

Table S1. comparison of baseline characteristics between 548 patients who were included and 161 patients who were excluded

	No (%) / median (IQR)		
	Patients included (n=548)	Patients excluded (n=161)	P-value
Age, years, median (IQR)	57 (39-68)	56 (40-71)	0.50
Male	250 (46%)	65 (40%)	0.24
Symptom onset			
Fever	432 (79%)	134 (83%)	0.22
Cough	371 (68%)	96 (60%)	0.06
Dyspnea	219 (40%)	63 (39%)	0.85
Fatigue	201 (37%)	53 (33%)	0.38
Muscle ache	132 (24%)	34 (21%)	0.43
Diarrhoea	51 (9%)	6 (4%)	0.02
Headache	35 (6%)	13 (8%)	0.45
Pharyngalgia	22 (4%)	5 (3%)	0.82
Comorbidities			
Hypertension	197 (36%)	52 (32%)	0.39
Diabetes	99 (18%)	25 (16%)	0.46
Chronic kidney disease	33 (6%)	4 (2%)	0.10
Cardiovascular disease	53 (10%)	12 (7%)	0.39
Cerebrovascular disease	37 (7%)	6 (4%)	0.16
Chronic pulmonary disease	32 (6%)	7 (4%)	0.47
In-hospital/admission treatment			
Quinolones	364 (66%)	97 (60%)	0.15
Cephalosporins	265 (48%)	73 (45%)	0.50
Ribavirin	487 (89%)	128 (80%)	0.002
Oseltamivir	144 (26%)	34 (21%)	0.18
Arbidol	138 (25%)	50 (31%)	0.14
Glucocorticoids	333 (61%)	77 (48%)	0.003
Intravenous immunoglobulin	285 (52%)	65 (40%)	0.053
Ventilation	88 (16%)	15 (9%)	0.03
Blood gas analysis and severity on admission			
Lactate, mmol/L, median (IQR)	1.2 (0.8-1.9)	1.1 (0.7-1.7)	0.09
PaO ₂ :FiO ₂ , mm Hg, median (IQR)	343 (244-500)	373 (229-524)	0.66
Disease severity			0.004
Non-severe	312 (57%)	112 (70%)	
Severe	236 (43%)	49 (30%)	

Table S2. Clinical features, laboratory findings, and outcomes of 99 patients with diabetes.

No (%) / median (IQR)	Diabetes (n=99)
Age, years, median (IQR)	66 (58-72)
Male	53 (54%)
Comorbidities	
Hypertension	69 (70%)
Chronic kidney disease	20 (20%)
Cardiovascular disease	19 (19%)
Cerebrovascular disease	18 (18%)
Chronic pulmonary disease	2 (2%)
In-hospital treatment	
Quinolones	62 (63%)
Cephalosporins	50 (51%)
Ribavirin	88 (89%)
Oseltamivir	23 (23%)
Arbidol	21 (21%)
Glucocorticoid therapy	30 (30%)
Intravenous immunoglobulin	45 (45%)
Non-invasive ventilation	20 (20%)
Hypoglycemic agents	87 (88%)
Biguanides	29 (29%)
α -glucosidase inhibitors	43 (43%)
Glinides	17 (17%)
Thiazolidinediones	5 (5%)
DPP-4 inhibitors	16 (16%)
Insulin therapy	64 (65%)
Insulin in combination with hypoglycemic agents	43 (43%)
Without any hypoglycemic treatment	12 (12%)
Hypoglycemia	6 (6%)
Blood gas analysis and severity	
Lactate, mmol/L, median (IQR)	1.3 (0.9-2.0)
PaO ₂ :FiO ₂ , mm Hg, median (IQR)	284 (212-400)
Baseline CURB-65 score, median (IQR)	1 (0-2)
0	28 (28%)
1	39 (39%)
2-5	32 (32%)
Disease severity status	
Non-severe	38 (38%)
Severe	61 (62%)
Laboratory findings on admission to hospital, median (IQR)	
White blood cell count, $\times 10^9/L$	5.6 (4.3-7.6)

Lymphocyte count, $\times 10^9/L$	0.9 (0.7-1.2)
C-reactive protein, mg/dL	3.4 (1.6-5.9)
Procalcitonin, ng/mL	0.10 (0.05-0.20)
Creatinine, $\mu\text{mol/L}$	74 (56-103)
Alanine aminotransferase, U/L	21 (14-32)
Fibrinogen, g/L	3 (3-4)
D-dimer, $\mu\text{g/L}$	1.0 (0.5-2.9)
Lactate dehydrogenase, U/L	212 (175-270)
Creatine kinase-MB, U/L	9 (6-12)
Glycemic parameters	
HbA1c, %	7.4 (6.7-8.9)
<6.5 (48 mmol/mol)	13/62 (21%)
≥ 6.5 (48 mmol/mol)	49/62 (79%)
G ₀	9.0 (6.7-12.3)
≤ 6.1	23 (23%)
6.1-7.8	10 (10%)
7.8-10	26 (26%)
>10	40 (40%)
G _{peak}	11.3 (8.7-16.3)
≤ 6.1	8 (8%)
6.1-7.8	11 (11%)
7.8-10	16 (16%)
>10	64 (65%)
G _{mean}	8.9 (6.7-11.4)
≤ 6.1	19 (19%)
6.1-7.8	22 (22%)
7.8-10	23 (23%)
>10	35 (35%)
G _{SD}	2.2 (1.3-3.7)
Outcomes and hospitalization expenses	
ARDS	54 (55%)
Death	17 (17%)
Length of hospital stay, days	30 (23-38)
Hospitalization expenses, $\times 1000$ RMB	30 (21-55)

Abbreviations: ARDS=acute respiratory distress syndrome. IQR=interquartile range. PaO₂=partial pressure of oxygen. FiO₂=fraction of inspired oxygen. G₀=admission glucose. G_{peak}=the peak value of the first-week glucose. G_{mean}=the mean value of the first-week glucose. G_{SD}=standard deviation of the first-week glucose. CURB-65=Confusion, Urea>7mmol/L, Respiratory rate $\geq 30/\text{min}$, Blood pressure (SBP<90 or DBP ≤ 60 mmHg), Age ≥ 65 .

Table S3. Associations of glycemic parameters with ARDS and all-cause mortality in 449 COVID-19 patients without pre-existing diabetes.

		HR (95% CI) for mortality			RR (95% CI) for ARDS	
	Death /total, n	Crude model	Adjusted model*	ARDS /total, n	Crude model	Adjusted model*
G₀, mmol/L						
≤6.1	14/292	1.00 (ref.)	1.00 (ref.)	80/292	1.00 (ref.)	1.00 (ref.)
6.1-7.8	18/105	3.01 (1.50, 6.07)	1.69 (0.77, 3.70)	51/105	2.50 (1.58, 3.84)	2.06 (1.24, 3.50)
7.8-10	5/37	2.22 (0.79, 6.19)	2.33 (0.77, 7.01)	22/37	3.89 (1.93, 8.13)	3.69 (1.69, 9.32)
>10	5/15	6.28 (2.26, 17.46)	2.35 (0.75, 7.36)	8/15	3.03 (1.02, 10.45)	1.46 (0.45, 5.03)
Per SD increment of ln(G ₀)		1.45 (1.19, 1.75)	1.23 (0.97, 1.55)		1.69 (1.37, 2.15)	1.48 (1.19, 1.98)
G_{peak}, mmol/L						
≤6.1	2/216	1.00 (ref.)	1.00 (ref.)	49/216	1.00 (ref.)	1.00 (ref.)
6.1-7.8	9/116	6.47 (1.40, 30.00)	3.17 (0.64, 15.62)	45/116	2.16 (1.35, 3.51)	1.80 (1.05, 3.12)
7.8-10	7/67	7.94 (1.65, 38.31)	3.13 (0.57, 17.11)	34/67	3.51 (1.98, 6.79)	3.01 (1.50, 6.27)
>10	24/50	47.24 (11.16, 200.00)	19.89 (4.43, 89.28)	33/50	6.62 (3.31, 13.71)	3.24 (1.57, 7.44)
Per SD increment of ln(G _{peak})		2.09 (1.75, 2.49)	1.95 (1.52, 2.50)		2.10 (1.71, 2.68)	1.70 (1.35, 2.22)
G_{mean}, mmol/L						
≤6.1	7/337	1.00 (ref.)	1.00 (ref.)	92/337	1.00 (ref.)	1.00 (ref.)
6.1-7.8	15/75	8.88 (3.62, 21.78)	3.88 (1.39, 10.81)	39/75	2.88 (1.76, 4.98)	2.08 (1.17, 3.80)
7.8-10	13/28	23.21 (9.25, 58.27)	17.05 (6.56, 44.31)	23/28	12.25 (4.98, 54.89)	8.27 (3.37, 41.93)
>10	7/9	58.57 (20.24, 169.48)	45.50 (14.36, 144.21)	7/9	Not estimated‡	Not estimated‡
Per SD increment of ln(G _{mean})		2.58 (2.12, 3.13)	2.31 (1.90, 2.82)		2.17 (1.76, 2.87)	1.78 (1.43, 2.40)
G_{SD}, mmol/L†						
≤0.4	3/112	1.00 (ref.)	1.00 (ref.)	23/112	1.00 (ref.)	1.00 (ref.)

0.4-0.7	4/112	1.08 (0.24, 4.82)	0.73 (0.16, 3.29)	36/112	1.83 (1.00, 3.56)	1.43 (0.75, 2.97)
0.7-1.5	8/112	1.92 (0.51, 7.27)	1.45 (0.38, 5.48)	43/112	2.41 (1.40, 4.76)	1.76 (0.91, 3.58)
>1.5	27/113	6.66 (2.02, 21.99)	3.73 (1.12, 12.49)	59/113	4.23 (2.44, 8.50)	2.50 (1.40, 5.07)
Per SD increment of $\ln(G_{SD})$		2.98 (2.02, 4.40)	2.18 (1.40, 3.41)		1.79 (1.47, 2.33)	1.32 (1.01, 1.80)

*Adjusted for age (in continuous), sex, baseline comorbidities (including chronic obstructive pulmonary disease, hypertension, chronic kidney disease, cardiovascular disease, and cerebrovascular disease), glucocorticoids use (yes/no), and baseline CURB-65 score.

†Additionally adjusted for baseline glucose level in the adjusted model.

‡The RRs and 95% CIs were not estimated because of the limited sample size in bootstrapping.

Abbreviations: ARDS=acute respiratory distress syndrome. COVID-19=coronavirus disease 2019. HR=hazard ratio. RR=risk ratio. CI=confidence interval. G_0 =admission glucose. G_{peak} =the peak value of the first-week glucose. G_{mean} =the mean value of the first-week glucose. G_{SD} =standard deviation of the first-week glucose. CURB-65=Confusion, Urea>7mmol/L, Respiratory rate \geq 30/min, Blood pressure (SBP<90 or DBP \leq 60 mmHg), Age \geq 65.

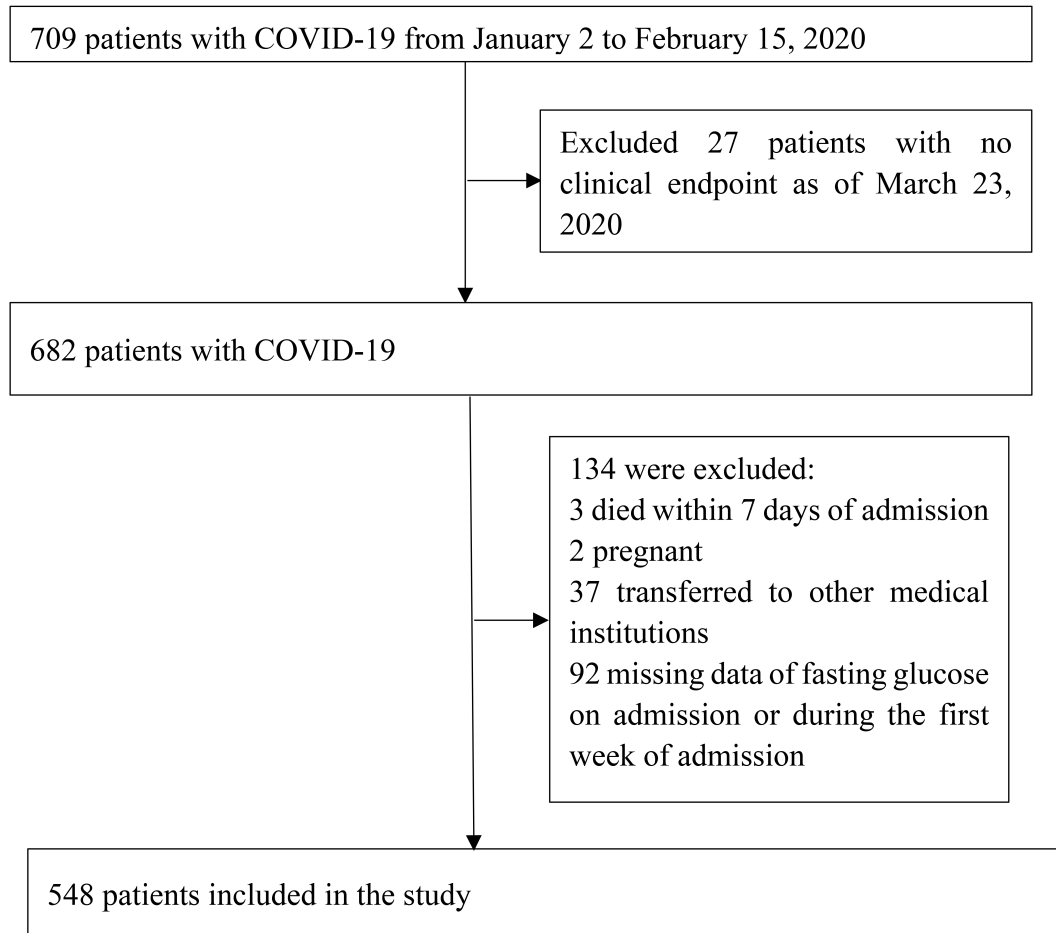


Figure S1. Study flow diagram.

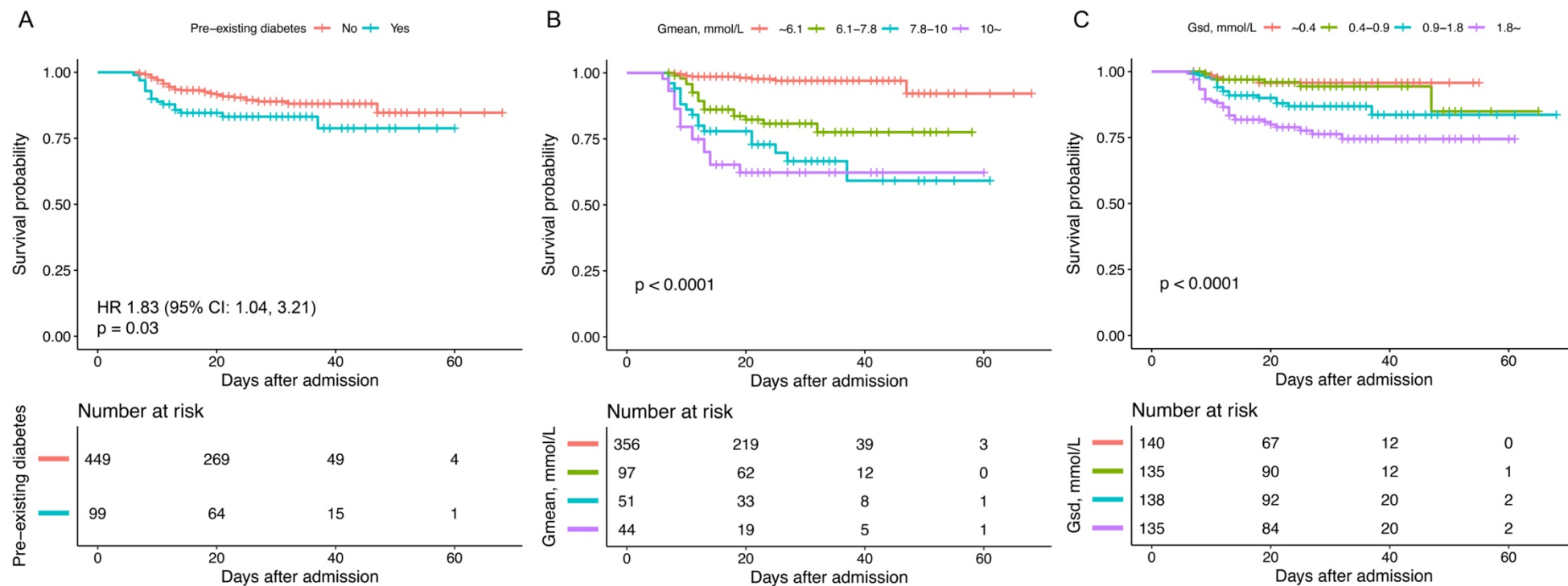


Figure S2. Kaplan-Meier curves for cumulative probability of COVID-19 mortality for diabetes (A), G_{mean} (B), and G_{SD} (C).

Abbreviations: CI=confidence interval. G_{mean} =the mean value of the first-week glucose. G_{SD} =standard deviation of the first-week glucose. HR=hazard ratio.

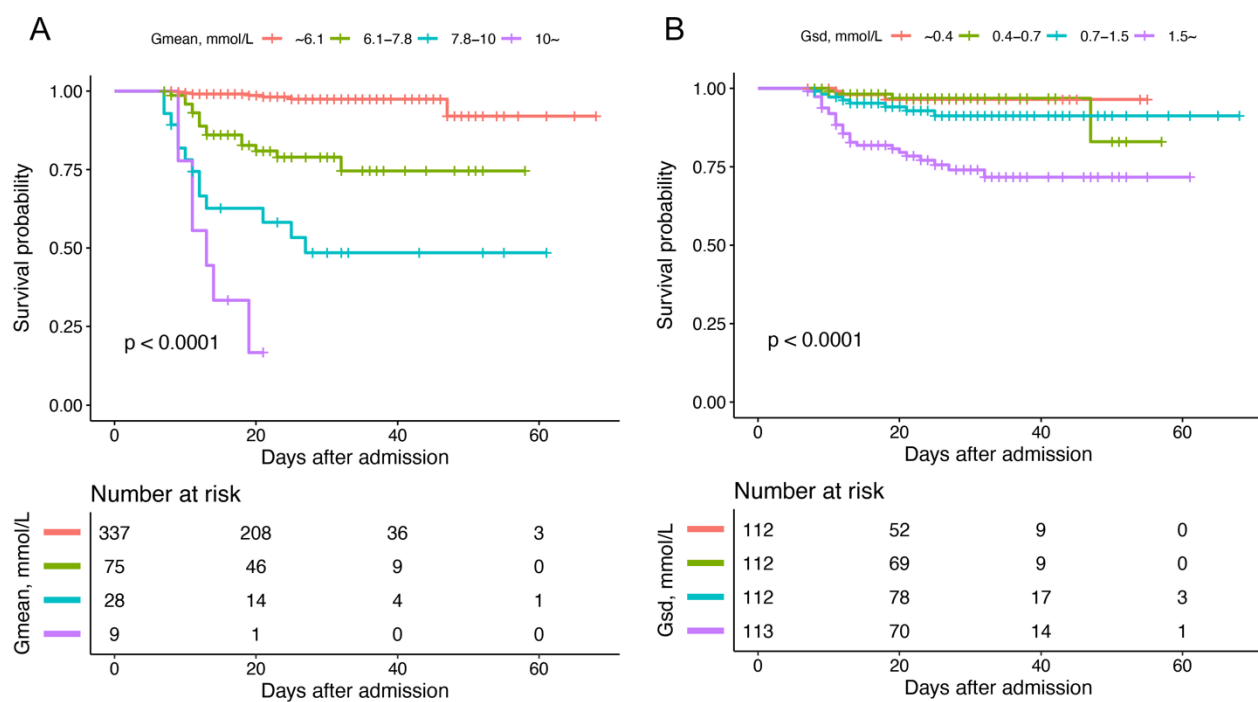


Figure S3. Kaplan-Meier curves for cumulative probability of COVID-19 mortality for G_{mean} (A) and G_{SD} (B) among 449 COVID-19 patients without pre-existing diabetes.

Abbreviations: G_{mean} =the mean value of the first-week glucose. G_{SD} =standard deviation of the first-week glucose.

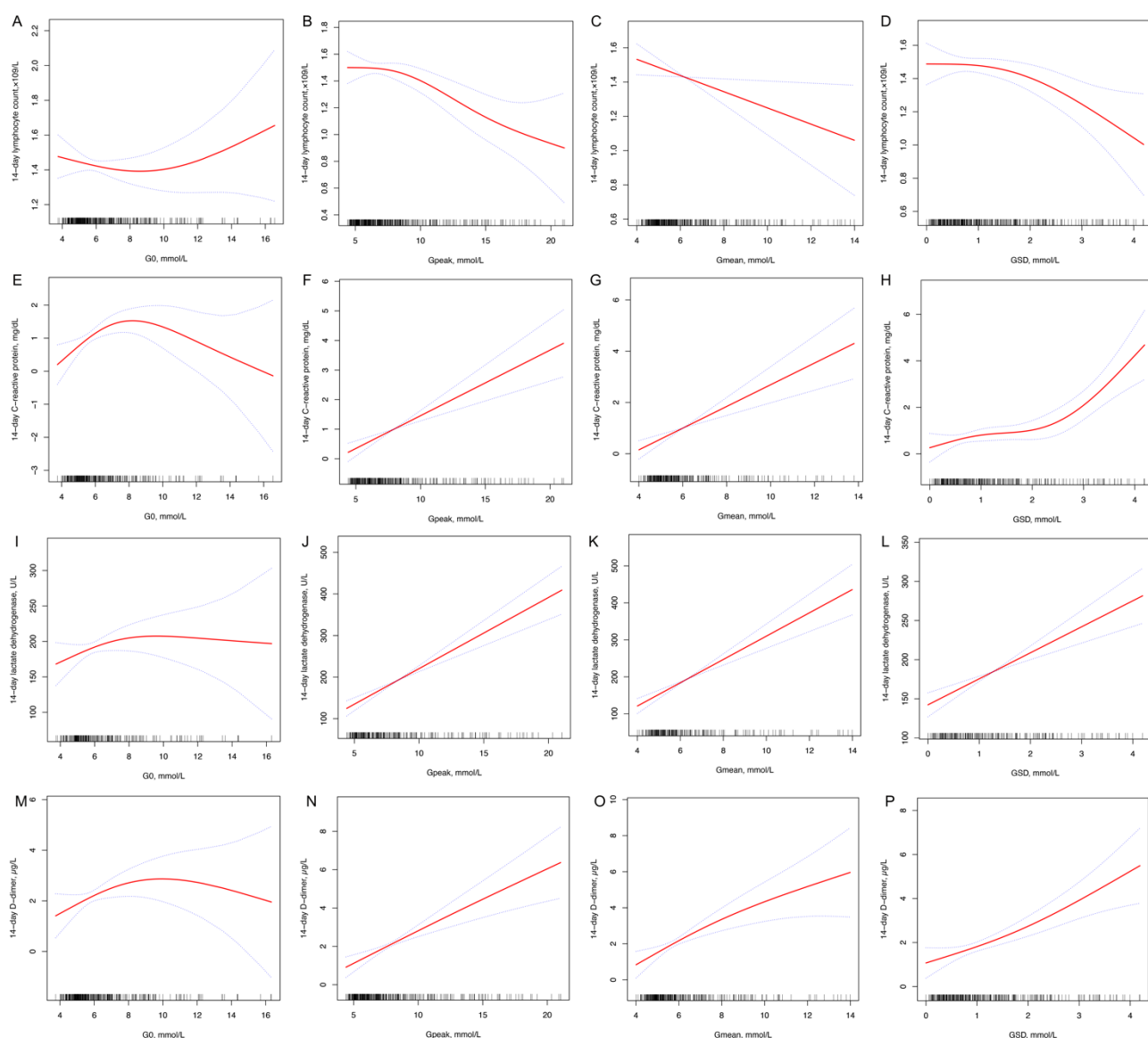


Figure S4. Associations of glycemic parameters with 14-day lymphocyte count (A, B, C, D, $n=415$), 14-day C-reactive protein levels (E, F, G, H, $n=315$), 14-day lactate dehydrogenase (I, J, K, L, $n=239$), and 14-day D-dimer (M, N, O, P, $n=351$). Smoothing splines were generated by generalized additive models and adjusted for age, sex, comorbidities (including chronic pulmonary disease, hypertension, diabetes, cardiovascular disease, cerebrovascular disease and chronic kidney disease) and baseline CURB-65 score. The red line indicates the estimated levels of laboratory markers and the blue dot line indicates 95% confidence intervals.

Abbreviations: G_0 =admission glucose. G_{peak} =the peak value of the first-week glucose. G_{mean} =the mean value of the first-week glucose. G_{SD} =standard deviation of the first-week glucose. CURB-65=Confusion, Urea >7 mmol/L, Respiratory rate ≥ 30 /min, Blood pressure (SBP <90 or DBP ≤ 60 mmHg), Age ≥ 65 .