Cell Metabolism, Volume *31*

Supplemental Information

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Supplemental Figures:

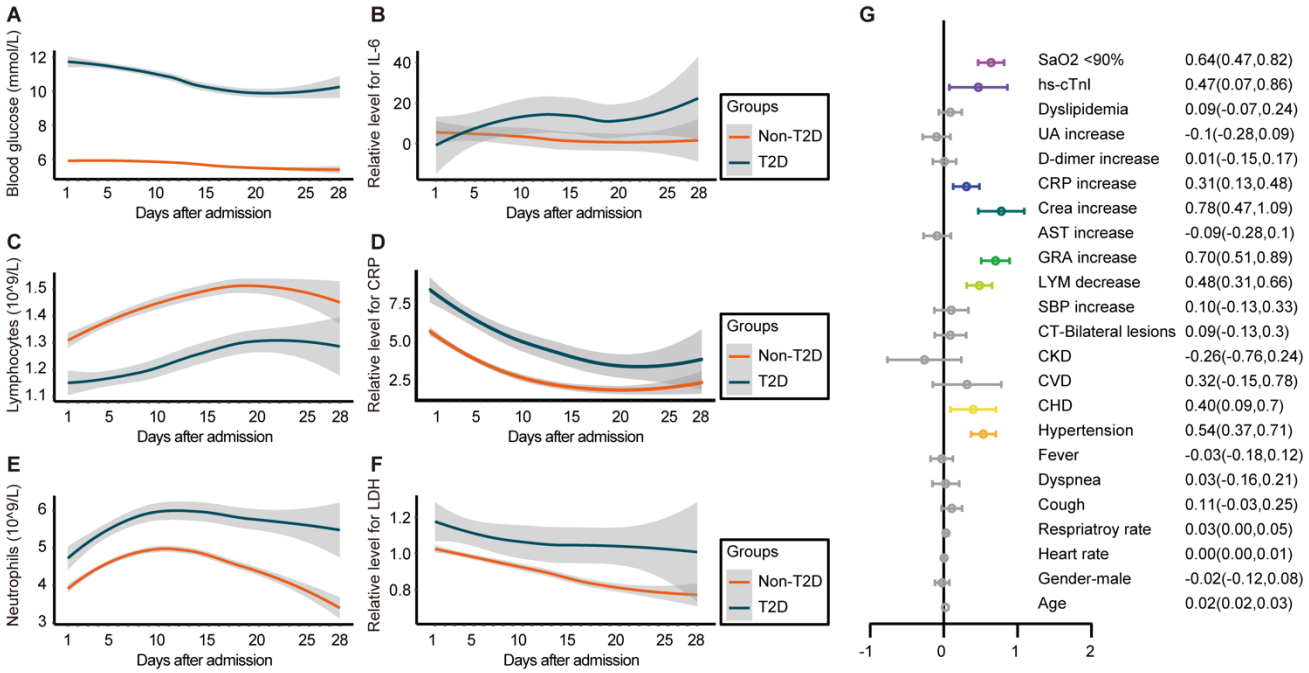

Figure S1. Dynamics of BG, lymphocyte count, neutrophil count, IL-6, CRP and LDH in T2D and non-T2D groups during hospitalization.

(A)–(F) Dynamic trajectories of blood glucose, lymphocytes, neutrophils and relative level for IL-6, CRP, LDH during 28-day follow-up duration with 95% confidence interval represented by shaded regions. Comparison between patients with T2D (blue) versus non-T2D patients (orange).

(G) Coefficients of factors related to viral infection or glucose control which affect the median of blood glucose based on generalized linear model. Age, respiratory rate, hypertension, CHD, lymphocyte (LYM) decrease, Neutrophil granulocyte (GRA) increase, Creatinine (CREA) increase, C-reactive protein (CRP) increase, hs-cTnI and SpO2<90% were positively associated with the median of blood glucose.

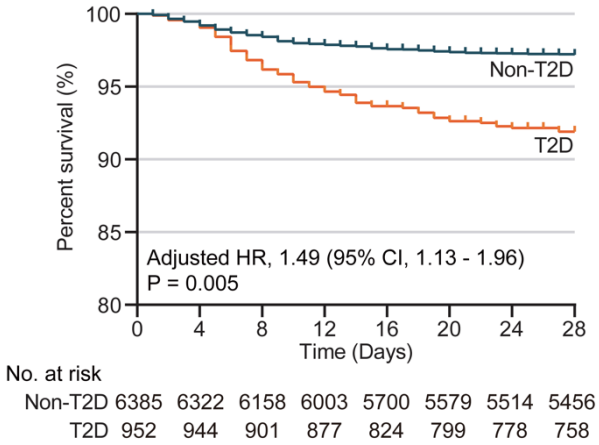

Figure S2. Kaplan-Meier Curves for cumulative probability of COVID-19 mortality during 28-day follow-up duration in T2D and non-T2D cohorts. The blips indicate censoring.

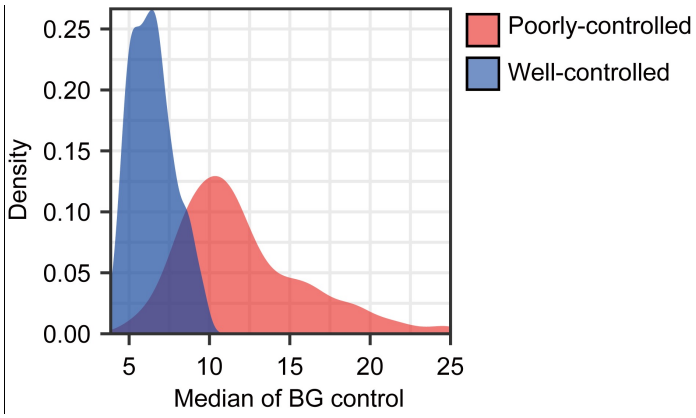

Figure S3. Distribution of glycemic variability in the well-controlled BG control group and the poorly-controlled BG control group.

Table S1. Characteristics of patients with or without T2D on admission.

Parameters	Total (N=7337)	T2D (n=952)	Non-T2D(n=6385)	*P* value[b]
Clinical characteristics				
Age, median(IQR), y	54 (42-64)	62 (55-68)	53 (40-63)	<0.001
Male gender, n (%)	3477(47.4%)	510(53.6%)	2967(46.5%)	<0.001
Female gender, n (%)	3860(52.6%)	442(46.4%)	3418(53.5%)	<0.001
Heart rate, median(IQR), bpm	84.0(78.0-95.0)	85.0(77.0-96.8)	84.0(78.0-95.0)	0.202
Respiratory rate, median(IQR)	20.0(19.0-21.0)	20.0(19.0-21.0)	20.0(19.0-21.0)	0.133
SBP, median(IQR), mmHg	127.0(120.0-137.0)	130.0(120.0-142.0)	126.0(120.0-136.0)	<0.001
DBP, median(IQR), mmHg	79.0(71.0-86.0)	80.0(72.0-86.8)	79.0(71.0-85.0)	0.025
Days from symptom onset to hospitalization, median(IQR), d	10.0(6.0-19.0)	10.0(6.0-19.0)	10.0(6.0-19.0)	0.894
Fever, n(%)	5268(71.8%)	671(70.5%)	4597(72.0%)	0.353
Cough, n(%)	4656(63.5%)	611(64.2%)	4045(63.4%)	0.646
Fatigue, n(%)	2369(32.3%)	362(38.0%)	2007(31.4%)	<0.001
Dyspnea, n(%)	1178(16.1%)	195(20.5%)	983(15.4%)	<0.001
Comorbidities				
Hypertension, n(%)	1763(24.0%)	508(53.4%)	1255(19.7%)	<0.001
Coronary heart disease, n(%)	363(5.0%)	130(13.7%)	233(3.7%)	<0.001
Chronic liver disease, n(%)	127(1.7%)	16(1.7%)	111(1.7%)	1.000
Cerebrovascular diseases, n(%)	146(2.0%)	53(5.6%)	93(1.5%)	<0.001
Chronic kidney disease, n(%)	129(1.8%)	47(4.9%)	82(1.3%)	<0.001
COPD, n(%)	56(0.8%)	12(1.3%)	44(0.7%)	0.091
Chest CT				
Unilateral lesion, n/N(%)	826/6739(12.3%)	60/868(6.9%)	766/5871(13.1%)	<0.001
Bilateral lesions, n/N (%)	5484/6739(81.4%)	765/868(88.1%)	4719/5871(80.4%)	<0.001
Laboratory examination				
Leukocyte count > 9.5, 10^9/L, n/N (%)	464/6407(7.2%)	98/870(11.3%)	366/5537(6.6%)	<0.001
Neutrophil count > 6.3, 10^9/L, n/N (%)	698/6397(10.9%)	149/869(17.2%)	549/5528(9.9%)	<0.001
Lymphocyte count < 1.1, 10^9/L, n/N (%)	2190/6398(34.2%)	387/869(44.5%)	1803/5529(32.6%)	<0.001
C-reactive protein increase>ULN[a], n/N (%)	2044/4597(44.5%)	365/640(57.0%)	1679/3957(42.4%)	<0.001
Procalcitonin level increase> ULN[a], n/N (%)	1082/4874(22.2%)	233/700(33.3%)	849/4174(20.3%)	<0.001
ALT increase> 40 U/L, n/N (%)	1032/6046(17.1%)	124/828(15.0%)	908/5218(17.4%)	0.094
AST increase> 40 U/L, n/N (%)	1019/6047(16.9%)	145/827(17.5%)	874/5220(16.7%)	0.607
Creatinine>ULN[a], n/N (%)	373/6225(6.0%)	103/860(12.0%)	270/5365(5.0%)	<0.001
D-dimer> ULN[a], n/N (%)	1944/5437(35.8%)	390/772(50.5%)	1554/4665(33.3%)	<0.001
K^+ < 3.5 mmol/L, n/N (%)	983/6169(15.9%)	133/852(15.6%)	850/5317(16.0%)	0.820
LDL-c, mmol/L, median (IQR)	2.4(2.0-3.0)	2.4(1.9-3.0)	2.4(2.0-3.0)	0.051
SpO2, <95%, n/N (%)	742/5326(13.9%)	135/717(18.8%)	607/4609(13.2%)	<0.001
Blood glucose, median (IQR), mmol/L	5.3(4.7-6.7)	8.3(6.2-12.4)	5.2(4.7-6.1)	<0.001

Abbreviations: SBP, Systolic blood pressure; DBP, Diastolic blood pressure; COPD, Chronic obstructive pulmonary disease; ALT, alanine transaminase; AST, Aspartate transaminase; IQR, Interquartile range.
a, upper limit of normal (ULN) was defined according to criteria in each hospital.
b, The P value was calculated by the Mann-Whitney U test for continuous variables between two groups, Fisher's exact test or $\chi 2$ test for categorical variables.

Table S2. In-hospital management of COVID-19 patients with or without T2D on admission

Management	Total (N=7337)	T2D (n=952)	Non-T2D (n=6385)	*P* value[b]
Traditional Chinese medicine, n (%)	5755(78.4%)	745(78.3%)	5010(78.5%)	0.917
Antiviral drug, n (%)	4874(66.4%)	642(67.4%)	4232(66.3%)	0.504
Antibiotics drug, n (%)	4217(57.5%)	584(61.3%)	3633(56.9%)	0.011
Systemic corticosteroids, n (%)	1737(23.7%)	280(29.4%)	1457(22.8%)	<0.001
Immunoglobin, n (%)	1347(18.4%)	219(23.0%)	1128(17.7%)	<0.001
Anti-hypertensive drug, n (%)	1773(24.2%)	429(45.1%)	1344(21.1%)	<0.001
Lipid lowering drug, n (%)	452(6.2%)	143(15.0%)	309(4.8%)	<0.001
Vasoactive drug, n (%)	216(2.9%)	73(7.7%)	143(2.2%)	<0.001
Antifungal medications, n (%)	103(1.4%)	24(2.5%)	79(1.2%)	0.003
Metformin, n (%)	302(4.1%)	302(31.7%)	0(0.0%)	<0.001
Sulfonylurea, n (%)	118(1.6%)	118(12.4%)	0(0.0%)	<0.001
DPP-4 inhibitor, n (%)	63(0.9%)	63(6.6%)	0(0.0%)	<0.001
Insulin, n (%)	384(5.2%)	384(40.3%)	0(0.0%)	<0.001
Alpha-glucosidase inhibitor, n (%)	378(5.2%)	378(39.7%)	0(0.0%)	<0.001
Triazolidinedione, n (%)	14(0.2%)	14(1.5%)	0(0.0%)	<0.001
Meglitide	40(0.6%)	40(4.2%)	0(0.0%)	<0.001
Oxygen inhalation, n (%)	4638(63.2%)	732(76.9%)	3906(61.2%)	<0.001
Noninvasive ventilation, n (%)	345(4.7%)	97(10.2%)	248(3.9%)	<0.001
Invasive ventilation, n (%)	80(1.1%)	34(3.6%)	46(0.7%)	<0.001
Renal replacement therapy, n(%)	57(0.8%)	19(2.0%)	38(0.6%)	<0.001
Extracorporeal membrane oxygenation, n (%)	8(0.1%)	5(0.5%)	3(0.1%)	0.001

a, Noninvasive ventilation, invasive ventilation, and extracorporeal membrane oxygenation are at mutually exclusive.
b, The P value was calculated by Fisher's exact test or $\chi 2$ test.

Table S3. Incidence for primary and secondary outcomes in T2D and non-T2D groups

Outcomes	Total (N=7337)	T2D (n=952)	Non-T2D (n=6385)	*P* value[a]
All-cause mortality, n (%)	248(3.4%)	74(7.8%)	174(2.7%)	<0.001
Septic shock, n (%)	76(1.3%)	27(3.8%)	49(1.0%)	<0.001
ARDS, n (%)	622(8.5%)	161(16.9%)	461(7.2%)	<0.001
DIC, n (%)	18(0.3%)	5(0.5%)	13(0.2%)	0.074
Acute kidney injury, n (%)	86(1.2%)	37(3.9%)	49(0.8%)	<0.001
Acute heart injury, n (%)	260(3.5%)	69(7.3%)	191(3.0%)	<0.001

Abbreviations: ARDS, Acute respiratory distress syndrome; DIC, disseminated intravascular coagulation.

a, The P value was calculated by Fisher's exact test or $\chi 2$ test.

Table S4. Hazard Ratio for primary and secondary outcome in T2D and non-T2D groups

	Unadjusted		Adjusted[a]		Adjusted[b]	
T2D vs non-T2D	HR(95%CI)	P value	HR(95%CI)	P value[c]	HR(95%CI)	P value[c]
All-cause mortality	2.90(2.21,3.81)	<0.001	1.70(1.29,2.24)	<0.001	1.49(1.13,1.96)	0.005
Septic shock	3.66(2.25,5.95)	<0.001	2.43(1.48,3.99)	<0.001	1.95(1.18,3.20)	0.009
ARDS	2.47(2.06,2.95)	<0.001	1.71(1.42,2.06)	<0.001	1.44(1.20,1.73)	<0.001
DIC	2.58(0.92,7.23)	0.072	1.40(0.49,3.94)	0.529	1.28(0.45,3.64)	0.644
Acute kidney injury	5.11(3.33,7.83)	<0.001	3.43(2.21,5.34)	<0.001	3.01(1.94,4.68)	<0.001
Acute heart injury	2.47(1.87,3.25)	<0.001	1.53(1.16,2.03)	0.003	1.32(0.99,1.74)	0.055

Abbreviations: ARDS, Acute respiratory distress syndrome; DIC, disseminated intravascular coagulation; HR, Hazard ratio; CI, Confidence interval.

a, The adjusted variables included age and gender, hospital sites (as a random effect).

b, The adjusted variables included age, gender, indicators of the severity of COVID-19, hospital sites (as a random effect).

c, The P values were calculated based on Cox proportional hazard model.

Table S5. Incidence for primary and secondary outcomes of patients in the well-controlled or poorly-controlled BG group.

Outcome	Total (N=810)	Well-controlled (n=282)	Poorly-controlled (n=528)	*P* value[a]
All-cause mortality, n (%)	61(7.5%)	3(1.1%)	58(11.0%)	<0.001
Septic shock, n (%)	19(3.1)	0(0.0%)	19(4.7%)	0.004
ARDS, n (%)	133(16.4%)	20(7.1%)	113(21.4%)	<0.001
DIC, n (%)	3(0.4%)	0(0.0%)	3(0.6%)	0.555
Acute kidney injury, n (%)	22(2.7%)	2(0.7%)	20(3.8%)	0.019
Acute heart injury, n (%)	56(6.9%)	4(1.4%)	52(9.9%)	<0.001

Abbreviations: ARDS, Acute respiratory distress syndrome; DIC, disseminated intravascular coagulation.

a, The P value was calculated by Fisher's exact test or $\chi 2$ test.

Table S6. Hazard Ratio for primary and secondary outcomes of patients in the well-controlled or poorly-controlled BG group.

Well-controlled vs. Poorly controlled.	Unadjusted		Adjusted[a]		Adjusted[b]	
	HR(95%CI)	P value[c]	HR(95%CI)	P value[c]	HR(95%CI)	P value[c]
All-cause mortality	0.09(0.03,0.30)	<0.001	0.10(0.03,0.32)	<0.001	0.13(0.04,0.44)	<0.001
Septic shock	-	-	-	-	-	-
ARDS	0.31(0.19,0.50)	<0.001	0.32(0.20,0.51)	<0.001	0.41(0.25,0.66)	<0.001
DIC	-	-	-	-	-	-
Acute kidney injury	0.19(0.04,0.80)	0.024	0.21(0.05,0.88)	0.033	0.22(0.05,1.03)	0.055
Acute heart injury	0.14(0.05,0.39)	<0.001	0.15(0.05,0.41)	<0.001	0.21(0.07,0.59)	0.003

Abbreviations: ARDS, Acute respiratory distress syndrome; DIC, disseminated intravascular coagulation; HR, Hazard ratio; CI, Confidence interval.
a, The adjusted variables included age and gender and hospital sites (as a random effect).
b, The adjusted variables included age, gender, indicators of the severity of COVID-19, comorbidities (hypertension, coronary heart disease, cerebrovascular diseases, chronic liver diseases and chronic renal diseases), and hospital sites (as a random effect).
c, The P values were calculated based on Cox proportional hazard model.

Table S7. Incidence for primary and secondary outcomes of patients in the well-controlled or poorly-controlled BG group in PSM model.

Outcomes	Total (N=500)	Well-controlled (n = 250)	Poorly-controlled (n = 250)	*P* value[a]
All-cause mortality, n (%)	17(3.4%)	2(0.8%)	15(6.0%)	0.003
Septic shock, n (%)	3(0.8%)	0(0.0%)	3(1.7%)	0.119
ARDS, n (%)	55(11.0%)	18(7.2%)	37(14.8%)	0.010
DIC, n (%)	0(0.0%)	0(0.0%)	0(0.0%)	1.000
Acute kidney injury, n (%)	9(1.8%)	1(0.4%)	8(3.2%)	0.037
Acute heart injury, n (%)	21(4.2%)	4(1.6%)	17(6.8%)	0.007

Abbreviations: ARDS, Acute respiratory distress syndrome; DIC, disseminated intravascular coagulation.

a, The P value was calculated by Fisher's exact test or $\chi 2$ test.

Table S8. In-hospital management of participants with well-controlled or poorly-controlled BG after PSM

Management	Total (N=500)	Well-controlled (n=250)	Poorly-controlled (n=250)	*P* value[b]
Traditional Chinese medicine, n (%)	409(81.8%)	211(84.4%)	198(79.2%)	0.164
Antiviral drug, n (%)	340(68.0%)	160(64.0%)	180(72.0%)	0.069
Antibiotics drug, n (%)	289(57.8%)	139(55.6%)	150(60.0%)	0.365
Systemic corticosteroids, n (%)	126(25.2%)	57(22.8%)	69(27.6%)	0.257
Immunoglobin, n (%)	95(19.0%)	43(17.2%)	52(20.8%)	0.362
Anti-hypertensive drug, n (%)	230(46.0%)	111(44.4%)	119(47.6%)	0.530
Lipid lowering drug, n (%)	81(16.2%)	35(14.0%)	46(18.4%)	0.225
Metformin, n (%)	164(32.8%)	66(26.4%)	98(39.2%)	0.003
Sulfonylurea, n (%)	55(11.0%)	19(7.6%)	36(14.4%)	0.022
DPP-4 inhibitor, n (%)	39(7.8%)	11(4.4%)	28(11.2%)	0.008
Insulin, n (%)	172(34.4%)	35(14.0%)	137(54.8%)	<0.001
Alpha-glucosidase inhibitor, n (%)	194(38.8%)	79(31.6%)	115(46.0%)	0.001
Triazolidinedione, n (%)	7(1.4%)	2(0.8%)	5(2.0%)	0.450
Meglitide	18(3.6%)	6(2.4%)	12(4.8%)	0.230
Oxygen inhalation, n (%)[a]	389(77.8%)	182(72.8%)	207(82.8%)	0.010
Noninvasive ventilation, n (%)[a]	33(6.6%)	11(4.4%)	22(8.8%)	0.072
Invasive ventilation, n (%)[a]	7(1.4%)	0(0.0%)	7(2.8%)	0.015
Renal replacement therapy, n(%)	9(1.8%)	5(2.0%)	4(1.6%)	1.000
Extracorporeal membrane oxygenation, n (%)[a]	2(0.4%)	0(0.0%)	2(0.8%)	0.499

a, Noninvasive ventilation, invasive ventilation, and extracorporeal membrane oxygenation are at mutually exclusive.
b, The P value was calculated by Fisher's exact test or $\chi 2$ test.

Table S9. Sensitivity analyses for primary and secondary outcome in well-controlled BG and poorly-controlled groups

	Sensitivity analyses 1[a]		Sensitivity analyses 2[b]	
	Adjusted		Adjusted	
Satisfied vs Unsatisfied	HR(95%CI)	*P* value[c]	HR(95%CI)	*P* value[c]
All-cause mortality	0.17(0.05,0.61)	0.006	0.16(0.05,0.58)	0.005
Septic shock	-	-	-	-
ARDS	0.43(0.24,0.78)	0.005	0.39(0.22,0.70)	0.001
DIC	-	-	-	-
Acute kidney injury	0.51(0.09,2.78)	0.434	0.52(0.09,2.82)	0.444
Acute heart injury	0.16(0.05,0.56)	0.004	0.15(0.04,0.53)	0.003

a, In the sensitivity analyses, propensity score matched model, age, gender, hospital sites, indicators of the severity of COVID-19, comorbidities (hypertension, coronary heart disease, cerebrovascular disease, and chronic renal diseases), and incidence of increased creatinine were matched.

b, In the sensitivity analyses, propensity score matched model, age, gender, hospital sites, indicators of the severity of COVID-19, comorbidities (hypertension, coronary heart disease, cerebrovascular disease, COPD, chronic liver diseases and chronic renal diseases), and incidence of increased creatinine were matched.

c, The *P* values were calculated based on Cox proportional hazard model.