

1 **Diabetes and Mortality Among 1.6 Million Adult Patients Screened for**
2 **SARS-CoV-2 in Mexico**

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24 **ABSTRACT**

25 **Background:** Whether diabetes is associated with COVID-19-related mortality remains unclear.

26 **Methods:** In this retrospective case-series study we examined the risk of death associated with
27 self-reported diabetes in symptomatic adult patients with laboratory-confirmed COVID-19 who
28 were identified through the System of Epidemiological Surveillance of Viral Respiratory Disease
29 in Mexico from January 1 through November 4, 2020. Survival time was right-censored at 28
30 days of follow-up.

31 **Results:** Among 757,210 patients with COVID-19 included in the study, 120,476 (16%) had
32 diabetes and 80,616 died. Patients with diabetes had a 49% higher relative risk of death than
33 those without diabetes (Cox proportional-hazard ratio; 1.49 (95% confidence interval [CI], 1.47-
34 1.52), adjusting for age, sex, smoking habit, obesity, hypertension, immunodeficiency, and
35 cardiovascular, pulmonary, and chronic renal disease. The relative risk of death associated with
36 diabetes decreased with age ($P=0.004$). The hazard ratios were 1.66 (1.58-1.74) in outpatients
37 and 1.14 (1.12-1.16) in hospitalized patients. The 28-day survival for inpatients with and without
38 diabetes was, respectively, 73.5% and 85.2% for patients 20-39 years of age; 66.6% and 75.9%
39 for patients 40-49 years of age; 59.4% and 66.5% for patients 50-59 years of age; 50.1% and
40 54.6% for patients 60-69 years of age; 42.7% and 44.6% for patients 70-79 years of age; and
41 38.4% and 39.0% for patients 80 years of age or older. In patients without COVID-19 (878,840),
42 the adjusted hazard ratio for mortality was 1.78 (1.73-1.84).

43 **Conclusion:** In symptomatic adult patients with COVID-19 in Mexico, diabetes was associated
44 with higher mortality. This association decreased with age.

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46 INTRODUCTION

47 As of November 15, 2020, over 53.7 million people worldwide have been infected with SARS-
48 CoV-2, the virus that causes COVID-19. Nearly 1.3 million people have died due to COVID-19.¹
49 Patients with COVID-19 who have diabetes are at increased risk of hospitalization,^{2,3} admission
50 to intensive care unit,⁴ and intubation,^{3,5} compared with those without diabetes. Although
51 diabetes is common in fatal cases of COVID-19,⁶⁻¹⁰ whether diabetes is associated with COVID-
52 19-related mortality remains unclear. Some studies have shown an association between diabetes
53 and mortality in subjects with COVID-19,^{4,6,7,9-14} but others have not confirmed this
54 relationship.^{2,3,8,15-18} These differences could be related to under-adjustment,^{9,12} the relatively
55 small number of subjects to estimate mortality risk,^{4,8,9,14,16,18} the use of composite outcomes,^{2,12}
56 the analysis of severe COVID-19 cases or critically ill patients only,^{9,10,15,17} the age of study
57 participants and lack of stratification by age,^{3,6,7,10-12} and the inclusion of unconfirmed cases.^{6,13}
58 Given the association of diabetes with severe COVID-19, specific guidelines for the treatment of
59 patients with COVID-19 and diabetes have been proposed.^{19,20} However, the association of
60 diabetes with mortality across age groups in outpatients and hospitalized patients has not been
61 well studied. Thus, clarification on this aspect may have clinical implications for risk
62 stratification. The aim of the present study was to examine the risk of death associated with
63 diabetes in symptomatic adult patients with COVID-19 confirmed by laboratory.

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65 **METHODS**

66 **Study design and population**

67 We conducted a retrospective case-series study using data from a large convenience sample of
68 symptomatic patients with viral respiratory disease who were screened for SARS-CoV-2 using
69 real-time reverse-transcriptase–polymerase-chain-reaction assay on samples obtained through
70 oropharyngeal or nasopharyngeal swabs.²¹ Patients were identified through the System of
71 Epidemiological Surveillance of Viral Respiratory Disease in Mexico from January 1 through
72 November 4, 2020. We included patients who were admitted from January 1 through October 7,
73 2020 in such a way that each patient had a 28-day follow-up unless the event (death) occurred
74 first. We excluded patients younger than 20 years of age or coded as pregnant, and those who did
75 not have test results for SARS-CoV-2 (Figure S1 in the Supplementary Appendix).

76 Since this study involved the analysis of publicly available de-identified data only, institutional-
77 review-board review was not required, as outlined in the Federal Policy for the Protection of
78 Human Subjects (detailed in 45 CFR part 46).²²

79 **Study setting**

80 Mexico has an estimated population of 127.6 million.²³ Adults 65 years of age or older represent
81 6.2% of the population.²⁴ In Mexico, the System of Epidemiological Surveillance of Viral
82 Respiratory Disease keeps track of suspected cases of viral respiratory disease, including
83 COVID-19 cases, through reports from 475 Viral Respiratory Disease Monitoring Units
84 (USMER) and all healthcare centers (non-USMER) located nationwide. The USMER reports all
85 suspected cases with severe respiratory symptoms but only 10% of all suspected cases with mild
86 symptoms. The non-USMER reports all cases of severe acute respiratory infection.²¹

87 **Data source**

88 Data at the individual level were obtained from the publicly available COVID-19 online dataset
89 updated daily by the Secretary of Health of Mexico

90 ([https://www.gob.mx/salud/documentos/datos-abiertos-bases-historicas-direccion-general-de-](https://www.gob.mx/salud/documentos/datos-abiertos-bases-historicas-direccion-general-de-epidemiologia)
91 [epidemiologia](https://www.gob.mx/salud/documentos/datos-abiertos-bases-historicas-direccion-general-de-epidemiologia)). All data on demographic and pre-existing comorbidities were obtained through a
92 standardized questionnaire.²¹

93 **Definitions**

94 According to the guidelines from the Secretary of Health of Mexico, a suspected case of viral
95 respiratory disease was defined as a subject who presented, in the last 10 days, cough, dyspnea,
96 fever, or headache, and at least one of the following signs or symptoms: myalgias, arthralgias,
97 odynophagia, chills, chest pain, rhinorrhea, polypnea, anosmia, dysgeusia, or conjunctivitis.²¹

98 These guidelines, released on August 2020, are an update of the guidelines in which a suspected
99 case of viral respiratory disease was defined as a subject who presented, in the last 7 days, cough,
100 fever, or headache, accompanied with at least one of the following signs or symptoms: dyspnea,
101 myalgias, arthralgias, odynophagia/sore throat, rhinorrhea, conjunctivitis, or chest pain.²⁵ In the
102 present study, a COVID-19 case was defined as a patient with suspected viral respiratory disease
103 who had SARS-CoV-2 infection confirmed by reverse-transcriptase–polymerase-chain-reaction
104 test. Patients who tested negative for SARS-CoV-2 were referred to as non-COVID-19 cases,
105 regardless of epidemiological association with COVID-19.

106 **Statistical analyses**

107 Incidence rates of death were expressed as cases per 100,000 person-days. We used Cox
108 proportional-hazards regression to calculate the hazard ratio and 95% confidence intervals (CIs)

109 for mortality. There was no violation of proportional-hazards assumption. Survival time was
110 right-censored at 28 days of follow-up from the admission date (date of the patient's visit).
111 Multivariate analyses included adjustment for age, sex, smoking habit, obesity, hypertension,
112 cardiovascular disease, chronic obstructive pulmonary disease, asthma, chronic kidney disease,
113 and immunodeficiency. These variables were chosen based on our judgment as they have been
114 associated with the severity of COVID-19 or mortality.^{13,26,27} Cox regression models were
115 adjusted for age using a five-knot restricted cubic spline fitting for age.²⁸ Analyses within each
116 age group (20 to 39, 40 to 49, 50 to 59, 60 to 69, 70 to 79, and ≥ 80 years) were adjusted for age
117 as a continuous variable. We tested for interactions between diabetes and age, diabetes and sex,
118 and diabetes and type of patient care (outpatient vs. inpatient). The trends for the hazard ratios
119 across age groups were tested using weighted linear regression. The probability weights were
120 obtained from the inverse of the variance of the risk estimates. Since missing data among
121 predictors included in our regression models represented less than 0.75%, missing data were not
122 imputed. A complete-case analysis was performed. There were no missing data on age, sex, date
123 of hospital admission, date of symptoms onset, or date of death.

124 We conducted three sensitivity analyses to assess the robustness of our findings: 1) full models
125 with further adjustment for pneumonia, admission to intensive care unit, intubation, and time
126 from symptoms onset to admission; 2) multilevel mixed-effect survival regression models to
127 assess the possible effect of geographical differences on our risk estimates;²⁹ and 3) comparison
128 of hazard ratios from analysis restricted to cases admitted before and after August 1 to address
129 the possible influence of changes to the definition of suspected viral respiratory disease.^{21,25} We
130 conducted stratified analysis according to age and sex, in outpatients and inpatients. We used the

131 log-rank test to compare survival curves. All p values were two-sided. All analyses were
132 performed using Stata 14 (StataCorp LP, TX).

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135 **RESULTS**

136 From January 1 through November 4, 2020, 2,445,709 symptomatic patients with viral
137 respiratory disease of all ages were reported. In total, 1,650,432 patients met the study inclusion
138 criteria. We excluded 197 patients who had implausible admission dates relative to their date of
139 death. We also excluded 14,185 patients who had missing data (0.86%) on diabetes, smoking
140 habit, obesity, hypertension, cardiovascular disease, chronic obstructive pulmonary disease,
141 asthma, chronic kidney disease, immunodeficiency, pneumonia, intubation, and admission to
142 intensive care unit (Table S1). Main analysis involved 757,210 adult patients with laboratory-
143 confirmed COVID-19. We also included 878,840 adult patients who tested negative for SARS-
144 CoV-2. In patients with COVID-19, the median age was 44 years (IQR, 33-56); 120,476 (15.9%)
145 had diabetes (Table 1). The proportion of patients with diabetes was 10.4% among outpatients
146 (575,866) and 33.3% among inpatients (181,344).

147 In patients without COVID-19, the median age was 40 years (IQR, 30-51); 88,235 (10.0%) had
148 diabetes (Table S2). The proportion of patients with diabetes was 7.6% among outpatients
149 (791,899) and 32.2% among inpatients (86,941).

150 ***Association of diabetes with mortality.*** As of November 4, 2020, 80,616 deaths occurred among
151 patients with COVID-19 who were followed up for 28 days (19,568,966 person-days of
152 observation); 31,389 (38.9%) had diabetes. During the same period, 20,134 deaths occurred
153 among patients without COVID-19 (24,172,062 person-days of observation); 7,923 (39.4%) had
154 diabetes (Table S3).

155 In patients with COVID-19, the incidence rate of death was 1,153.1 cases per 100,000 person-
156 days in those with diabetes and 292.2 cases per 100,000 person-days in those without diabetes. In

157 outpatients with COVID-19, the incidence rate of death in those with and without diabetes was,
158 respectively, 194.1 and 39.2 cases per 100,000 person-days. In hospitalized patients with
159 COVID-19, the incidence rate of death in those with and without diabetes was, respectively,
160 2,552.8 and 1,735.3 cases per 100,000 person-days. In patients without COVID-19, the incidence
161 rate of death was 344.9 cases per 100,000 person-days in those with diabetes and 55.8 cases per
162 100,000 person-days in those without diabetes.

163 Among COVID-19 cases, our adjusted Cox proportional-hazards regression analysis showed that
164 patients with diabetes had a 49% higher relative risk of death than those without diabetes (hazard
165 ratio: 1.49 (95% confidence interval [CI], 1.47-1.52) (Table 2). The association of diabetes with
166 mortality was mediated by age, sex, and the type of patient care (outpatient vs. inpatient)
167 (P<0.001 for all interactions). Men were at higher risk of death than women (hazard ratio: 1.65;
168 95% CI, 1.63-1.68). Compared with subjects 50 to 59 years of age, those 70 to 79 years of age
169 and those 80 years of age or older had 3-fold and 4-fold higher risk of death, respectively (Table
170 S4). A slightly stronger association between diabetes and mortality was noted in women (hazard
171 ratio: 1.64; 95% CI, 1.59-1.68) than in men (hazard ratio: 1.41; 95% CI, 1.38-1.44). We observed
172 a stronger association between diabetes and mortality in outpatients (hazard ratio: 1.66; 95% CI,
173 1.58-1.74) compared with that in hospitalized patients (hazard ratio: 1.14; 95% CI, 1.12-1.16)
174 (Table 2). Diabetes was associated with lower survival probability in outpatients and inpatients,
175 both in women and men (Figure 1).

176 In non-COVID-19 cases, the adjusted hazard ratio for mortality was 1.78 (95% CI, 1.73-1.84).
177 This association was also stronger in outpatients (hazard ratio: 1.91; 95% CI, 1.68-2.18)
178 compared with that in hospitalized patients (hazard ratio: 1.11; 95% CI, 1.07-1.14). The 28-day

179 survival for inpatients with diabetes who had COVID-19 was lower (53.4%) compared with that
180 for those without COVID-19 (73.4%) (Figure 2).

181 ***Sensitivity and subgroup analyses.*** In COVID-19 cases, the association of diabetes with
182 mortality persisted after further adjustment for pneumonia, admission to intensive care unit,
183 intubation, and time from symptoms onset to admission (Table S5). Accounting for geographical
184 location did not substantially affect our estimates of the risk of death for outpatients (hazard
185 ratio: 1.62, 95% CI, 1.54-1.70) or inpatients (hazard ratio: 1.13, 95% CI, 1.12-1.15) with
186 COVID-19. The updated guidelines to define suspected cases of viral respiratory disease did not
187 have a substantial effect on the hazard ratios estimates for outpatients (before: 1.66, 95% CI,
188 1.57-1.74; after: 1.63, 95% CI, 1.42-1.87) or inpatients (before: 1.14, 95% CI, 1.12-1.16; after:
189 1.15, 95% CI, 1.10-1.19).

190 In stratified analysis among COVID-19 cases according to sex and age, diabetes was associated
191 with higher mortality in all age groups, among women and men. We observed that the relative
192 risk of death associated with diabetes decreased with age (Table 2) (trend test: $P=0.004$). These
193 trends were observed in women ($P=0.006$) and men ($P=0.007$) (Table S6). Although the relative
194 risk of death decreased with age, the incidence rates of death were higher in older subjects (Table
195 S7). The relative risk of death associated with diabetes decreased with age in outpatients (trend
196 test: $P=0.001$) and in hospitalized patients (trend test: $P=0.006$) (Table S8).

197 In hospitalized patients with COVID-19, the probability of survival at 28 days of follow-up for
198 those with diabetes compared with that among those without diabetes decreased as age increased.
199 We did not observe substantial differences in survival between patients 70 years of age or older
200 with diabetes and those without diabetes (Figure 3). The 28-day survival for inpatients with and
201 without diabetes was, respectively, 73.5% and 85.2% for patients 20-39 years of age; 66.6% and

202 75.9% for patients 40-49 years of age; 59.4% and 66.5% for patients 50-59 years of age; 50.1%
203 and 54.6% for patients 60-69 years of age; 42.7% and 44.6% for patients 70-79 years of age; and
204 38.4% and 39.0% for patients 80 years of age or older. In hospitalized patients 60 years of age or
205 older without COVID-19, we did not observe substantial differences in survival between patients
206 with diabetes and those without diabetes (Figure S2).

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221 **DISCUSSION**

222 Our analysis of a large population of symptomatic adult patients with COVID-19 in Mexico
223 (>750,000) shows that those with diabetes have increased risk of death during a follow-up of 28
224 days. The relative risk of death associated with diabetes was stronger in outpatients than in
225 hospitalized patients, and decreased with age. However, the incidence rate of death was much
226 higher in hospitalized patients than in outpatients, and increased with age.

227 Although the 28-day survival for hospitalized patients with diabetes in the youngest group (20 to
228 39 years) was about 12 percentage points lower compared with that for those without diabetes,
229 the survival difference between patients with diabetes and those without diabetes was less than 2
230 percentage points in those 70 years of age or older (Figure 3). Lower hazard ratios for death
231 associated with diabetes have been reported among older patients with COVID-19 in England³⁰.
232 Our study shows a detailed comparison of the association of diabetes with mortality across age
233 groups in a Hispanic-Latino population in Mexico, a country that has one of the highest numbers
234 of deaths in the world due to COVID-19.³¹

235 Previous studies have shown diabetes is very common in patients with COVID-19.^{26,32} In our
236 study, the proportion of patients with diabetes among hospitalized patients with COVID-19 was
237 similarly high in those with and without COVID-19 (~30%). Among deceased patients, the
238 proportion of patients with diabetes was also similar in both groups (~40%). Although some
239 studies have detected an association between diabetes and mortality in subjects with COVID-
240 19,^{4,6,7,9-13} others have not found a significant association.^{2,3,8,15-18} In our study, diabetes was
241 associated with mortality in patients with COVID-19. However, this association was not stronger
242 than that observed in patients without COVID-19. Our findings also raise concern that the
243 association of diabetes with COVID-19-related mortality varies with age (Table 2). We observed

244 a modest association in patients 70 to 79 years of age. No association was observed in patients 80
245 years of age or older. The latter age group represented 11% of all COVID-19-related deaths in
246 our study (Table S3). Data from preliminary reports^{13,26,33} suggest that 30-50% of the total
247 number of COVID-19-related deaths occur in patients 80 years of age or older. Thus, our
248 findings may help guide decisions when assessing the risk of death among patients with COVID-
249 19 who have diabetes.

250 The present study has many strengths. The high number of fatal cases among patients with
251 COVID-19 (>80,000 deaths) and the high number of patients who had diabetes (>120,000) in the
252 population studied enabled us to conduct a stratified analysis according to age groups to obtain
253 precise estimates of the association of diabetes with mortality. The association of diabetes with
254 mortality across age groups in Latino populations has remained unknown. Our stratified analysis
255 by age was performed in a population with a number of deaths that was 15 times higher than the
256 number analyzed in a previous study conducted in a predominantly Caucasian population.³⁰ We
257 also performed stratified analysis among outpatients and inpatients. We observed a substantial
258 difference in the magnitude of the association of diabetes with mortality in outpatients (66%
259 higher risk) and inpatients (14% higher risk) with COVID-19, suggesting this association is
260 weaker in patients with severe COVID-19.

261 Limitations of this study include self-reported diabetes, unknown type of diabetes, and unknown
262 diabetes status. The proportion of patients with diabetes in the overall population (with and
263 without COVID-19) was 12.8%, slightly lower than the adult prevalence of diabetes in Mexico
264 (15.2%).³⁴ Our regression models were not adjusted for ethnicity or clinical and laboratory
265 variables since data were not available. Proper blood glucose control has been associated with
266 lower COVID-19-related mortality.³⁵ Another limitation of our study is that we cannot exclude

267 the possibility that the number of deaths in patients who had COVID-19 could be underreported.
268 Finally, since our analysis was restricted to patients who presented symptoms for suspected viral
269 respiratory disease and only 10% of patients with mild symptoms of viral respiratory disease
270 were reported to the surveillance system, our findings may not be generalizable to populations
271 with asymptomatic or mild COVID-19.

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286 **CONCLUSION**

287 In symptomatic adult patients with COVID-19 in Mexico, diabetes was associated with higher
288 mortality. The relative risk of death associated with diabetes decreased with age.

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295 on suspected cases of viral respiratory disease in Mexico.

296

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322 **AUTHORSHIP CONFIRMATION STATEMENT**

323 OOW: study design, data collection, statistical analyses, data interpretation, final draft writing.

324 JPCB: contributed with study design and data interpretation. OOW and JPCB have reviewed and

325 approved the manuscript prior to submission.

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341 **AUTHOR DISCLOSURE STATEMENTS**

342 Authors have nothing to disclose.

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Table 1. Characteristics of study patients with COVID-19.

Characteristic	All (n=757,210)	With diabetes (n=120,476)	Without diabetes (n=636,734)
Median age (IQR), years	44 (33-56)	58 (49-67)	42 (32-53)
Age distribution, n (%)			
20-39 years	296,881 (39.2)	9,586 (8.0)	287,295 (45.1)
40-49 years	169,645 (22.4)	22,103 (18.4)	147,542 (23.2)
50-59 years	138,707 (18.3)	34,444 (28.6)	104,263 (16.4)
60-69 years	86,446 (11.4)	30,884 (25.6)	55,562 (8.7)
70-79 years	45,352 (6.0)	17,243 (14.3)	28,109 (4.4)
≥80 years	20,179 (2.7)	6,216 (5.2)	13,963 (2.2)
Male sex, n (%)	394,832 (52.1)	63,431 (52.7)	331,401 (52.1)
Smoking habit, n (%)	57,451 (7.6)	9,433 (7.8)	48,018 (7.5)
Pneumonia, n (%)	140,819 (18.6)	45,895 (38.1)	94,924 (14.9)
<i>Pre-existing comorbidities, n (%)</i>			

Diabetes	120,476 (15.9)	--	--
Obesity	139,115 (18.4)	32,808 (27.2)	106,307 (16.7)
Hypertension	151,731 (20.0)	65,353 (54.3)	86,378 (13.6)
Cardiovascular disease	15,087 (2.0)	6,252 (5.2)	8,835 (1.4)
Chronic kidney disease	14,657 (1.9)	8,182 (6.8)	6,475 (1.0)
Chronic obstructive pulmonary disease	11,275 (1.5)	4,520 (3.8)	6,755 (1.1)
Asthma	19,260 (2.5)	3,251 (2.7)	16,009 (2.5)
Immunodeficiency	7,947 (1.1)	2,717 (2.3)	5,230 (0.8)
Any comorbidity including diabetes	316,917 (41.9)	--	--
Any comorbidity excluding diabetes	279,468 (36.9)	83,027 (68.9)	196,441 (30.9)
<i>Outcomes, n (%)</i>			
Outpatient	575,866 (76.1)	60,007 (49.8)	515,859 (81.0)
Hospitalized	181,344 (24.0)	60,469 (50.2)	120,875 (19.0)
Admitted to intensive care unit	15,501 (2.1)	5,409 (4.5)	10,092 (1.6)
Intubated	31,921 (4.2)	11,474 (9.5)	20,447 (3.2)
Died	80,616 (10.7)	31,389	49,227 (7.7)

		(26.1)	
<i>Time variables</i>			
Person-days of follow-up	19,568,966	2,722,253	16,846,713
Median number of days from symptoms onset to admission (IQR)	4 (2-6)	4 (2-7)	4 (2-6)
Median number of days from admission to death (IQR), days	6 (3-12)	6 (2-11)	7 (3-13)
Median number of days from symptoms onset to death (IQR), days	12 (7-18)	11 (7-17)	12 (7-18)

Table 2. Association of diabetes with mortality among subjects with COVID-19. *

Subgroup	Number of subjects	Hazard ratio (95% CI)	
		Unadjusted	Adjusted†
All	757,210	3.74 (3.69-3.80)	1.49 (1.47-1.52)
Women	362,378	4.73 (4.62-4.84)	1.64 (1.59-1.68)
Men	394,832	3.26 (3.20-3.32)	1.41 (1.38-1.44)
Age group‡			
20-39	296,881	6.92 (6.40-7.48)	3.12 (2.86-3.40)
40-49	169,645	3.30 (3.16-3.45)	2.33 (2.22-2.44)
50-59	138,707	2.16 (2.10-2.23)	1.74 (1.68-1.79)
60-69	86,446	1.57 (1.53-1.61)	1.41 (1.37-1.45)
70-79	45,352	1.26 (1.23-1.30)	1.20 (1.17-1.24)
≥80	20,179	1.15 (1.10-1.20)	1.11 (1.06-1.16)
Outpatients			
All	575,866	4.90 (4.69-5.12)	1.66 (1.58-1.74)
Women	291,969	6.31 (5.87-6.78)	1.86 (1.72-2.01)
Men	283,897	4.30 (4.06-4.54)	1.55 (1.46-1.64)
Age group‡			
20-39	273,871	6.08 (4.79-7.70)	2.65 (2.04-3.44)
40-49	138,404	3.44 (3.02-3.92)	2.41 (2.10-2.78)
50-59	95,355	2.49 (2.28-2.72)	1.98 (1.80-2.18)
60-69	44,181	1.86 (1.71-2.02)	1.59 (1.45-1.73)
70-79	17,268	1.45 (1.32-1.60)	1.33 (1.20-1.47)
≥80	6,787	1.22 (1.07-1.40)	1.17 (1.01-1.35)

Inpatients			
All	181,344	1.42 (1.40-1.44)	1.14 (1.12-1.16)
Women	70,409	1.51 (1.47-1.55)	1.17 (1.14-1.21)
Men	110,935	1.39 (1.36-1.42)	1.12 (1.09-1.14)
Age group†			
20-39	23,010	1.94 (1.79-2.11)	1.52 (1.40-1.66)
40-49	31,241	1.49 (1.43-1.56)	1.30 (1.24-1.36)
50-59	43,352	1.29 (1.25-1.33)	1.18 (1.14-1.22)
60-69	42,265	1.17 (1.14-1.20)	1.13 (1.10-1.16)
70-79	28,084	1.07 (1.04-1.11)	1.06 (1.02-1.09)
≥80	13,392	1.04 (0.99-1.09)	1.03 (0.98-1.08)

* Hazard ratios with 95% confidence intervals (CIs) were calculated using the Cox proportional-hazards regression.

† Adjusted for age, sex, smoking habit, obesity, hypertension, cardiovascular disease, chronic obstructive pulmonary disease, asthma, chronic kidney disease, and immunodeficiency. A five-knot restricted cubic spline fitting was used for age.

‡ Hazard ratios were adjusted for age, sex, smoking habit, obesity, hypertension, cardiovascular disease, chronic obstructive pulmonary disease, asthma, chronic kidney disease, and immunodeficiency.

FIGURE LEGENDS

Figure 1. Unadjusted Kaplan-Meier survival curves among outpatients and inpatients with COVID-19 according to sex. Panels show the probability of survival according to sex among adult patients with and without diabetes who had COVID-19. Subjects were admitted from January 1 through October 7, 2020, and followed up for 28 days unless the event (death) occurred first. The solid lines represent survival probabilities and the shaded area represent the 95% confidence intervals (CIs).

Figure 2. Comparison of unadjusted Kaplan-Meier survival curves among subjects with and without COVID-19. Panels show the probability of survival among outpatients (A) and inpatients (B) who had diabetes with and without COVID-19. Subjects were admitted from January 1 through October 7, 2020, and followed up for 28 days unless the event (death) occurred first. The solid lines represent survival probabilities and the shaded area represent the 95% confidence intervals (CIs).

Figure 3. Unadjusted Kaplan-Meier survival curves according to age for inpatients with COVID-19. Panels A to F show the probability of survival stratified according to age groups among adult inpatients with and without diabetes who had COVID-19. Subjects were admitted from January 1 through October 7, 2020, and followed up for 28 days unless the event (death) occurred first. The solid lines represent survival probabilities and the shaded area represent the 95% confidence intervals (CIs).

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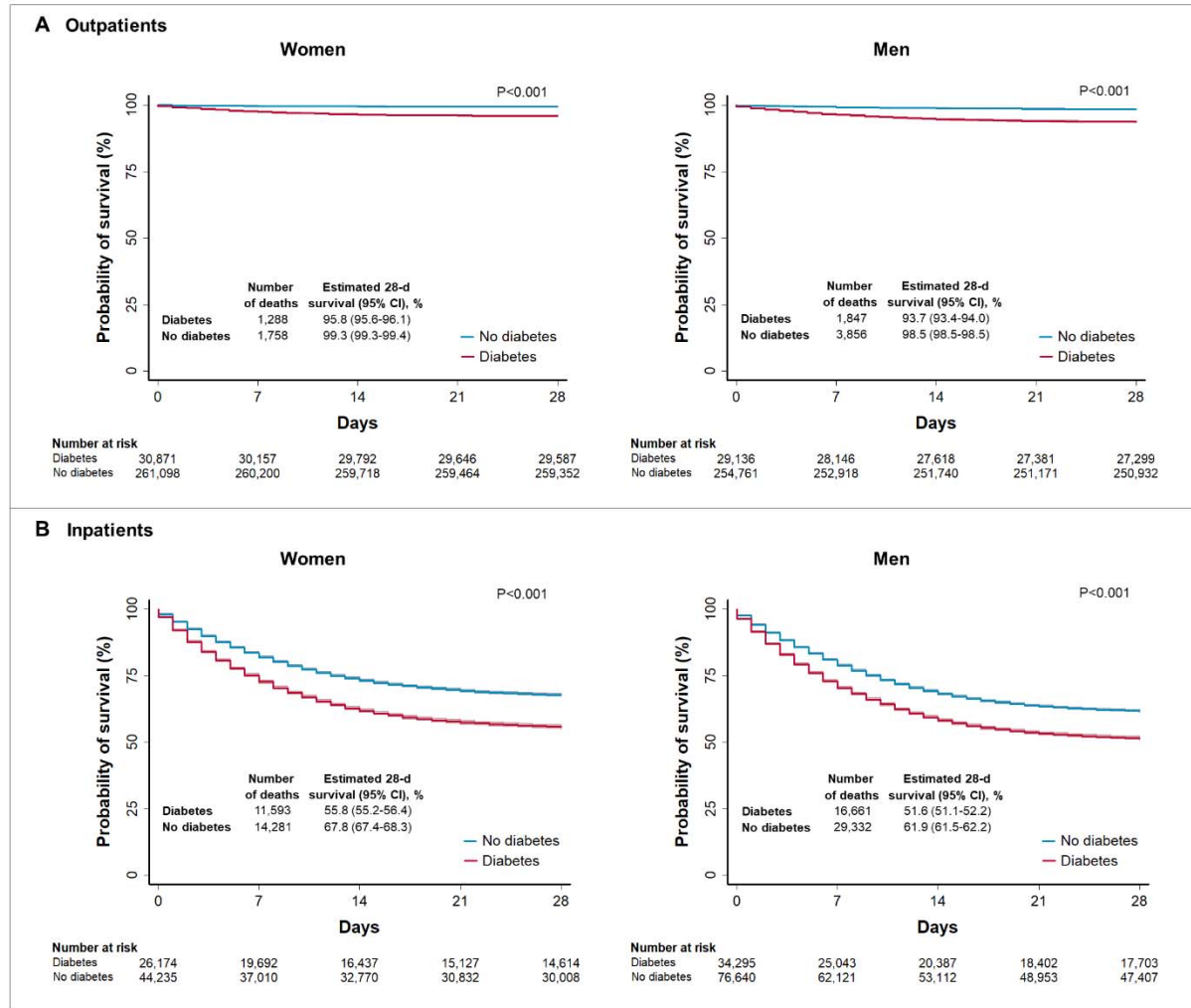


Figure 1

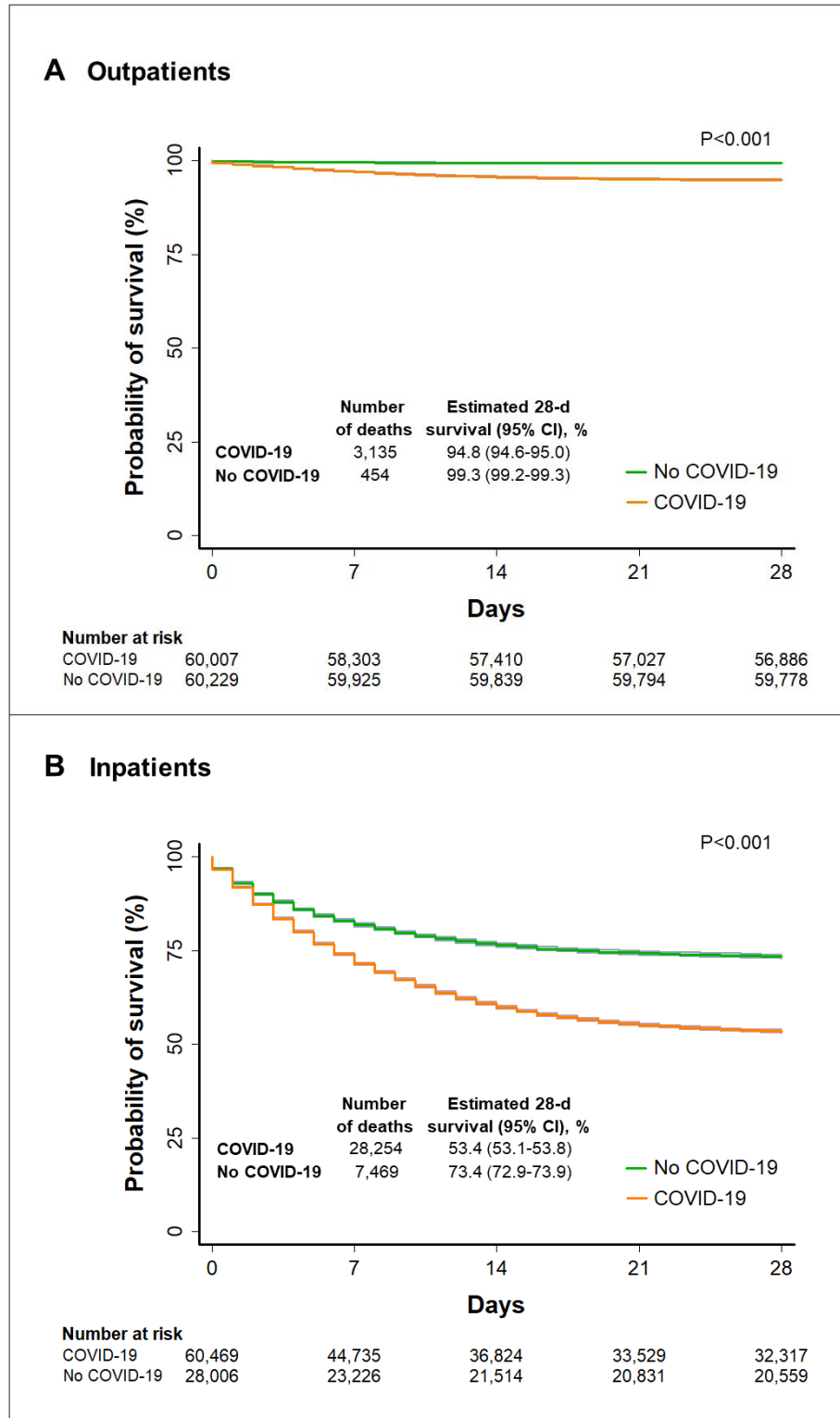


Figure 2

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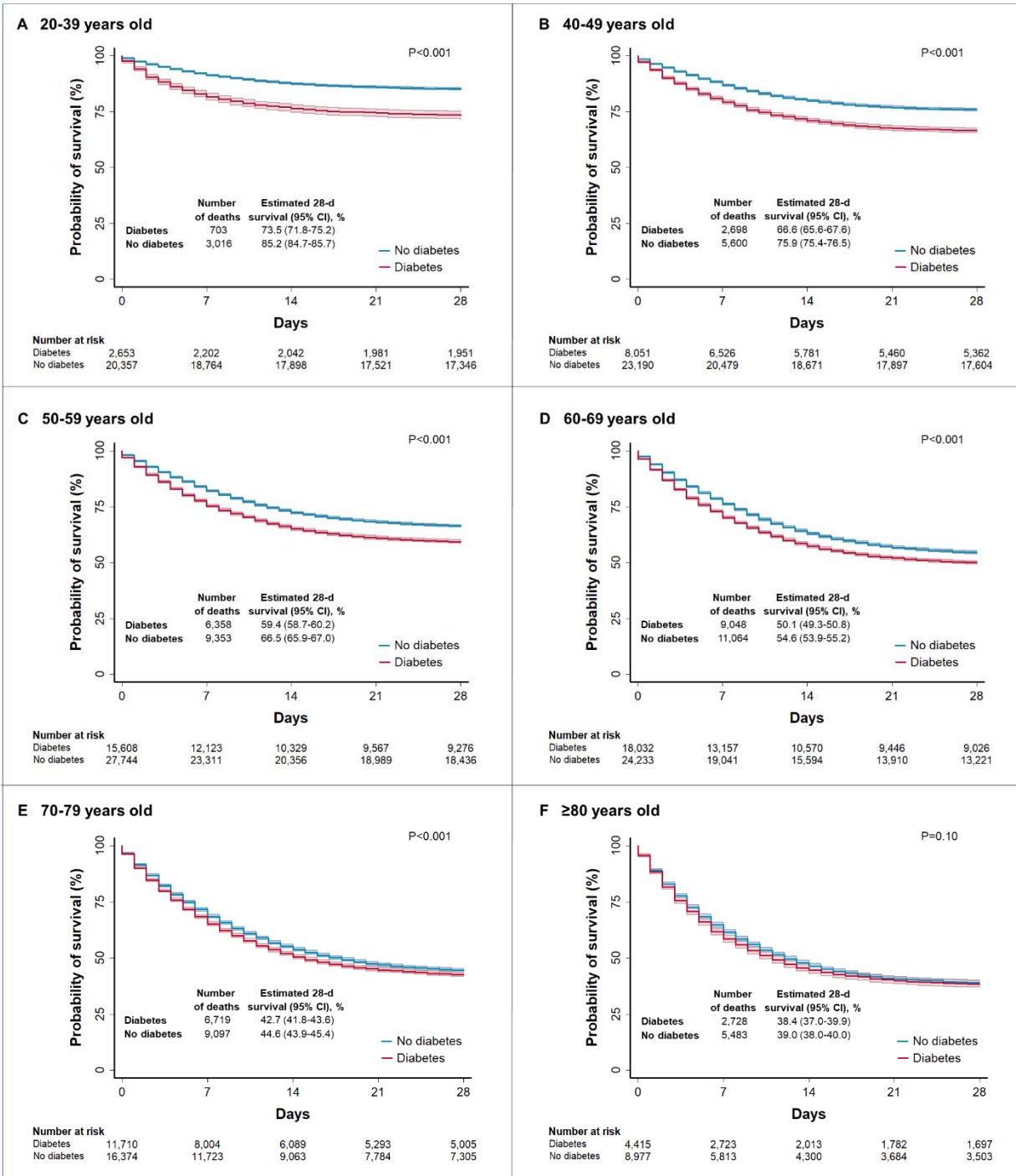


Figure 3