

Association between hematocrit-to-albumin ratio and acute kidney injury in patients with acute pancreatitis: a retrospective cohort study
supplementary materials

Hospital admission information for patients with AP was extracted according to International Classification of Diseases, 9th Revision (ICD - 9) code 5770 and 10th Revision (ICD - 10) codes K859, K8520, K8580, K8591, K8500, K8592, K8511, K8530, K853, K8581, K850, K8501, K8582, K8502, K8531, K8590, K858, K8510, K851, K8512, K860, K852, K8521, K8522, K51011, K51018, K51019, J0140, and J0141, with a total of 1609 had been admitted to the ICU.

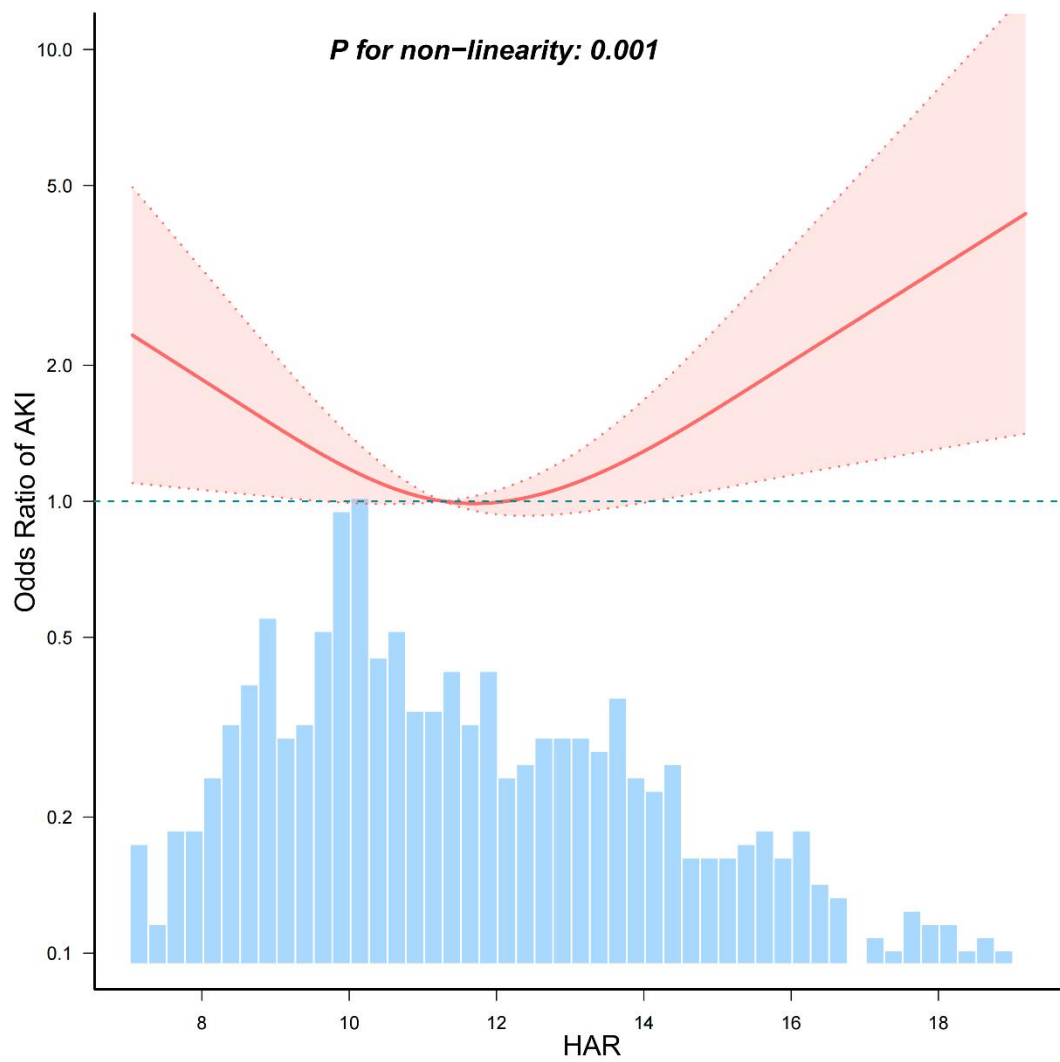


Figure S1. The Nonlinear association between HAR and AKI in patients with acute pancreatitis. Adjusted for all covariates as model 3 with MIMIC-IV database. Solid lines represent the odds ratio of AKI and dotted lines represent the corresponding 95% CI. OR = 1 was set as the reference line. (takes the upper limit of 97%).

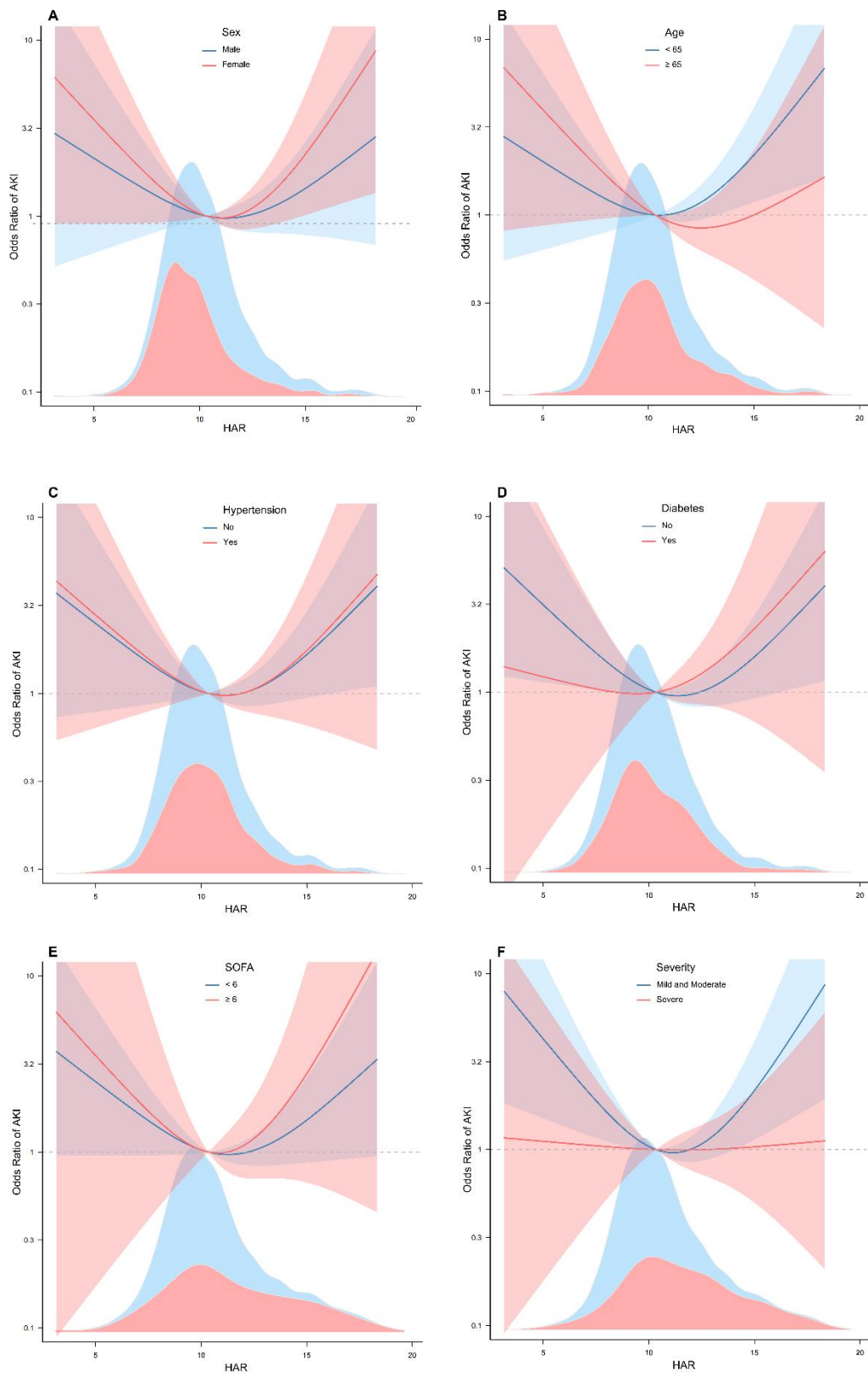


Figure S2. Subgroups with Chinese population. Solid lines represent the odds ratio of AKI and dotted lines represent the corresponding 95% CI. ORs were adjusted for variates with

model 3. OR = 1 was set as the reference line.

Characteristics	Chinese population Total (n = 1514)	MIMIC-IV Total (n = 672)
Sex (%)		
male	812 (53.6)	387 (57.6)
female	702 (46.4)	285 (42.4)
Age (years)	53.0 (41.0, 65.0)	56.0 (45.0, 70.0)
Death (%)	23 (1.5)	96 (14.3)
ICU (%)	247 (16.3)	N/A
LOS (days)	16.6 ± 12.7	12.0 (6.0, 20.0)
Hypertension (%)	392 (25.9)	375 (55.8)
DM (%)	225 (14.9)	255 (37.9)
CHD (%)	103 (6.8)	123 (18.3)
SBP (mmHg)	129.0 (117.0, 143.0)	126.0 (110.0, 144.2)
DBP (mmHg)	80.0 (72.0, 90.0)	73.0 (61.0, 85.0)
HR (bpm)	80.0 (72.0, 93.0)	98.5 (83.0, 114.0)
RR (bpm)	20.0 (19.0, 20.0)	22.0 (18.0, 26.0)
SpO ₂ (%)	99.0 (97.0, 100.0)	N/A
P/F	N/A	218.2 (152.7, 329.0)
Ventilation (%)	158 (10.4)	556 (82.7)
Transfusion (%)	168 (11.1)	61 (9.1)
CRRT (%)	92 (6.1)	55(8.2)
WBC (×10 ⁹ /L)	9.8 (6.6, 13.6)	11.8 (7.7, 17.5)
HGB (g/L)	129.0 (114.0, 145.0)	11.4 (10.0, 13.0)
HCT (%)	38.5 (34.5, 42.7)	34.2 (30.0, 39.2)
PCT (ng/ml)	0.2 (0.1, 0.9)	N/A
CRP (mg/L)	37.1 (6.6, 134.7)	N/A
AST (U/L)	41.0 (23.0, 139.5)	73.0 (35.0, 178.2)
ALB (g/dl)	3.8 (3.4, 4.2)	3.0 (2.6, 3.5)
FPG (mmol/L)	6.7 (5.3, 9.1)	7.3 (5.6, 10.1)
TG (mmol/L)	1.5 (1.0, 3.6)	1.8 (1.1, 3.9)
Na (mmol/L)	139.6 (136.7, 141.8)	138.0 (135.0, 141.0)
Ca (mmol/L)	2.2 (2.0, 2.4)	2.0 (1.9, 2.1)
CREA (μmol/L)	68.0 (55.0, 85.2)	97.2 (61.9, 159.1)
Lac (mmol/L)	N/A	1.7 (1.2, 2.6)
AKI (%)	257 (17.0)	322 (47.9)
SOFA	2.7 ± 2.5	5.0 (3.0, 9.0)
Etiology (%)		N/A

biliary	1019 (67.3)	
hyperlipidemic	354 (23.4)	
alcoholic	51 (3.4)	
others	90 (5.9)	
Severity (%)		N/A
mild and moderate	1343 (88.7)	
severe	171 (11.3)	
BISAP	1.0 (0.0, 2.0)	N/A

Table S1. Baseline characteristics of included patients grouped by two databases of Chinese population and MIMIC-IV.

Variables	Total (n = 1514)	Non-ICU (n = 1267)	ICU (n = 247)	p
Sex (%)				0.108
male	812 (53.6)	668 (52.7)	144 (58.3)	
female	702 (46.4)	599 (47.3)	103 (41.7)	
Age (years)	53.0 (41.0, 65.0)	52.0 (41.0, 64.0)	58.0 (44.5, 70.0)	< 0.001
Hypertension (%)	392 (25.9)	319 (25.2)	73 (29.6)	0.151
DM (%)	225 (14.9)	181 (14.3)	44 (17.8)	0.154
CHD (%)	103 (6.8)	76 (6)	27 (10.9)	0.005
COPD (%)	64 (4.2)	47 (3.7)	17 (6.9)	0.023
Weight(kg)	64.0 (55.0, 75.0)	65.0 (56.0, 75.0)	62.0 (54.0, 75.0)	0.136
Height(cm)	164.0 (158.0, 170.0)	163.0 (157.5, 170.0)	167.0 (160.0, 172.0)	< 0.001
BMI	24.2 (21.7, 26.7)	24.2 (22.0, 26.7)	23.1 (20.2, 26.6)	< 0.001
SBP (mmHg)	129.0 (117.0, 143.0)	130.0 (119.0, 143.0)	123.0 (106.5, 145.0)	< 0.001
DBP (mmHg)	80.0 (72.0, 90.0)	80.0 (73.0, 90.0)	78.0 (66.0, 88.0)	< 0.001
HR (bpm)	80.0 (72.0, 93.0)	78.0 (72.0, 90.0)	95.0 (80.0, 114.5)	< 0.001
Temperature	36.5 (36.4, 36.7)	36.5 (36.4, 36.6)	36.6 (36.5, 36.8)	< 0.001
RR (bpm)	20.0 (19.0, 20.0)	20.0 (19.0, 20.0)	20.0 (19.0, 23.0)	< 0.001
SpO ₂ (%)	99.0 (97.0, 100.0)	99.0 (98.0, 100.0)	97.0 (94.0, 99.0)	< 0.001
Ventilation (%)	158 (10.4)	5 (0.4)	153 (61.9)	< 0.001
Transfusion (%)	168 (11.1)	36 (2.8)	132 (53.4)	< 0.001
CRRT (%)	92 (6.1)	16 (1.3)	76 (30.8)	< 0.001
WBC($\times 10^9/L$)	9.8 (6.6, 13.6)	9.6 (6.5, 13.1)	11.7 (8.1, 17.4)	< 0.001
HGB(g/L)	129.0 (114.0, 145.0)	129.0 (115.5, 145.0)	127.0 (100.0, 144.5)	0.009
HCT (%)	38.5 (34.5, 42.7)	38.7 (34.9, 42.5)	37.9 (30.2, 43.0)	0.020
PLT($\times 10^9/L$)	179.0 (137.0, 233.0)	183.0 (142.0, 234.0)	157.0 (110.5, 216.0)	< 0.001
NEUT($\times 10^9/L$)	8.2 (4.9, 11.6)	7.9 (4.7, 11.2)	9.6 (6.6, 15.1)	< 0.001
LYMPH($\times 10^9/L$)	1.0 (0.7, 1.4)	1.0 (0.7, 1.4)	0.8 (0.6, 1.2)	< 0.001

MONO($\times 10^9/L$)	0.6 (0.4, 0.8)	0.5 (0.4, 0.7)	0.6 (0.4, 1.0)	< 0.001
RDW (fL)	13.0 (12.4, 13.7)	13.1 (12.5, 13.7)	12.8 (12.3, 13.3)	< 0.001
PCT (ng/ml)	0.2 (0.1, 0.9)	0.1 (0.0, 0.5)	1.3 (0.4, 8.1)	< 0.001
CRP (mg/L)	37.1 (6.6, 134.7)	31.4 (5.9, 116.6)	93.4 (14.4, 206.5)	< 0.001
AST(U/L)	41.0 (23.0, 139.5)	38.0 (22.0, 134.0)	54.0 (31.0, 186.5)	< 0.001
ALT(U/L)	46.0 (22.0, 153.0)	47.0 (22.0, 157.0)	41.0 (21.0, 95.0)	0.114
TBIL ($\mu\text{mol/L}$)	21.8 (13.3, 42.6)	22.2 (13.7, 43.7)	20.1 (11.8, 37.5)	0.056
DBIL ($\mu\text{mol/L}$)	7.8 (4.0, 22.2)	7.7 (4.0, 23.0)	8.9 (4.3, 21.2)	0.292
ALB (g/dl)	3.8. (3.4, 4.2)	3.9.3(3.5, 4.3)	3.2 (2.8, 3.8)	< 0.001
FPG (mmol/L)	6.7 (5.3, 9.1)	6.6 (5.3, 8.9)	7.9 (5.8, 11.1)	< 0.001
AMY(U/L)	167.5 (67.0, 699.8)	164.0 (65.7, 703.0)	193.0 (79.5, 637.0)	0.139
LIPASE(U/L)	204.1 (69.3, 716.4)	208.0 (69.8, 733.8)	185.4 (65.2, 650.0)	0.421
PA (mg/L)	160.1 (107.8, 212.8)	163.3 (113.0, 209.7)	136.0 (89.2, 250.0)	0.119
HbA1c	5.9 (5.4, 7.2)	5.9 (5.4, 7.2)	5.9 (5.4, 7.4)	0.348
TG (mmol/L)	1.5 (1.0, 3.6)	1.5 (1.0, 3.8)	1.7 (1.1, 3.2)	0.207
CHOL (mmol/L)	4.6 (3.7, 5.9)	4.6 (3.8, 5.8)	4.5 (3.1, 9.9)	0.588
LDL (mmol/L)	2.1 (1.5, 2.9)	2.2 (1.5, 2.9)	1.7 (1.1, 2.6)	< 0.001
HDL (mmol/L)	1.1 (0.8, 1.5)	1.2 (0.9, 1.5)	0.7 (0.4, 1.2)	< 0.001
Na(mmol/L)	139.6 (136.7, 141.8)	139.6 (136.9, 141.7)	138.8 (135.4, 142.1)	0.136
Ca(mmol/L)	2.2 (2.0, 2.4)	2.2 (2.1, 2.4)	2.0 (1.8, 2.2)	< 0.001
BUN (mmol/L)	5.3 (4.0, 7.1)	5.0 (3.9, 6.5)	8.4 (5.5, 14.1)	< 0.001
CREA ($\mu\text{mol/L}$)	68.0 (55.0, 85.2)	66.0 (53.5, 79.0)	101.0 (69.0, 195.5)	< 0.001
HAR	10.1 (9.0, 11.3)	10.0 (9.0, 11.0)	11.0 (9.5, 13.2)	< 0.001
Etiology of AP (%)	nan	nan	nan	< 0.001
biliary	1019 (67.3)	916 (72.3)	103 (41.7)	
hyperlipidemic	354 (23.4)	310 (24.5)	44 (17.8)	
alcoholic	51 (3.4)	41 (3.2)	10 (4)	
others	90 (5.9)	0 (0)	90 (36.4)	
Severity (%)	nan	nan	nan	< 0.001
mild and moderate	1343 (88.7)	1266 (99.9)	77 (31.2)	
severe	171 (11.3)	1 (0.1)	170 (68.8)	
SOFA	2.7 \pm 2.5	2.1 \pm 1.6	5.9 \pm 3.7	< 0.001
BISAP	1.0 (0.0, 2.0)	1.0 (0.0, 2.0)	2.0 (1.0, 3.0)	< 0.001
Death (%)	23 (1.5)	0 (0)	23 (9.3)	< 0.001
LOS(days)	16.6 \pm 12.7	15.0 \pm 8.2	25.2 \pm 23.6	< 0.001
ICU (%)	247 (16.3)	0 (0)	247 (100)	< 0.001
AKI (%)	257 (17.0)	125 (9.9)	132 (53.4)	< 0.001

Table S2. Non-ICU vs. ICU in Chinese population

Characteristics	OR_95CI	p-value
Sex	0.53 (0.4~0.71)	<0.001
Age	1.01 (1.01~1.02)	0.001
Death	18.86 (6.93~51.29)	<0.001
LOS	1.02 (1.01~1.03)	<0.001
ICU	10.49 (7.69~14.31)	<0.001
Hypertension	1.63 (1.22~2.18)	0.001
DM	1.4 (0.99~1.99)	0.06
CHD	1.72 (1.08~2.75)	0.022
SBP	0.99 (0.98~1)	0.001
DBP	0.99 (0.98~1)	0.003
HR	1.03 (1.02~1.04)	<0.001
RR	1.04 (1.02~1.06)	<0.001
SpO ₂	0.85 (0.81~0.89)	<0.001
Ventilation	8.02 (5.64~11.39)	<0.001
Transfusion	10.45 (7.38~14.81)	<0.001
CRRT	22.47 (13.48~37.44)	<0.001
WBC	1.07 (1.05~1.09)	<0.001
HGB	1 (0.99~1)	0.277
HCT	0.97 (0.95~0.99)	0.012
PCT	1.02 (1.01~1.02)	<0.001
CRP	1 (1~1.01)	<0.001
AST	1 (1~1)	0.036
ALB	0.91 (0.89~0.93)	<0.001
FPG	1.06 (1.04~1.08)	<0.001
TG	1.03 (1.01~1.05)	0.005
Na	0.94 (0.91~0.97)	<0.001
Ca	0.16 (0.09~0.26)	<0.001
CREA	1.06 (1.05~1.06)	<0.001
SOFA	1.48 (1.4~1.57)	<0.001
BISAP	1.845(1.64~2.08)	<0.001
Severity. severe vs. mild and moderate	9.11 (6.46~12.85)	<0.001
Etiology. Hyperlipidemic vs. biliary	1.51 (1.09~2.09)	0.013
Etiology. Alcoholic vs. biliary	1.44 (0.69~3.03)	0.336
Etiology. Others vs. biliary	8.79 (5.57~13.85)	<0.001
HAR	1.24(1.17~1.32)	<0.001

Table S3. Univariate Logistic regression analysis for AKI in Chinese population.

	Chinese population		MIMIC-IV population	
Characteristics	The number of missing values	The percentage of missing values (%)	The number of missing values	The percentage of missing values (%)
Age	0	0.0	0	0.0
AKI	0	0.0	0	0.0
ALB	7	0.4499	0	0.0
ALT	7	0.4499	14	2.0833
AMY	57	3.6632	377	56.1012
AST	78	5.0129	12	1.7857
BISAP	1	0.0643	672	100
BMI	53	3.4062	672	100
BUN	1	0.0643	3	0.4464
Ca	1	0.0643	6	0.8929
CHD	0	0.0	0	0.0
CHOL	284	18.2519	N/A	N/A
CKD	0	0.0	N/A	N/A
COPD	0	0.0	N/A	N/A
CREA	0	0.0	1	0.1488
CRP	25	1.6067	656	97.619
CRRT	0	0.0	0	0.0
DBIL	7	0.4499	534	79.4643
DBP	236	15.1671	1	0.1488
Death	0	0.0	0	0.0
DM	0	0.0	0	0.0
Etiology	0	0.0	672	100
FPG	89	5.7198	517	76.9345
HBA1c	1046	67.2237	672	100
HCT	0	0.0	0	0.0
HDL	285	18.3162	672	100
Height	53	3.4062	301	44.7917
HGB	0	0.0	0	0.0
HR	237	15.2314	0	0.0
Hypertension	0	0.0	0	0.0
ICU	0	0.0	0	0.0
LDL	285	18.3162	672	100
LIPASE	170	10.9254	672	100
LOS	0	0.0	0	0.0
LYMPH	0	0.0	672	100
MONO	0	0.0	339	50.4464
Na	1	0.0643	1	0.1488

NEU	0	0.0	326	48.5119
PA	498	32.0051	672	100
PCT	241	15.4884	672	100
PLT	0	0.0	0	0.0
RR	239	15.3599	0	0.0
SBP	236	15.1671	1	0.1488
Severity	0	0.0	672	100
Sex	0	0.0	0	0.0
SOFA	7	0.4499	0	0.0
SpO ₂	422	27.1208	672	100
TBIL	7	0.4499	6	0.8929
Temperature	19	1.2211	672	100
TG	103	6.6195	416	61.9048
Transfusion	0	0.0	0	0.0
Ventilation	0	0.0	0	0.0
WBC	0	0.0	0	0.0
Weight	52	3.3419	21	3.125
Lac	917	60.5680	169	25.1488

Table S4. Details of missing values in two databases of Chinese population and MIMIC-IV.

Abbreviation: LOS Length of hospital stay, DM diabetes mellitus, CHD coronary heart disease, SBP systolic blood pressure, DBP diastolic blood pressure, HR heart rate, RR respiratory rate, SpO₂ pulse oxygen saturation, P/F PaO₂/FiO₂, Ventilation noninvasive or invasive mechanical ventilation, Transfusion blood transfusion, CRRT continuous renal replacement treatment, WBC white blood cell count, HGB hemoglobin, HCT hematocrit, PCT procalcitonin, CRP C-reactive protein, AST aspartate aminotransferase, ALB albumin, FPG fasting plasma glucose, TG triglyceride, Na sodium, Ca calcium, CREA creatinine, Lac lactic acid, AKI Acute kidney injury, SOFA sequential organ failure assessment score, BISAP Bedside Index of Severity in Acute Pancreatitis score, HAR dividing the hematocrit level (%) by the ALB level (g/dl).