Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Clinical characteristics and risk factors for mortality of patients with COVID-19 in a large data set from Mexico

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ABSTRACT

Purpose: The purpose of this study was to assess clinical characteristics and risk factors for mortality of patients with coronavirus disease 2019 (COVID-19) from Mexico, given that it currently is in active community transmission.
Methods: Multivariate logistic regression model and Kaplan–Meier survival curves were fitted to study odds of death of characteristics and comorbidities in patients with COVID-19 in Mexico.
Results: Age, sex, and the most frequent comorbidities diabetes, obesity, and hypertension were significantly associated to the risk of death by COVID-19 ($P < .0001$). Smoking habit was not identified as a risk factor for death. Less-frequent comorbidities such as chronic obstructive pulmonary disease, chronic kidney disease, and patients with immunosuppressed conditions also showed a significant risk for death ($P < .0001$). Hospitalized patients and those with pneumonia had serious risks for mortality ($P < .0001$), and more attention to specific conditions might be considered during clinical admission.
Conclusions: A more vulnerable positive patient is depicted by a male patient, older than 41 years, which increases their risk with more prevalent comorbidities such as diabetes, hypertension, and obesity. Some implications on outcomes are discussed.

Introduction

In December 2019, a coronavirus disease 2019 (COVID-19) outbreak emerged in Wuhan City, Hubei province in China [1]. COVID-19 is a disease of the respiratory tract characterized by a severe acute respiratory syndrome; the causative agent is a beta-coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [2,3]. Despite a rigorous global containment and quarantine efforts, the incidence of COVID-19 continued to expand and rise, becoming a global pandemic, that currently is in all continents with more than 14 million positive cases and more than 597 thousand deaths [4].

In Mexico, first cases of COVID-19 were registered since January 2020, and official confirmation was published during late February. On April 20, 2020, the Mexican government declared officially the phase 3 of epidemic, and currently, the status is in active community transmission [4]. With a population of almost 130 million inhabitants, from which 52% and 48% are females and males, respectively [5], and a high prevalence of high risk–related comorbidities such as hypertension, obesity, and diabetes [6], Mexico is one of the most affected countries of America, just behind the United States, Brazil, Peru, and Chile [4].

Limited information has been available to describe the characteristics of the affected population and outcomes of the disease so far. Given that the number of infected cases is still increasing, it would be important to perform analysis of the current data to have a better comprehension of the relative importance of some factors associated to the different events in the development of pandemics and the mortality of the symptomatic patients with COVID-19. As the characteristics and risk factors associated with the risk of mortality are unclear, the assessment of available information is fundamental. Hence, the objectives of the present study were to identify characteristics of patients who are current positive cases of COVID-19 in Mexico and assess risk factors for mortality.

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Material and methods

Data source

A database including COVID-19 monitoring cases, since January 1, 2020, was downloaded from the open data source of Epidemiologic Surveillance Source of Respiratory Viral Diseases (Sistema de Vigilancia Epidemiológica de Enfermedades Respiratorias Virales) that include information from 475 monitoring units all along the country from the public and private health sectors. Positive cases were extracted and edited. Data from 331,298 patients diagnosed positively to COVID-19, from the first positive case registered on January 13 to July 17, 2020 (database accessed in July 18, 2020), were analyzed. All positive cases to COVID-19 were diagnosed using real-time PCR and were officialized by the National Network for Epidemiologic Surveillance (Red Nacional de Laboratorios de Vigilancia Epidemiologica) recognized by the Institute of Epidemiological Diagnosis and Reference (Instituto de Diagnóstico y Referencia Epidemiológicos).

The data set included information of age, sex, smoking condition, exposure history, comorbidity traits, and clinical care management. Continuous age variable was described using the median and the interquartile range (IQR). Sex and discrete yes or no variables included survival information, smoking condition, patient hospitalization, COVID-19 contact, hypertension, obesity, cardiopathy, pneumonia, chronic obstructive pulmonary disease, asthma, immunosuppression, chronic kidney disease, and other complications (see Appendix A for clinical definitions). Clinical care management was described by intensive care unit (ICU) access and endotracheal intubation. All discrete variables were described using the number of cases and percentages. Given the small number of observations for multivariate logistic model, some variables such as COVID-19 contact, ICU, and endotracheal intubation were excluded from the statistical analysis.

Statistical analysis

All statistical analyses were performed using SAS University edition (SAS® Institute Inc., Cary, NC). Age and discrete variables were examined to compare differences between survivors and nonsurvivors by Mann–Whitney and χ^2 tests, using PROC FREQ and PROC NPAR1WAY, respectively. A univariate logistic analysis was fitted for each variable using the PROC LOGISTIC.

Probability of mortality of patients diagnosed as positive to COVID-19 was modeled with a multivariate logistic regression that included the effects of age, sex, smoking habits, patient hospitalization, and comorbidity traits. Comorbidity conditions included hypertension, obesity, pneumonia, chronic obstructive pulmonary disease, asthma, immunosuppression, chronic renal disease, and other complications, using the PROC LOGISTIC. For this analysis, age was classified into five groups: 0–20, 21–40, 41–60, 61–80, and older than 80 years. The Akaike Information Criterion was used to define the best multivariate logistic model, and some variables were excluded from the final model (exposure history, ICU access, and endotracheal intubation). Statistical significance was considered when *P*-value was less than .01. A long-rank test analysis was performed, considering age as a longitudinal censored trait, and four Kaplan–Meier survival curves were predicted to describe the survival probabilities, combining the sex effect by pneumonia, obesity, diabetes, and hypertension comorbidities, using the PROC LIFETEST.

Results

This study analyzed 331,298 positive cases of COVID-19 to assess the risk factors associated with mortality. Clinical characteristics of patients who survived and who did not survive are presented in Table 1. All, age median ($P < .001$), and survival versus nonsurvival ($\chi^2_{1,\ 0.01}$, $P < .0001$) frequencies were statistically different. The

Table 1
Baseline clinical characteristics and univariate odds ratios (±95% confidence interval) of patients positive to COVID-19 in Mexico, from 13 January to 17 July 2020

Clinical characteristics	Total $n = 331,298$	Survivor $n = 292,988$	Nonsurvivor $n = 38,310$	Fatality ratio %	Odds ratio
Age median (IQR)	44 (33–56)	42 (32–53)	62 (52–71)		
Age groups					
0–20	12,595 (3.8%)	12,432 (4.2%)	163 (0.4%)	1.3	1.0 (Ref.)
21–40	125,475 (37.9%)	122,847 (41.9%)	2628 (6.9%)	2.1	1.632 (1.391–1.913)
41–60	132,013 (39.8%)	117,167 (40.0%)	14,846 (38.8%)	11.2	9.664 (8.272–11.289)
61–80	53,860 (16.3%)	36,445 (12.4%)	17,415 (45.5%)	32.2	36.444 (31.194–42.579)
>80	7355 (2.2%)	4097 (1.4%)	3258 (8.5%)	44.3	60.650 (51.619–71.260)
Sex					
Female	153,143 (46.2%)	139,851 (47.7%)	13,292 (34.7%)	8.7	1.0 (Ref.)
Male	178,155 (53.8%)	153,137 (52.3%)	25,015 (65.3%)	14.0	1.719 (1.681–1.758)
Smoking habits	24,484 (7.4%)	21,269 (7.3%)	3215 (8.4%)	13.1	1.175 (1.130–1.221)
COVID-19 contact	111,680 (33.7%)	107,523 (36.7%)	4157 (10.9%)	3.7	0.309 (0.298–0.321)
Hospitalized	95,458 (28.8%)	61,368 (20.9%)	34,090 (89.0%)	35.7	30.489 (29.494–31.519)
Pneumonia	72,675 (21.9%)	44,009 (15.0%)	28,666 (74.8%)	39.4	16.816 (16.397–17.245)
Comorbidity					
Hypertension	66,170 (20.0%)	49,761 (17.0%)	16,409 (42.8%)	24.8	3.688 (3.606–3.772)
Obesity	63,459 (19.2%)	53,955 (18.4%)	9504 (24.8%)	15.0	1.470 (1.433–1.507)
Diabetes	53,712 (16.2%)	39,417 (13.5%)	14,295 (37.3%)	26.6	3.855 (3.766–3.946)
Cardiopathy	7351 (2.2%)	5314 (1.8%)	2037 (5.3%)	27.7	3.054 (2.898–3.217)
COPD	5458 (1.6%)	3619 (1.2%)	1839 (4.8%)	33.7	4.047 (3.822–4.285)
Asthma	8983 (2.7%)	8206 (2.8%)	777 (2.0%)	8.6	0.721 (0.670–0.777)
Immunosuppressed	4196 (1.3%)	3135 (1.1%)	1061 (2.8%)	25.3	2.634 (2.463–2.836)
CKD	6895 (2.1%)	4307 (1.5%)	2588 (6.8%)	37.5	4.876 (4.639–5.126)
Other complication	8901 (2.7%)	6944 (2.4%)	1957 (5.1%)	22.0	2.229 (2.118–2.347)
Clinical care					
ICU	7904 (8.2%)	3897 (6.4%)	4007 (11.8%)	50.7	1.967 (1.878–2.060)
ETI	9237 (9.7%)	2685 (4.4%)	6552 (19.2%)	70.9	5.209 (4.969–5.460)

Age group: Percentages are expressed as proportions of column totals as mutually exclusive variables. Percentages in comorbidities are not mutually exclusive. The fatality ratio was estimated by variable cases.
ICU and ETI are expressed as proportions of hospitalized patients.
COPD = chronic obstructive pulmonary disease; CKD = chronic kidney disease; ETI = endotracheal intubation.

fatality ratio defined as the number of deaths in persons who tested positive for SARS-CoV-2 divided by the number of SARS-CoV-2 cases was 11.56%, indicating that approximately 12% of positive cases were nonsurvivors. The median age of positive cases in the present study was 45 years (95% IQR, 34–57) and 62 years (95% IQR, 52–71) in nonsurvivor cases. The median age of nonsurvivors was 17 years greater than the median age of survivors. The age class with the highest percentage of positive cases was adult patients aged between 41 and 60 years (39.8%), and this class together with the age class between 61 and 80 years had the highest percentage (84.3%) of nonsurvivors. Both older age groups had the highest fatality ratio of 32.2% and 44.3%, respectively. Only 7.4% of patients diagnosed as COVID-19 positive had smoking habits, the other 92.6% was recorded with nonsmoking habits. Interestingly, 71% of smokers were males. The fatality ratio among females and males smokers was 15.5% and 7.3%, respectively.

Records revealed that 33.7% of positive cases were previously exposed to contact with other known COVID-19–positive patients. Around 29% of patients diagnosed as positive to COVID-19 were hospitalized. More frequent comorbidities of COVID-19–positive patients were hypertension, obesity, and diabetes, with 20.0%, 19.20%, and 16.2%, respectively (Table 1). Deaths associated with these comorbidities were 42.8%, 24.8%, and 37.3%, respectively. Fatality ratios for these comorbidities were, 24.8%, 15.0%, and 26.6%, respectively. Twenty-three percent of all positive cases exhibited pneumonia, and 74.8% of these were nonsurvivors. Around 8% and 10% of all hospitalized cases needed the access to an ICU and endotracheal intubation, respectively, and dramatically high fatality ratios were observed for these conditions with 50.7% and 70.9%, respectively (Table 1).

Odds ratios (ORs) obtained from the multivariate logistic regression model were estimated for all clinical characteristics of COVID-19–positive patients (Table 2). ORs for age classes showed a gradual higher mortality risk as the patients became older ($P < .0001$). Older categories from 41 to 60, 61 to 80, and older than 80 years had 3.730 (95% confidence interval [CI], 2.996–4.645), 7.753 (95% CI, 6.222–9.662), and 12.598 (95% CI, 10.000–15.871) greater risk for death than patients of the age class of 0–20 years, respectively. Adjusting for other risk factors, male patients showed to have 1.45 time greater risk of death than female patients (95% CI, 1.393–1.502). Smoking habit was not considered significantly associated with the risk of mortality in patients with COVID-19 ($P > .01$). Hospitalized patients showed a greater OR of mortality than nonhospitalized patients ($P < .0001$). Similarly, patients diagnosed with pneumonia had a significant ($P < .0001$) and high risk for mortality than patients who were not diagnosed with pneumonia at the time of record (Table 2). Within comorbidities, all were significantly related to the risk of death for COVID-19 ($P < .0001$), except for cardiopathy and asthma ($P > .01$). Among the major comorbidities, diabetes had the highest odds of death risk, followed by hypertension and obesity, with 1.288 (95% CI, 1.237–1.341), 1.243 (95% CI, 1.194–1.294), and 1.223 (95% CI, 1.173–1.275), respectively. Among the less-frequent comorbidities, higher mortality risk was significantly associated to patients with chronic kidney disease ($P < .0001$). Patients with chronic obstructive pulmonary disease, immunosuppressed conditions, and other complications had similar significant OR for death (Table 2).

Given the relevance of comorbidities and their prevalence among both sexes of the patients, Kaplan–Meier survival curve graphs for hypertension, obesity, pneumonia, and diabetes are presented in Figure 1. In general, higher estimated survival curves agree with the gradual increase in ORs by comorbidity traits assessed (Table 2). Survival probabilities showed a constant decline because approximately the age of 40 years and the higher survival probabilities were observed for female patients without the comorbidity in all cases. Conversely, male patients with comorbidities presented the lowest survival probabilities, even lower when obesity and pneumonia conditions were present. Pneumonia also showed a decrease in survival probabilities in female patients (Fig. 1).

Table 2
Multivariate odds ratios (±95% confidence interval) for clinical traits associated to mortality in patients positive to COVID-19 in Mexico, from January 13 to July 17, 2020

Clinical characteristics	Multivariate odds ratio*	*P*-value
Age		
0–20	1.0	
21–40	1.419 (1.134–1.775)	<.0001
41–60	3.730 (2.996–4.645)	<.0001
61–80	7.753 (6.222–9.662)	<.0001
>80	12.598 (10.000–15.871)	<.0001
Sex		
Female	1.0	
Male	1.447 (1.393–1.502)	<.0001
Smoking		
No	1.0	
Yes	0.931 (0.873–0.992)	.0151
Hospitalized		
No	1.0	
Yes	7.187 (6.815–7.580)	<.0001
Pneumonia		
Without	1.0	
With	3.398 (3.257–3.546)	<.0001
Comorbidity		
Not present	1.0	
Hypertension	1.243 (1.194–1.294)	<.0001
Obesity	1.223 (1.173–1.275)	<.0001
Diabetes	1.288 (1.237–1.341)	<.0001
Cardiopathy	0.976 (0.894–1.064)	.9069
COPD	1.261 (1.150–1.383)	<.0001
Asthma	0.949 (0.832–1.082)	<.0306
Immunosuppressed	1.211 (1.078–1.359)	<.0001
CKD	1.802 (1.657–1.960)	<.0001
Other complication	1.450 (1.328–1.582)	<.0001

COPD = chronic obstructive pulmonary disease; CRD = chronic kidney disease.
* $n = 328{,}922$.

Discussion

In the present study, we analyzed a large data set of registered positive cases of COVID-19 in Mexico from January 13 to July 17, 2020. To our knowledge, this study represents one of the first documented large case studies with confirmed COVID-19 cases in México and represents a full assessment complementing the daily technical communications from the Mexican Government through the Secretariat of Health [7], providing the most relevant novelty on the national situation.

In general, older patients, men, and those with pre-existing comorbidities such as hypertension, obesity, and diabetes were highly prevalent in this assessment, which is a similar pattern to that reported in China [8,9] and New York [10]. However, specific variations were found in this study. The present study confirmed that age is significantly associated with death in patients with COVID-19. Previous studies have indicated that older age is an important variable associated with mortality in different countries [9,11]. Our results indicated that around 92% of nonsurvivor patients were older than 41 years, with an odd ratio for death risk almost 4 times compared with the 20-year age class. The mortality OR increased with age. Older age susceptibility has been linked to age-dependent defects on T-cell and B-cell function and increased production of type 2 cytokines that lead to deficiency in control of viral replication and prolonged proinflammatory responses [9,12].

In regard to sex, our analysis confirmed the higher risk for male than female patients. The prevalence of infection among patient sex

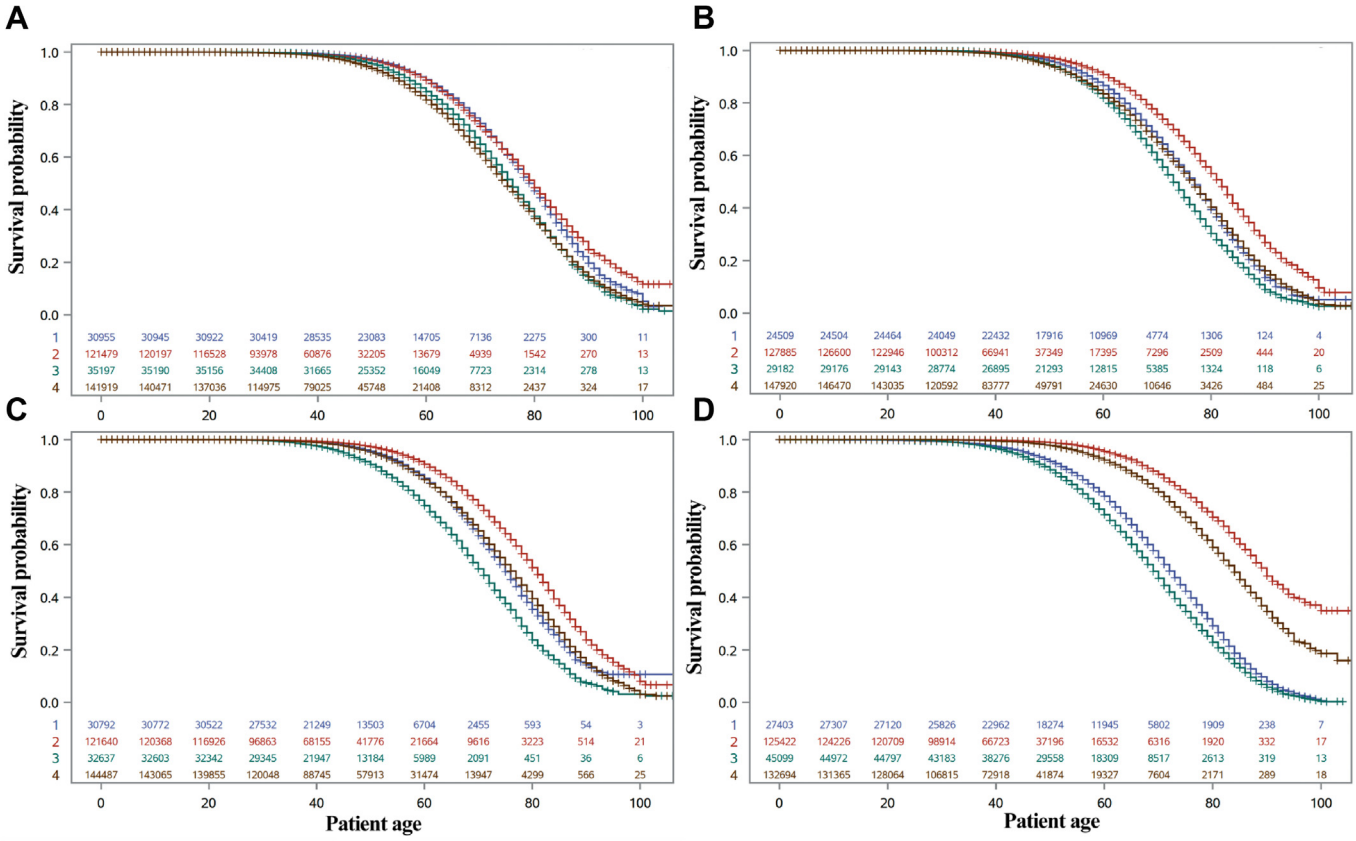

Fig. 1. Kaplan–Meier curves of survival probability of female and male patients positive to COVID-19, with and without (A) hypertension, (B) diabetes, (C) obesity, and (D) pneumonia. Patients at risk: (1) blue, female patients with comorbidity; (2) red, female patients without comorbidity; (3) green, male patients with comorbidity; (4) brown, male patients without comorbidity. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

is different from that prevalence cited by Mattiuzzi and Lippi [13], indicating a higher prevalence of men versus women (71% vs. 29%) in world COVID-19 cases. Data from Mexico show a more equilibrated occurrence of cases, yet a larger frequency of nonsurvivors was males (65.3%). This ratio is similar to that reported by the Novel Coronavirus Pneumonia Emergency Response Epidemiology Team [8] from 44,672 confirmed cases from China.

Our multivariate logistic regression model showed that smoking habit was not significantly associated to the risk of death by COVID-19. Lippi and Henry [14], using a meta-analysis based on Chinese cases, suggested that smoking habits apparently are not significantly associated with enhanced risk of progressing toward severe disease in COVID-19. However, this assessment is based on limited information and perhaps not enough to draw firm conclusions about the association of severity of COVID-19 with smoking status. Berlin et al. [2] remarked some reasons that support smoking as a risk for symptomatic patients with COVID-19. Among these reasons, the higher expression of the specific SARS-CoV-2 angiotensin II conversion enzyme-2 receptor is more available and expressed in smokers than never smokers [15]. Given these notions, as 71% of Mexican patients with smoking habits are males, univariate analysis was performed separately (data not shown), revealing different yet significant odds for risk of mortality from 1.143 (95% CI, 1.094–1.193, $P \leq .0001$, $n = 177{,}422$) to 0.826 (95% CI, 0.754–0.905, $P \leq .0001$, $n = 152{,}730$) for male and female patients, respectively. As observed, important differences on death risk among assessed groups might suggest some association between the smoking habit and frequency of smoking linked by sex of patient, influencing the multivariate analysis outcome.

Hospitalization was an important factor highly related to odds for death in confirmed cases of COVID-19. Eighty-nine percent of nonsurvivor patients were hospitalized. We identified a significant increase in the odds for death of this factor in univariate analysis, indicating perhaps confounding sources of variation. Previous exploratory analysis indicates that inclusion of pneumonia improved the overestimated hospitalization OR in multivariate analysis, indicating a possible interaction among hospitalization and other factors and comorbidities, including pneumonia. No specific information on severity status of the cases is reported during diagnosis, and given the existence of nonhospitalized patients with pneumonia (see Appendix B), this might suggest that the severity of the developed atypical pneumonia in the inpatients could be associated to the severity of the cases and possible death outcome along with their interactions with comorbidity traits. These data also could be conditioned to the lack of diagnosis of a proportion of those nonhospitalized patients who also can develop some degree of less-severe pneumonia. During the course of COVID-19, eventually all patients develop pneumonia; this has been confirmed by the presence of abnormal chest computed tomography findings [13]; some evidence shows that about 50% of COVID-19–positive patients could not reach obvious clinical and radiological remission within 10 days after hospitalization [16] and their pneumonia diagnosis was not well considered. The records examined from our study can be associated to the presence of the condition at the time of diagnosis, but not to severity, so specific information is needed to completely explain the variable. For example, assessments from China show that severity status is related to death outcomes [9] and bilateral pneumonia can be

diagnosed in 75% patients [13], significantly increasing the odds for unimprovement in patients with COVID-19 [9]. Specific assessment of specific hospitalization characteristics and pneumonia is needed, given the highly increasing risk observed in survival analysis in male and female patients.

By prevalence, hypertension, diabetes, and obesity were the most important comorbidities found in Mexican COVID-19–positive patients. Prevalence of hypertension in adults was 18.4% in 2018 [6], higher in females versus males (20.9% vs. 15.3%), which makes the population particularly vulnerable. More importantly, our findings showed that the prevalence of hypertension on positive patients was higher than the population mean [6]. Diabetes mellitus or type 2 diabetes has been pointed out as the main health problem [17] and the second most important cause of mortality (15.4%) in Mexico. Prevalence of the disease during 2018 in Mexican population (>20 years) was around 10.3% and slightly higher in females than males, 11.4% and 9.1%, respectively [6]. Our findings indicated a considerable proportion of nonsurvivor patients had this comorbidity trait. Obesity is one of the prevalent morbidity causes in the Mexican population. According to the Health and Nutrition Survey in 2018, prevalence of obesity was 36.1% in adult population [6]. Although there is limited information on the actual association of these comorbidity traits with the risk of death in patients with COVID-19, evidence shows that this variation can be related to the population structure and actual comorbidity prevalence in the countries [8–10]. So far, no assessment has sufficiently depicted the life-span risks from these factors; our survival analysis, however, graphically illustrates that Mexican males exhibiting any of these comorbidities increasingly reduce their survival probabilities because of being older than 40 years old.

Other comorbidity traits, with prevalence less than or equal to 3%, such as chronic obstructive pulmonary disease, chronic kidney disease, and immunosuppression, also have been associated to the risk of severe infection and death outcomes. Lippi and Henry [18] using a meta-analysis suggested that chronic obstructive pulmonary disease is associated with a significant, more than five-fold increased risk of severe COVID-19 infection. Similarly, Alqahtani et al. [19] by a meta-analysis indicated that patients with chronic obstructive pulmonary disease were at a higher risk of more severe disease (63%) than patients without chronic obstructive pulmonary disease (33.4%; OR: 1.88, 95% CI: 1.4–2.4) and associated with higher mortality (60%). Cheng et al. [20] showed that the prevalence of kidney disease on admission and the development of acute kidney injury during hospitalization in patients with COVID-19 is high and is associated with in-hospital mortality [20]. On the other hand, it is important to redefine the immunosuppression definition to understand specifically the risk associated to this condition. For instance, D'Antiga [21] indicated that patients with immunosuppressed conditions are not at an increased risk of severe complications compared with the general population, both in children and adults, but this is related to transplantation or chemotherapy for cancer. However, immunosuppression may include patients with HIV and although not enough information on the actual risk from the HIV and COVID-19 is available, Vizcarra et al. [22] indicated that patients with HIV have no lower risk of severe disease than the general population.

In the present study, 331,298 COVID-19–positive cases were used to fit multivariate logistic regression models, considering discrete variables to study the risk of mortality from which the sample size allowed the reduction of analytically induced bias and protected against extreme value estimates revealing the true values of population [23]. Some limitations are related to lacking specific information on comorbidity traits and clinical tests, which may reveal more information on final cause of deaths. This limitation could be related to the available information when recording cases, that is, hospitalized inpatients might have more accurate and accumulate data regarding comorbidities leading to bias in their relationship to death. This apparent bias is revealed when examining the comorbidity stratification in hospitalized inpatients (Appendix B), where an accumulated proportion of clinical conditions, for instance, pneumonia with 65.4% of hospitalized cases, is observed. Further analysis would clarify this hypothesis. In addition, the size of the country and diversity of localities and other patient habits are factors that need to be considered to find particularities on observed variations that could be used for better management of the course of infections and improve prognosis in patients; for example, the number of patients deceased with endotracheal intubation is greater than those admitted to the ICU, which could reveal overburdening of the health-care system capabilities where patients are not receiving appropriate escalation of care because of limited resources [24].

Conclusions

This study unveiled the characteristics of current outcomes in confirmed positive cases of COVID-19 from Mexico. The study revealed robust and confidence odds that indicate that factors such as patients being male and older than 41 years have an increasing risk of mortality by COVID-19. Diabetes, hypertension, and obesity are the most frequent comorbidity trait associated with the higher risk for mortality in the Mexican population. Smoking habit has no relationship with the risk of death by COVID-19. Patients with chronic kidney disease very likely need proper attention, given its odds for risk of death. Further analysis on specific definition and relationship on hospitalization and pneumonia-diagnosed condition would clarify the higher risk for death estimated for these factors. The results from our study should be considered to improve protocols and actions to reduce the spreading of infection and management of vulnerable population.

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Authors' contribution: G.M.P-B. contributed to conceptualization, methodology, software, data curation, formal analysis, original draft preparation, writing, and reviewing. N.L-V. contributed to methodology, writing, reviewing, and editing. F.E.P-B. contributed to investigation, methodology, writing, and reviewing.

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Appendix A

Clinical definitions

In addition to the diagnostic for coronavirus disease 2019, the personal information registered in the database was completed by the patient or relatives at the time of sampling for confirmatory test. The following comorbidity traits were defined. Obesity is the abnormal or excessive fat accumulation that presents a risk to health. A body mass index more than 25 was considered overweight, and a body mass index more than 30 was considered obese. In accordance with most major guidelines, it is recommended that hypertension should be diagnosed when a person's systolic blood pressure in the office or clinic is greater than 140 mm Hg and/or their diastolic blood pressure is greater than or equal to 90 mm Hg after repeated examination [1]. Diabetes mellitus is considered when plasmatic glucose is A1C is greater than or equal to 6.5% [48 mmol per mol] and FPG is less than 126 mg per dL [7.0 mmol per L] [2]. Pneumonia, or atypical pneumonia, is an inflammatory process of the lung tissue due to an infection, in this case, with a confirmatory positive real-time PCR test for SARS-CoV-2 diagnostics; stratification of severity can be supported by thorax radiography and computed tomography. Cardiopathy is defined also as a cardiovascular disease and refers to any infection related to the heart and vascular systems: coronary artery disease, pulmonary or systemic artery hypertension, chronic effects on heart, heart muscle infections, congenital heart malformations, valvular diseases, arrhythmia, all relating to clinical features of congestive heart failure. Chronic obstructive pulmonary disease is a frequent, preventable and treatable infection characterized by respiratory symptoms and persistent limitation of aerial flux related to a constant exposure to particles and harmful gases (i.e., smoking, biomass). More common symptoms for chronic obstructive pulmonary disease are dyspnea, cough, and sputum [3]. Asthma is defined as a chronic inflammatory disease of the aerial via, characterized by an exacerbated response of tracheobronchial tree with hyper-reactivity to determine stimulus conducting to airflow obstruction [4]. Chronic kidney disease is related to a structural or functional alteration of the kidney persistent during or more than three months, with complications for health (not graded). Criteria for chronic kidney disease (either of the following present for >3 months) are as follows: markers of kidney damage (one or more): albuminuria (Albumin excretion rate > o = 30 mg/24 hours; Albumin-to-creatinine ratio > o = 30 mg/g (>o = 3 mg/mmol); urine sediment abnormalities; electrolyte and other abnormalities due to tubular disorders; abnormalities detected by histology; structural abnormalities detected by imageology; history of kidney transplantation; and decreased glomerular filtration rate < 60 mL/min/1.73m^2 (glomerular filtration rate categories G3a-G5) [5]. Immunosuppression is the condition of patients receiving either glucocorticoid or immunosuppressor drugs or both, for autoimmune diseases, chemotherapy, and onco-hematological diseases and immunosuppression therapy after transplant procedures and a condition in HIV-positive patients. Other complications considered hepatic insufficiency, sepsis, and cerebrovascular events.

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Appendix B

Appendix B
Baseline clinical characteristic stratification in hospitalized and non-hospitalized patients positive to COVID-19 in Mexico, from January 13 to July 17, 2020

Clinical characteristics	Hospitalized			Non-hospitalized		
	Total	Survivors	Nonsurvivors	Total	Survivors	Nonsurvivors
	$n = 95,458$	$n = 61,368$	$n = 34,090$	$n = 235,840$	$n = 231,620$	$n = 4220$
Age group						
0–20	1649 (1.7%)	1499 (2.4%)	150 (0.4%)	10,946 (4.6%)	10,933 (4.7%)	13 (0.3%)
21–40	14,442 (15.1%)	12,168 (19.8%)	2274 (6.7%)	111,033 (47.1%)	110,679 (47.8%)	354 (8.4%)
41–60	41,617 (43.6%)	28,464 (46.4%)	13,153 (38.6%)	90,396 (38.3%)	88,703 (38.3%)	1693 (40.1%)
61–80	32,678 (34.2%)	17,079 (27.8%)	15,599 (45.8%)	21,182 (9.0%)	19,366 (8.4%)	1816 (43.0%)
>80	5072 (5.3%)	2158 (3.5%)	2914 (8.5%)	2283 (1.0%)	1939 (0.8%)	344 (8.2%)
Sex						
Female	36,376 (38.1%)	24,505 (39.9%)	11,871 (34.8%)	116,767 (49.5%)	115,346 (49.8%)	1421 (33.7%)
Male	59,082 (61.9%)	36,863 (60.1%)	22,219 (65.2%)	119,073 (50.5%)	116,274 (50.2%)	2799 (66.3%)
Smoking habits	7517 (7.9%)	4629 (7.5%)	2888 (8.5%)	16,676 (7.1%)	16,640 (7.2%)	327 (7.7%)
Pneumonia	62,401 (65.4%)	35,997 (58.7%)	26,404 (77.5%)	10,274 (4.4%)	8012 (3.5%)	2262 (53.6%)
Comorbidity						
Hypertension	33,468 (35.1%)	18,793 (30.6%)	14,675 (43.0%)	32,702 (13.9%)	30,968 (13.4%)	1734 (41.1%)
Obesity	22,390 (23.5%)	14,043 (22.9%)	8347 (24.5%)	41,069 (17.4%)	39,912 (17.2%)	1157 (27.4%)
Diabetes	29,922 (31.3%)	17,105 (27.9%)	12,817 (37.6%)	23,790 (10.1%)	22,312 (9.6%)	1478 (35.0%)
Cardiopathy	3986 (4.2%)	2164 (3.5%)	1822 (5.3%)	3365 (1.4%)	3150 (1.4%)	215 (5.1%)
COPD	3371 (3.5%)	1742 (2.8%)	1629 (4.8%)	2087 (0.9%)	1877 (0.8%)	210 (5.0%)
Asthma	2151 (2.3%)	1490 (2.4%)	661 (1.9%)	6832 (2.9%)	6716 (2.9%)	116 (2.7%)
Immunosuppressed	2302 (2.4%)	1341 (2.2%)	961 (2.8%)	1894 (0.8%)	1794 (0.8%)	100 (2.4%)
CKD	4610 (4.8%)	2284 (3.7%)	2326 (6.8%)	2285 (1.0%)	2023 (0.9%)	262 (6.2%)
Other complication	4155 (4.4%)	2386 (3.9%)	1769 (5.8%)	4746 (2.0%)	4558 (2.0%)	188 (4.5%)

Age group: Percentages are expressed as proportions of column totals as mutually exclusive variables. Percentages in comorbidities are not mutually exclusive.
COPD = chronic obstructive pulmonary disease; CKD = chronic kidney disease.