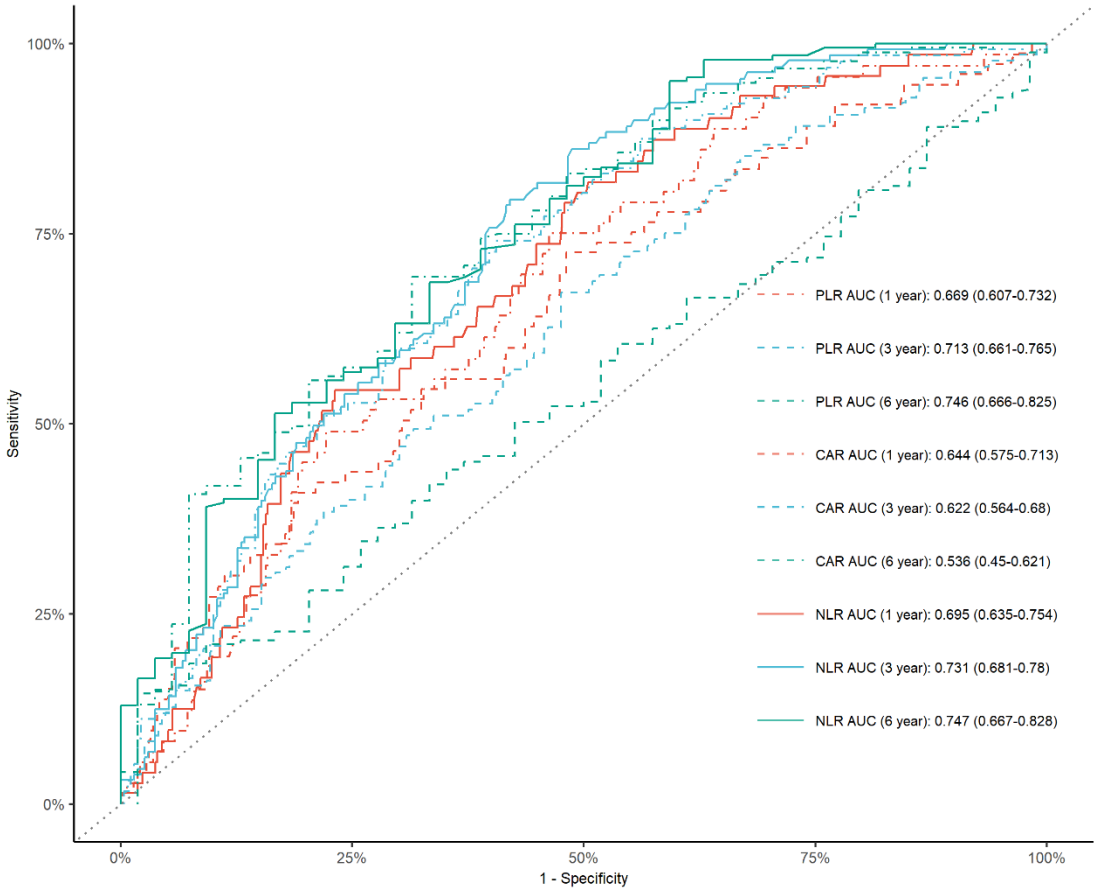
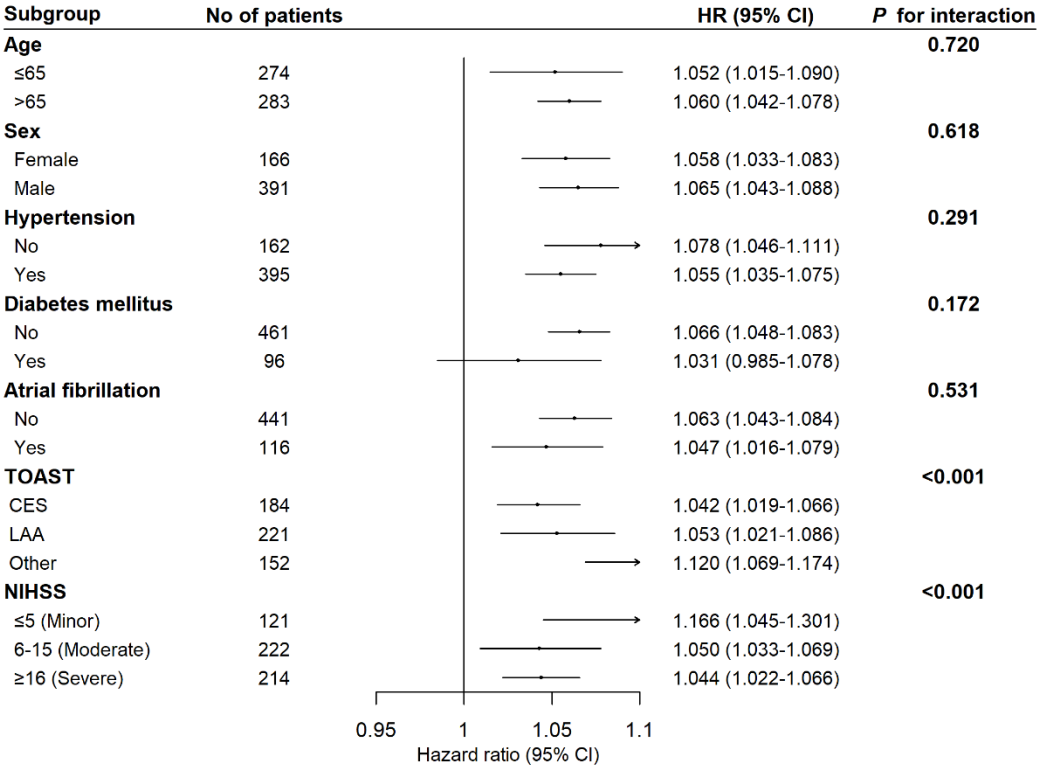
Supplementary materials

Figure S1. ROC Curves for Other Inflammatory Markers.



Abbreviations: The AUCs (95% CI) of PLR were 0.669 (0.607-0.732) for 1 year, 0.713 (0.661-0.765) for 3-year and 0.746 (0.666-0.825) for 6-year mortality. The AUCs (95% CI) of CAR were 0.644 (0.575-0.713) for 1 year, 0.622 (0.564-0.680) for 3-year and 0.536 (0.450-0.621) for 6-year mortality. The AUCs (95% CI) of NLR were 0.695 (0.635-0.754) for 1 year, 0.731 (0.681-0.780) for 3-year and 0.747 (0.667-0.828) for 6-year mortality. AUC, area under the curve; CAR, C-reactive protein-albumin ratio; CI, confidence interval; NLR, neutrophil-lymphocyte ratio; PLR, platelet-lymphocyte ratio; ROC, receiver operating characteristic curve. Delong test for NLR: $P = 0.008$, PLR: $P = 0.074$, CAR $P = 0.005$.

Figure S2. Subgroup Analysis for the Association between the Cumulative Inflammatory Index and Mortality in Stroke-Associated Pneumonia.



Abbreviations: We observed no significant interactions were detected between subgroup factors and IIC in relation to prolonged mortality among SAP patients, except for atrial fibrillation and stroke severity. CES, cardio-embolic stroke; CI, confidence interval; HR, hazard ratio; LAA, large artery atherosclerosis; NIHSS, National Institute of Health Stroke Scale; TOAST, Trial of ORG 10172 in Acute Stroke Treatment.

Table S1. Definition of the Pneumonia Severity Index score.

Characteristics	Points
Demographic factor	
Age	
Men	Age (year)
Women	Age (year)-10
Nursing home resident	+10
Coexisting illnesses	
Neoplastic disease	+30
Liver disease	+20
Congestive heart failure	+10
Cerebrovascular disease	+10
Renal disease	+10
Physical-examination findings	
Altered mental status	+20
Respiratory rate ≥30/min	+20
Systolic blood pressure <90mmHg	+20
Temperature <35℃ or ≥40℃	+15
Pulse ≥125/min	+10
Laboratory and radiographic findings	
Arterial pH <7.35	+30
Blood urea nitrogen ≥11mmol/L	+20
Sodium <130mmol/L	+20
Glucose ≥14mmol/L	+10
Hematocrit <30%	+10
Partial pressure of arterial oxygen <60mmHg	+10
Pleural effusion	+10
Total Points	

Table S2. Baseline Characteristics According to the Cumulative Inflammatory Index Tertiles.

Characteristics	Tertile 1 (n = 187)	Tertile 2 (n = 184)	Tertile 3 (n = 186)	*P* value
Age, years	65.0 [56.5, 71.0]	65.0 [57.0, 73.2]	68.0 [59.2, 75.0]	0.026
Male, n (%)	124 (66.3)	129 (70.1)	138 (74.2)	0.250
BMI, kg/m^2	24.8 (3.4)	24.2 (3.4)	24.5 (3.4)	0.251
Vital signs				
Systolic blood pressure, mmHg	140.7 (20.4)	138.6 (20.4)	137.3 (20.7)	0.284
Temperature, ℃	37.0 [36.8, 37.8]	37.8 [37.0, 38.3]	38.0 [37.4, 38.6]	<0.001
Pulse, n/min	87.0 [79.5, 99.0]	92.0 [80.0, 112.2]	104.0 [89.0, 119.8]	<0.001
Smoking, n (%)				0.593
Nonsmokers	81 (43.3)	77 (41.8)	92 (49.5)	
Former smokers	16 (8.6)	15 (8.2)	16 (8.6)	
Current smokers	90 (48.1)	92 (50.0)	78 (41.9)	
Drinking, n (%)				0.678
Nondrinkers	121 (64.7)	109 (59.2)	111 (59.7)	
Former drinkers	25 (13.4)	28 (15.2)	33 (17.7)	
Current drinkers	41 (21.9)	47 (25.5)	42 (22.6)	
Medical history, n (%)				
Hypertension	125 (66.8)	134 (72.8)	136 (73.1)	0.322
Diabetes mellitus	40 (21.4)	26 (14.1)	30 (16.1)	0.160
Coronary heart disease	51 (27.3)	55 (29.9)	60 (32.3)	0.574
Atrial fibrillation	22 (11.8)	42 (22.8)	52 (28.0)	<0.001
Dyslipidemia	21 (11.2)	29 (15.8)	46 (24.7)	0.002
NIHSS, score	7.0 [3.0, 13.0]	13.0 [8.0, 20.2]	17.0 [12.0, 23.8]	<0.001
Pneumonia severity index, score	69.0 [60.0, 85.0]	81.0 [65.0, 102.0]	94.5 [77.2, 114.8]	<0.001

TOAST, n (%)				<0.001
LAA	82 (43.9)	67 (36.4)	72 (38.7)	
CES	36 (19.3)	64 (34.8)	84 (45.2)	
SVS	19 (10.2)	5 (2.7)	3 (1.6)	
SOD	36 (19.3)	28 (15.2)	22 (11.8)	
SUD	14 (7.5)	20 (10.9)	5 (2.7)	
Blood examination				
White blood cells, $\times10^9$/L	7.0 [5.8, 8.6]	9.4 [7.8, 11.5]	11.2 [9.3, 13.8]	<0.001
Lymphocyte, $\times10^9$/L	24.0 [20.6, 28.6]	13.9 [12.5, 15.6]	7.6 [5.9, 9.4]	<0.001
Neutrophils, $\times10^9$/L	67.2 [61.7, 71.2]	79.0 [76.0, 81.6]	86.3 [84.3, 89.4]	<0.001
C-reactive protein, mg/L	3.8 [1.8, 10.8]	11.0 [3.6, 31.5]	12.1 [3.7, 33.9]	<0.001
Platelet, $\times10^9$/L	8.1 [6.3, 10.3]	13.7 [10.2, 16.5]	24.8 [17.7, 34.9]	<0.001
Mean corpuscular volume, fL	90.6 (5.1)	90.6 (5.3)	91.6 (6.1)	0.117
Red cell distribution width, %	13.1 [12.6, 13.7]	13.0 [12.6, 13.7]	13.3 [12.8, 13.8]	0.026
Glucose, mmol/L	5.5 [4.8, 7.3]	6.3 [5.4, 8.1]	7.0 [5.9, 8.9]	<0.001
High-density lipoprotein, mmol/L	1.1 (0.3)	1.7 (8.6)	1.8 (8.6)	0.554
Low-density lipoprotein, mmol/L	2.6 [2.2, 3.3]	2.5 [1.8, 3.2]	2.4 [1.9, 2.9]	0.018
Triglyceride, mmol/L	1.3 [0.9, 1.8]	1.2 [0.9, 1.5]	1.0 [0.8, 1.3]	<0.001
Total cholesterol, mmol/L	4.5 (1.5)	4.2 (1.2)	4.1 (1.1)	0.021
Interleukin-6, ng/L	15.4 [6.7, 49.8]	16.1 [8.8, 35.6]	23.8 [12.3, 56.4]	0.002
Albumin, g/L	39.1 [36.6, 42.0]	38.6 [34.5, 41.7]	37.5 [33.6, 40.6]	0.001
Antibiotics, n (%)				0.051
Cephalosporins, carbapenems and monobactams	326 (58.5)	109 (58.3)	102 (55.4)	
Fluoroquinolones	49 (8.8)	21 (11.2)	9 (4.9)	
Penicillins	7 (1.3)	1 (0.5)	2 (1.1)	

None	175 (31.4)	56 (29.9)	71 (38.6)	
Medications at discharge, n (%)				
Antiplatelet drugs	164 (87.7)	138 (75.0)	132 (71.0)	0.021
Anticoagulants	24 (12.8)	34 (18.5)	43 (23.1)	0.036
Mortality, n (%)	18 (9.6)	51 (27.7)	80 (43.0)	<0.001
Follow-up time, years	3.6 [2.1, 5.1]	2.8 [1.1, 4.3]	2.2 [0.7, 3.7]	<0.001
Stroke recurrence, n (%)	29 (15.5)	26 (14.1)	25 (13.4)	0.845

Abbreviations: BMI, body mass index; CAR, C-reactive protein-albumin ratio; CES, cardio-embolism; IIC, cumulative inflammatory index; LAA, large-artery atherosclerosis; NIHSS, National Institute of Health Stroke Scale; NLR, neutrophil-lymphocyte ratio; PLR, platelet-lymphocyte ratio; SOE, stroke of other determined etiology; SUE, stroke of undetermined etiology; SVS, small-vessel occlusion; TOAST, Trial of ORG 10172 in Acute Stroke Treatment.

Table S3. Univariable Analyses for the Predictors of the Long-Term Mortality in Stroke-Associated Pneumonia.

Characteristics	HR (95% CI)	*P* value
Age, years	1.06 (1.04-1.08)	<0.001
Male, n (%)	0.88 (0.63-1.24)	0.464
BMI, kg/m^2	1.00 (0.95-1.04)	0.838
Vital signs		
Systolic blood pressure, mmHg	1.00 (0.99-1.01)	0.530
Temperature, ℃	1.61 (1.35-1.92)	<0.001
Pulse, n/min	1.01 (1.01-1.02)	<0.001
Smoking, n (%)		
Nonsmokers	Reference	
Former smokers	1.10 (0.62-1.94)	0.753
Current smokers	0.79 (0.57-1.11)	0.182
Drinking, n (%)		
Nondrinkers	Reference	
Former drinkers	0.87 (0.55-1.38)	0.545
Current drinkers	0.82 (0.53-1.25)	0.349
Medical history, n (%)		
Hypertension	1.45 (0.99-2.11)	0.056
Diabetes mellitus	0.98 (0.65-1.49)	0.942
Coronary heart disease	0.97 (0.67-1.40)	0.876
Atrial fibrillation	2.44 (1.75-3.41)	<0.001
Dyslipidemia	1.38 (0.92-2.07)	0.119
NIHSS, score	1.05 (1.04-1.07)	<0.001
Pneumonia severity index, score	1.02 (1.02-1.03)	<0.001
TOAST, n (%)		
LAA	Reference	
CES	1.85 (1.30-2.65)	<0.001
SVS	0.73 (0.29-1.83)	0.502
SOD	0.73 (0.42-1.28)	0.278
SUD	0.62 (0.25-1.56)	0.309
Blood examination		
White blood cells, $\times10^9$/L	1.03 (1.00-1.06)	0.033
Lymphocyte, $\times10^9$/L	0.91 (0.89-0.93)	<0.001
Neutrophils, $\times10^9$/L	1.08 (1.06-1.10)	<0.001
C-reactive protein, mg/L	1.01 (1.00-1.01)	<0.001
Platelet, $\times10^9$/L	1.00 (1.00-1.00)	0.550
Mean corpuscular volume, fL	1.03 (0.99-1.06)	0.105
Red cell distribution width, %	1.22 (1.07-1.39)	0.003
Glucose, mmol/L	1.01 (0.99-1.02)	0.257
High-density lipoprotein, mmol/L	1.01 (0.99-1.03)	0.218
Low-density lipoprotein, mmol/L	0.85 (0.72-1.01)	0.072
Triglyceride, mmol/L	0.86 (0.67-1.10)	0.226

Total cholesterol, mmol/L	0.90 (0.78-1.04)	0.144
Interleukin-6, ng/L	1.00 (1.00-1.00)	0.051
Albumin, g/L	0.94 (0.92-0.97)	<0.001
Antibiotics, n (%)		
Cephalosporins, carbapenems and monobactams	Reference	
Fluoroquinolones	0.65 (0.33-1.30)	0.221
Penicillins	2.19 (0.69-6.94)	0.183
None	1.35 (0.96-1.90)	0.084
Medications at discharge, n (%)		
Antiplatelet drugs	0.52 (0.37-0.74)	<0.001
Anticoagulants	1.09 (0.73-1.65)	0.667
Inflammatory markers		
NLR	1.07 (1.05-1.10)	<0.001
PLR	1.00 (1.00-1.00)	0.550
CAR	1.26 (1.11-1.43)	<0.001
IIC at discharge	1.07 (1.04-1.09)	<0.001

Abbreviations: BMI, body mass index; CAR, C-reactive protein-albumin ratio; CES, cardio-embolism; CI, confidence interval; HR, hazard ratio; LAA, large-artery atherosclerosis; NIHSS, National Institute of Health Stroke Scale; NLR, neutrophil-lymphocyte ratio; PLR, platelet-lymphocyte ratio; SOE, stroke of other determined etiology; SUE, stroke of undetermined etiology; SVS, small-vessel occlusion; TOAST, Trial of ORG 10172 in Acute Stroke Treatment.

Table S4. The dynamic relationship between IIC and long-term mortality risk.

	Model 1		Model 2		Model 3	
IIC	**HR (95% CI)**	***P* value**	**HR (95% CI)**	***P* value**	**HR (95% CI)**	***P* value**
Trajectory: High to High	Reference		Reference		Reference	
Trajectory: High to Low	0.55 (0.33-0.92)	0.023	0.50 (0.29-0.84)	0.010	0.46 (0.26-0.78)	0.005
Trajectory: Low to High	0.46 (0.27-0.79)	0.005	0.54 (0.30-0.97)	0.040	0.62 (0.35-1.09)	0.097
Trajectory: Low to Low	0.16 (0.09-0.30)	<0.001	0.21 (0.11-0.42)	<0.001	0.29 (0.15-0.56)	<0.001

Abbreviations: BMI, body mass index; CI, confidence interval; HR, hazard ratio; IIC, cumulative inflammatory index; NIHSS, National Institute of Health Stroke Scale; TOAST, Trial of ORG 10172 in Acute Stroke Treatment.

To capture the dynamic changes in IIC, patients were stratified into high or low groups at both admission and discharge according to the median IIC value at each time point. By combining the admission and discharge classifications, four distinct trajectories were defined: (1) Low to Low, patients who remained in the low group throughout hospitalization; (2) Low to High, patients who shifted from the low group at admission to the high group at discharge; (3) High to Low, patients who shifted from the high group at admission to the low group at discharge; and (4) High to High, patients who consistently remained in the high group at both time points.

Model 1 was unadjusted model.

Model 2 was adjusted for demographic variables, medical history and inflammatory markers including: age, sex, BMI, NIHSS, TOAST, hypertension, diabetes mellitus, atrial fibrillation, white blood cells, C-reactive protein, glucose, and interleukin-6.

Model 3 was adjusted for variables with P <0.1 in the univariable analysis and back-ward selection method. The variables included in the final model were age, temperature, NIHSS, hypertension, atrial fibrillation, albumin, antibiotics and pneumonia severity index.