

Online-only supplemental material.

Table S1. Percent of patients with diabetic ketoacidosis by age at hospital admission among patients with diabetes hospitalized with COVID-19 in the United States, March–November, 2020.

Age (yrs)	T1DM			T2DM		
	DKA	% (95% CI)	Total	DKA	%	Total
0–17	53	74.6 (63.1–83.5)	71	14	24.6 (14.9–37.6)	57
18–39	383	54.9 (51.2–58.6)	697	482	9.7 (8.9–10.5)	4,994
40–49	96	33.1 (27.9–38.7)	290	596	6.1 (5.6–6.6)	9,832
50–64	120	27.6 (23.6–32.0)	435	1301	3.8 (3.6–4.0)	33,918
65–74	22	11.0 (7.3–16.2)	200	682	2.3 (2.1–2.5)	29,973
≥75	16	10.3 (6.4–16.1)	156	430	1.3 (1.2–1.5)	32,069
Total	690	37.3 (35.1–39.5)	1,849	3505	3.2 (3.1–3.3)	110,843

Abbreviations: CI = confidence interval; DKA = diabetic ketoacidosis; T1DM = type 1 diabetes mellitus; T2DM = type 2 diabetes mellitus

Table S2. Adjusted absolute risk and odds ratios for intensive care unit/mechanical ventilation among 269,674 patients hospitalized with COVID-19 in the United States, March–November, 2020.

	Risk Ref (95% CI)	Risk T1DM (95% CI)	OR (95% CI)	p-value
ICU/MV				
T1DM (Ref. no DM)				
Model Set 0	0.44 (0.41–0.46)	0.60 (0.57–0.63)	1.96 (1.77–2.17)	<0.001
Model Set 1*	0.44 (0.41–0.46)	0.65 (0.62–0.68)	2.48 (2.23–2.76)	<0.001
Model Set 2	0.44 (0.41–0.46)	0.65 (0.63–0.68)	2.58 (2.32–2.87)	<0.001
Model Set 2+CKD	0.44 (0.42–0.46)	0.64 (0.61–0.66)	2.40 (2.16–2.67)	<0.001
Model Set 3a	0.44 (0.42–0.46)	0.64 (0.61–0.67)	2.42 (2.17–2.70)	<0.001
T1DM (Ref. no T2DM)				
Model Set 0	0.55 (0.53–0.57)	0.60 (0.57–0.63)	1.25 (1.13, 1.38)	<0.001
Model Set 1	0.55 (0.52–0.57)	0.64 (0.61–0.67)	1.47 (1.32–1.64)	<0.001
Model Set 2	0.55 (0.53–0.57)	0.65 (0.63–0.68)	1.58 (1.43–1.76)	<0.001
Model Set 2 + CKD	0.55 (0.53–0.57)	0.64 (0.62–0.67)	1.52 (1.37–1.69)	<0.001
Model Set 2 + DKA	0.55 (0.53–0.57)	0.56 (0.53–0.59)	1.05 (0.95–1.16)	0.369
Model Set 3b	0.55 (0.53–0.57)	0.57 (0.54–0.60)	1.09 (0.98–1.21)	0.098
Death				
T1DM (Ref. no DM)				
Model Set 0	0.12 (0.12–0.13)	0.10 (0.08–0.11)	0.76 (0.66–0.89)	<0.001
Model Set 1*	0.12 (0.12–0.13)	0.17 (0.15–0.19)	1.54 (1.31–1.81)	<0.001
Model Set 2	0.12 (0.12–0.12)	0.17 (0.15–0.19)	1.51 (1.29–1.77)	<0.001
Model Set 2+CKD	0.12 (0.12–0.13)	0.15 (0.13–0.17)	1.31 (1.12–1.54)	<0.001
Model Set 3a	0.12 (0.12–0.12)	0.15 (0.13–0.17)	1.32 (1.12–1.55)	0.001
T1DM (Ref. no T2DM)				
Model Set 0	0.19 (0.18–0.19)	0.10 (0.08–0.11)	0.47 (0.40–0.54)	<0.001
Model Set 1	0.18 (0.18–0.19)	0.18 (0.16–0.21)	1.00 (0.86–1.17)	0.975
Model Set 2	0.18 (0.18–0.19)	0.18 (0.16–0.20)	0.98 (0.84–1.14)	0.763
Model Set 2+CKD	0.18 (0.18–0.19)	0.17 (0.15–0.19)	0.92 (0.78–1.07)	0.259
Model Set 2+DKA	0.18 (0.18–0.19)	0.16 (0.14–0.18)	0.81 (0.69–0.95)	0.009
Model Set 3b	0.18 (0.18–0.19)	0.16 (0.14–0.18)	0.80 (0.68–0.94)	0.007

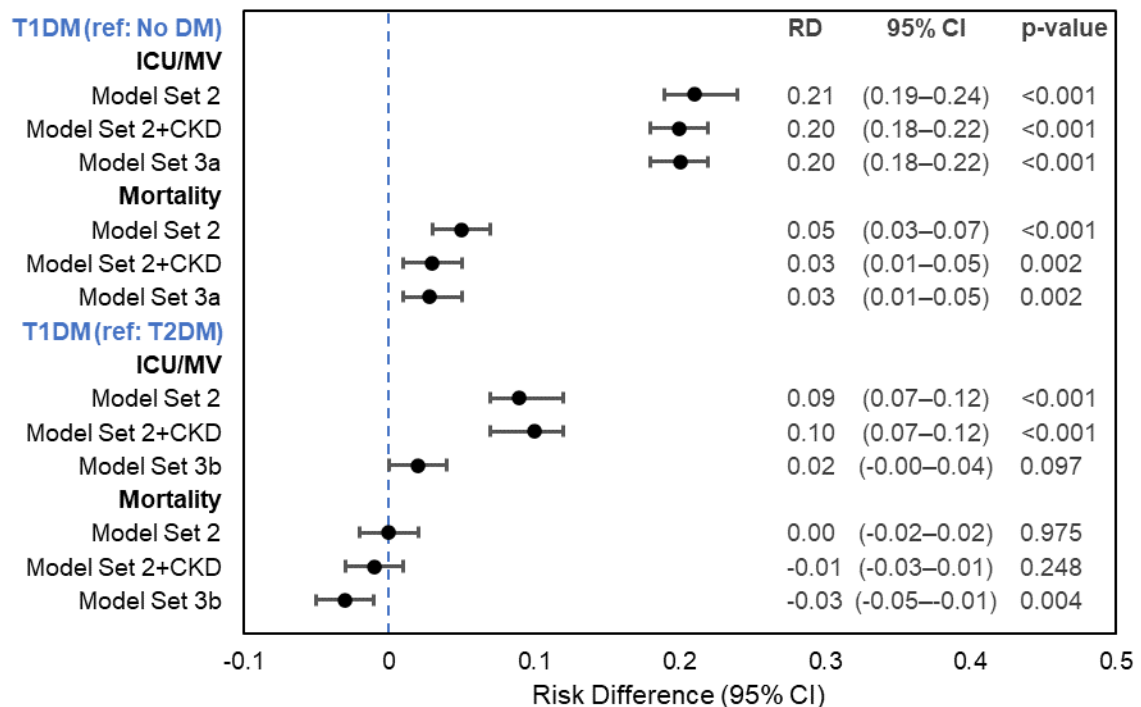
Abbreviations: CI = confidence interval; CKD = chronic kidney disease; COVID-19 = coronavirus disease 2019; DKA = diabetic ketoacidosis; DM = diabetes; ICU/MV= intensive care unit/mechanical ventilation; OR = odds ratio; Ref = reference; T1DM = type 1 diabetes mellitus; T2DM = type 2 diabetes mellitus. Each estimate represents results from a separate model, clustered on hospital ID and controlling for age, sex, race/ethnicity (Model Set 1); and additionally for payer type, Census region, urbanicity of hospitals, and admission month (Model Set 2); underlying medical conditions (hypertension, disorders of lipid metabolism, obesity, CKD, coronary atherosclerosis and other heart disease, COPD, neoplasms) (Model Set 3a); and DKA (Model Set 3b).

Table S3. Adjusted absolute risk differences and risk ratios for intensive care unit/mechanical ventilation among 269,674 patients hospitalized with COVID-19 in the United States, March–November, 2020 using the full modified Klompas algorithm.

	RD	p-value	RR	p-value
ICU/MV				
T1DM (Ref. no DM)				
Model Set 1	0.23 (0.21,0.26)	<0.001	1.53 (1.46,1.60)	<0.001
T1DM (Ref. no T2DM)				
Model Set 1	0.11 (0.09,0.14)	<0.001	1.20 (1.16,1.25)	<0.001
Model Set 2 + DKA	0.02 (-0.00,0.05)	0.069	1.04 (1.00,1.09)	0.064
Death				
T1DM (Ref. no DM)				
Model Set 1	0.05 (0.03,0.07)	<0.001	1.42 (1.25,1.61)	<0.001
T1DM (Ref. no T2DM)				
Model Set 1	0.00 (-0.02,0.03)	0.914	1.01 (0.89,1.15)	0.914
Model Set 2+DKA	-0.03 (-0.05,-0.01)	0.005	1.23 (1.04,1.45)	0.013

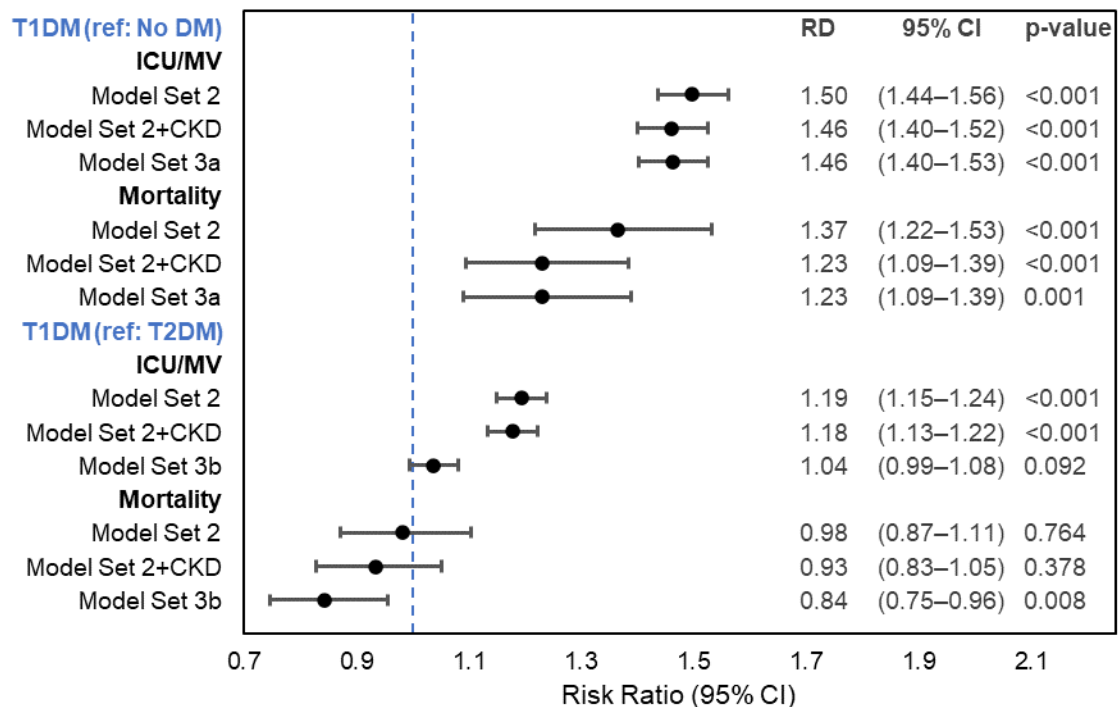
Abbreviations: CI = confidence interval; COVID-19 = coronavirus disease 2019; DKA = diabetic ketoacidosis; DM = diabetes; ICU/MV= intensive care unit/mechanical ventilation; RD = risk difference; Ref = reference; RR = risk ratio; T1DM = type 1 diabetes mellitus; T2DM = type 2 diabetes mellitus. Each estimate represents results from a separate model, clustered on hospital ID and controlling for age, sex, race/ethnicity (Model Set 1); and additionally for payer type, Census region, urbanicity of hospitals, admission month, and DKA (Model Set 2+DKA).

Figure S1. Adjusted absolute risk differences for intensive care unit/mechanical ventilation and mortality among 269,674 patients hospitalized with COVID-19 in the United States, discharged March–November 2020.



Abbreviations: CKD = chronic kidney disease; COVID-19 = coronavirus disease 2019; DKA = diabetic ketoacidosis; DM = diabetes mellitus; ICU/MV= intensive care unit/mechanical ventilation; RD = risk difference; Ref = reference; T1DM = type 1 diabetes mellitus; T2DM = type 2 diabetes mellitus. Each estimate represents results from a separate model, clustered on hospital ID and controlling for age, sex, race/ethnicity, payer type, Census region, urbanicity of hospitals, and admission month (Model Set 2); underlying medical conditions (hypertension, disorders of lipid metabolism, obesity, CKD, coronary atherosclerosis and other heart disease, COPD, neoplasms) (Model Set 3a); and DKA (Model Set 3b).

Figure S2. Adjusted absolute risk ratios for intensive care unit/mechanical ventilation and mortality among 269,674 patients hospitalized with COVID-19 in the United States, discharged March–November 2020.



Abbreviations: COVID-19 = coronavirus disease 2019; DM = diabetes mellitus; ICU/MV= intensive care unit/mechanical ventilation; Ref = reference; RR = risk ratio; T1DM = type 1 diabetes mellitus; T2DM = type 2 diabetes mellitus. Each estimate represents results from a separate model, clustered on hospital ID and controlling for age, sex, race/ethnicity, payer type, Census region, urbanicity of hospitals, and admission month (Model Set 2); underlying medical conditions (hypertension, disorders of lipid metabolism, obesity, CKD, coronary atherosclerosis and other heart disease, COPD, neoplasms) (Model Set 3a); and DKA (Model Set 3b).