g/l] M (P25, P75)	3.90 (3.20, 4.23)	3.90 (3.20, 4.23)	0.977
AST [IU/l] M (P25, P75)	24.40 (18.0, 38.90)	24.45 (18.0, 39.0)	0.996
ALT [IU/l] M (P25, P75)	20.0 (13.0, 38.70)	20.0 (12.95, 39.0)	0.990
Bilirubin [μ mol/l] M (P25, P75)	0.70 (0.48, 1.09)	0.70 (0.48, 1.09)	0.980
K ⁺ [mmol/l] M (P25, P75)	4.0 (3.72, 4.30)	4.000 (3.71, 4.30)	0.953
Creatinine [μ mol/l] M (P25, P75)	0.78 (0.61, 0.97)	0.79 (0.62, 0.97)	0.916
Glucose [mmol/l] M (P25, P75)	103.14 (88.96, 132.30)	103.93 (89.33, 132.62)	0.847
Platelets [$\times 10^9/l$] M (P25, P75)	203.0 (150.0, 264.0)	203.0 (150.0, 264.0)	0.982

Data are expressed as number (proportion), median (IQR [range]). BMI – body mass index, COPD – chronic obstructive pulmonary diseases, ALT – alanine aminotransferase, AST – aspartate aminotransferase, WBC – white blood cells, NLR – neutrophil-lymphocyte ratio.

The distribution between MIMIC and Multi datasets has significant differences, while it is roughly the same between training and test datasets.

Supplementary Table SIII. Baseline information of patients between the training, test, and validation dataset

Parameter	Train (n = 455)	Test (n = 193)	Validation (n = 307)	P-value ¹	P-value ²
Sepsis, n (%)	149 (32.7)	63 (32.6)	73 (23.8)	0.019	0.979
Age [years] M (P25, P75)	57.0 (40.0, 68.0)	59.0 (41.0, 69.0)	57.0 (41.0, 68.0)	< 0.001	0.595
BMI [kg/m ²] M (P25, P75)	23.33 (20.79, 25.71)	22.86 (20.57, 24.97)	23.16 (20.76, 25.39)	< 0.001	0.543
Female, n (%)	235 (51.6)	98 (5.8)	178 (58.0)	0.159	0.879
Comorbidity, n (%)					
Chemotherapy	12 (2.6)	3 (1.6)	22 (7.2)	< 0.001	0.571
Hypertension	66 (14.5)	40 (20.7)	6 (2.0)	< 0.001	0.050
Diabetes	51 (11.2)	23 (11.9)	75 (24.4)	< 0.001	0.795
Cardiopathy	52 (11.4)	29 (15.0)	93 (30.3)	< 0.001	0.205
COPD	9 (2.0)	7 (3.6)	28 (9.1)	< 0.001	0.267
Nephropathy	38 (8.4)	32 (16.6)	109 (35.5)	< 0.001	0.002
Cancer	220 (48.4)	92 (47.7)	48 (15.6)	< 0.001	0.874
Emergency surgery, n (%)				0.516	0.262
Yes	227 (49.9)	87 (45.1)	146 (47.6)		
No	228 (50.1)	106 (54.9)	161 (52.4)		
ASA, n (%)				< 0.001	0.910
I	11 (2.4)	5 (2.6)	80 (26.1)		
II	292 (64.2)	120 (62.2)	166 (54.1)		
III	137 (30.1)	60 (31.1)	50 (16.3)		
IV	15 (3.3)	8 (4.1)	11 (3.6)		
Type of surgery, n (%)				< 0.001	0.079
Open	71 (15.6)	20 (10.4)	147 (47.9)		
Laparoscopy	384 (84.4)	173 (89.6)	160 (52.1)		
Procedure site, n (%)				< 0.001	0.690
Lymphatic (spleen)	0	1 (0.5)	2 (0.7)		
Gastrointestinal	296 (65.1)	127 (65.8)	174 (56.7)		
Hepatobiliary and pancreas	55 (12.1)	24 (12.4)	115 (37.5)		
Endocrine (adrenal gland)	15 (3.3)	8 (4.1)	10 (3.3)		
Urinary	1 (0.2)	0	0		
Female reproductive	88 (19.3)	33 (17.1)	6 (2.0)		
Preoperative laboratory results					
Albumin [g/dl] M (P25, P75)	4.03 (3.40, 4.31)	3.99 (3.31, 4.20)	4.02 (3.39, 4.28)	< 0.001	0.243
AST [IU/l] M (P25, P75)	23.10 (18.90, 34.0)	23.50 (17.70, 35.0)	23.20 (18.10, 34.25)	0.002	1.00
ALT [IU/l] M (P25, P75)	18.70 (13.0, 30.0)	18.0 (11.80, 31.0)	18.55 (12.40, 30.73)	< 0.001	0.963
Bilirubin [mg/dl] M (P25, P75)	0.77 (0.54, 1.06)	0.71 (0.50, 1.06)	0.75 (0.53, 1.06)	0.002	0.966
K ⁺ [mmol/l] M (P25, P75)	4.01 (3.75, 4.26)	4.02 (3.71, 4.30)	4.01 (3.74, 4.27)	0.642	/
Creatinine [mg/dl] M (P25, P75)	0.76 (0.61, 0.92)	0.77 (0.62, 0.93)	0.76 (0.62, 0.92)	0.004	1.000
Glucose [mg/dl] M (P25, P75)	102.78 (87.97, 134.64)	100.26 (88.20, 124.92)	102.06 (88.02, 131.85)	0.117	/
WBC [$\times 10^9/l$] M (P25, P75)	7.19 (5.49, 9.68)	6.52 (5.22, 9.18)	7.08 (5.40, 9.63)	< 0.001	0.443
Platelets [$\times 10^9/l$] M (P25, P75)	192.0 (147.0, 250.0)	189.0 (141.0, 253.0)	191.0 (145.75, 251.25)	< 0.001	1.000
Hemoglobin [g/dl] M (P25, P75)	12.60 (10.70, 13.70)	12.40 (11.10, 13.70)	12.60 (10.90, 13.70)	< 0.001	1.000
Neutrophils [$\times 10^9/l$] M (P25, P75)	4.810 (3.53, 7.42)	4.51 (3.18, 7.35)	4.77 (3.42, 7.39)	< 0.001	1.000
Lymphocytes [$\times 10^9/l$] M (P25, P75)	1.33 (0.94, 1.76)	1.21 (0.90, 1.62)	1.31 (0.93, 1.72)	0.088	/
NLR, M (P25, P75)	3.61 (2.26, 6.82)	3.74 (2.37, 7.34)	3.63 (2.27, 6.87)	< 0.001	1.000

Data are expressed as number (proportion), median (IQR [range]). BMI – body mass index, COPD – chronic obstructive pulmonary diseases, ALT – alanine aminotransferase, AST – aspartate aminotransferase, WBC – white blood cells, NLR – neutrophil-lymphocyte ratio. P-value 1 – comparison between training dataset and test dataset; P-value 2 – comparison among three datasets.