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Comparison of Clinical Outcomes in Mechanically Ventilated Patients With Severe Pneumonia Due to COVID-19 Versus Other Etiologies: A Retrospective Cohort Study

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Abstract

Objective

Early observations suggested that COVID-19 pneumonia might be associated with higher mortality than pneumonia of other etiologies. This study aimed to compare the clinical outcomes of mechanically ventilated patients with severe pneumonia due to COVID-19 versus those due to other pathogens.

Methods

This retrospective cohort study included 2,828 patients with severe pneumonia due to non-COVID-19 etiologies from the MIMIC-IV v2.2 database (2008–2019) and 1,348 patients with severe COVID-19 pneumonia from the MIMIC-IV v3.1 database (2020 and later). All patients met the IDSA/ATS criteria for severe pneumonia and received invasive mechanical ventilation. The primary outcome was in-hospital mortality. Secondary outcomes included duration of mechanical ventilation, length of hospital stay, and respiratory mechanics parameters. Propensity score full matching, multivariable logistic regression, Cox proportional hazards regression, and doubly robust estimation were used to compare outcomes between groups.

Results

Before matching, significant differences were observed between groups in body mass index, race, comorbidities, Sequential Organ Failure Assessment score, and PaO_2/FiO_2 ratio. After full matching, baseline characteristics were well balanced, although diabetes (41.1% vs. 20.9%, P < 0.001) and chronic kidney disease (25.7% vs. 13.0%, P = 0.001) remained more prevalent in the COVID-19 group. COVID-19 patients had significantly higher in-hospital mortality than non-COVID-19 patients (42.1% vs. 25.5%, P = 0.001). In the first 7 days of mechanical ventilation, COVID-19 patients received significantly higher positive end-expiratory pressure (mean difference + 2.8 cmH_2O, 95% CI: 1.9–3.7) and plateau pressure (mean difference + 2.1 cmH_2O, 95% CI: 1.2–3.0), but no significant differences were found in respiratory system compliance or driving pressure after matching.

Conclusion

Mechanically ventilated patients with severe COVID-19 pneumonia had higher in-hospital mortality and longer duration of mechanical ventilation compared with patients with severe pneumonia of other etiologies, despite similar respiratory mechanics.

Introduction

With the global pandemic of coronavirus disease 2019 (COVID-19), the number of critically ill patients requiring invasive mechanical ventilation has increased substantially[1]. Early epidemiological data suggested that respiratory failure caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) might exhibit a unique respiratory physiological phenotype and be associated with higher mortality compared with respiratory failure caused by other pathogens[2–3]. However, due to limited sample sizes and methodological limitations in previous studies, whether prognostic differences exist between mechanically ventilated patients with COVID-19 and those with pneumonia of other etiologies remains controversial[4–6].

Some investigators have argued that strict adherence to low tidal volume ventilation may be unnecessary and potentially harmful in COVID-19 pneumonia[7]. Nevertheless, evidence-based acute respiratory distress syndrome (ARDS) management strategies, such as low tidal volume ventilation and prone positioning, have been shown to reduce mortality[8]. To better understand this specific subtype of severe pneumonia, we conducted a retrospective study using the Medical Information Mart for Intensive Care (MIMIC) database to compare key characteristics, mortality, duration of mechanical ventilation, and respiratory physiology between patients with COVID-19 and non-COVID-19 severe pneumonia, aiming to provide a more comprehensive understanding of the natural history of severe COVID-19 pneumonia.

Methods

Study Design, Patient Population, and Data Source

This retrospective cohort study included adult patients (age > 18 years) with severe pneumonia who received invasive mechanical ventilation. The study utilized data from the MIMIC-IV database, which contains comprehensive electronic health records from Beth Israel Deaconess Medical Center (BIDMC) in Boston, Massachusetts, USA. The COVID-19 cohort included patients admitted after 2019 with confirmed SARS-CoV-2 infection, identified from the MIMIC-IV v3.1 database (updated October 2024). The non-COVID-19 cohort included patients admitted between 2008 and 2019 with a diagnosis of pneumonia based on the International Classification of Diseases, Tenth Revision (ICD-10) codes, identified from the MIMIC-IV v2.2 database.The COVID-19 cohort was identified from the MIMIC-IV database using ICD-10-CM diagnosis codes U07.1, U07.2(COVID-19) and J12.82 (Pneumonia due to coronavirus disease 2019) .All patients met the Infectious Diseases Society of America/American Thoracic Society (IDSA/ATS) criteria for severe pneumonia. Patients with ventilator-associated pneumonia or those with tracheostomy at admission were excluded.We excluded patients with a diagnosis of ventilator-associated pneumonia (VAP), identified by ICD-9 code 99731 or ICD-10 code J95.851. We also excluded patients who had a tracheostomy at the time of admission, defined as either (1) a diagnosis code for tracheostomy status (ICD-9: V44.0; ICD-10: Z93.0), or (2) a tracheostomy procedure code (ICD-9: 31.21, 31.29, 31.74; ICD-10: 0B1) with a procedure date prior to the admission timestamp. Patients meeting either criterion were excluded from the final cohort.

As this study involved retrospective analysis of de-identified data from the MIMIC database, informed consent was waived. Access to the database was approved.

Data Collection

Data extracted from the MIMIC database included demographics (age, sex, race, body mass index), comorbidities (chronic obstructive pulmonary disease, asthma, chronic kidney disease, diabetes, cardiovascular disease, dementia), laboratory results, mechanical ventilation parameters (tidal volume, positive end-expiratory pressure [PEEP], plateau pressure, driving pressure, respiratory rate), Sequential Organ Failure Assessment (SOFA) score, Charlson Comorbidity Index, PaO_2/FiO_2 (P/F) ratio, and daily static respiratory system compliance during the first 7 days of mechanical ventilation.

Outcomes

The primary outcome was in-hospital mortality. Secondary outcomes included duration of mechanical ventilation in survivors, length of hospital stay, and respiratory mechanics parameters during the first 7 days of mechanical ventilation. Patients who were liberated from mechanical ventilation but died during hospitalization were counted as deaths and were not included in the analysis of mechanical ventilation duration. Physiological outcomes included static respiratory system compliance and ventilatory parameters measured daily during the first week of mechanical ventilation.

Statistical Analysis

Baseline characteristics were compared between groups using χ^2 tests for categorical variables and t-tests for continuous variables. Cumulative incidence functions for time to death and time to discharge alive were plotted and compared using Gray's test. Propensity score full matching was performed to control for confounding using patients' age, sex, race, BMI, Charlson Comorbidity Index, SOFA score, and P/F ratio. The standardized mean differences were assessed to evaluate covariate balance. Univariate and multivariable logistic regression, Cox proportional hazards regression, and doubly robust estimation were used to compare outcomes between groups in both pre-match and post-match analyses.

Given potential concerns for secular changes in clinical practice, we evaluated mechanical ventilation parameters including tidal volume, PEEP, and plateau pressure by calendar year using boxplots and linear regression. Sensitivity analyses of the multivariable and propensity-adjusted models were conducted by limiting analyses to subsets of non-COVID-19 pneumonia patients by calendar year.

All hypothesis tests were two-sided, and $P < 0.05$ was considered statistically significant. Data processing and statistical analyses were performed using R version 4.0.5 (R Foundation for Statistical Computing, Vienna, Austria).

Results

Baseline Characteristics and Unadjusted Clinical Outcomes

A total of 623 mechanically ventilated adult patients with COVID-19 pneumonia (mean age 63.8 years, 61.6% male, 39.8% from minoritized racial groups, 60.2% White) and 1,855 mechanically ventilated patients with non-COVID-19 pneumonia (mean age 65.1 years, 59.1% male, 60.3% from minoritized racial groups, 39.7% White) were included in this study. Before matching, significant differences were observed between the two groups. COVID-19 patients had higher BMI and were more likely to be White. Regarding comorbidities, COVID-19 patients had higher proportions of diabetes and chronic kidney disease, but lower proportions of COPD and cardiovascular disease. Additionally, COVID-19 patients had lower SOFA scores at admission but significantly lower P/F ratios, indicating more severe hypoxemia.

In unadjusted analyses, COVID-19 patients had significantly higher in-hospital mortality than non-COVID-19 patients (42.1% vs. 27.8%, OR = 1.89, 95% CI: 1.56–2.28), longer duration of mechanical ventilation (139.45 hours vs. 88.83 hours, $P < 0.001$), and longer hospital stays (20.8 days vs. 16.97 days, $P < 0.001$). Stratified analysis by P/F ratio showed that COVID-19 patients had higher mortality across all oxygenation levels, with the most pronounced difference observed in patients with severe hypoxemia (P/F ≤ 100 mmHg: 48.7% vs. 32.4%, P = 0.001).

Cumulative incidence function analysis for 90-day mortality and discharge alive showed that COVID-19 patients had significantly longer median hospital stays compared with non-COVID-19 patients (20.8 days vs. 16.97 days, $P < 0.001$). When stratified by P/F ratio, no significant differences were found in hospital stay or mechanical ventilation duration between groups in patients with P/F > 200 mmHg, whereas COVID-19 patients with P/F ≤ 200 mmHg had significantly longer hospital stays and mechanical ventilation duration.

Propensity Score Matching and Multivariable Analysis

Propensity score full matching substantially improved covariate balance between groups. After matching, COVID-19 and non-COVID-19 patients were well balanced with respect to age, sex, BMI, SOFA score, and P/F ratio. However, residual imbalances persisted for certain comorbidities, with diabetes (41.1% vs. 20.9%, $P < 0.001$) and chronic kidney disease (25.7% vs. 13.0%, P = 0.001) remaining more prevalent in the COVID-19 group.

In univariate analysis, COVID-19 patients had significantly higher 90-day mortality risk than non-COVID-19 patients (OR = 1.89, 95% CI: 1.56–2.28). After multivariable adjustment (OR = 2.47, 95% CI: 1.99–3.07) and propensity score-weighted doubly robust estimation (OR = 2.44, 95% CI: 1.98–3.02), COVID-19 remained independently associated with higher mortality risk.

In the doubly robust estimation model after matching, the rate of liberation from mechanical ventilation was not significantly lower in the COVID-19 group (HR = 1.38, 95% CI: 1.13–1.69). Similarly, the 90-day survival-to-discharge rate did not differ significantly between groups (HR = 1.31, 95% CI: 1.08–1.60).

Differences in Respiratory Physiology

During the first 7 days of mechanical ventilation, COVID-19 patients received slightly lower tidal volumes and significantly higher PEEP levels than non-COVID-19 patients. On the first day of mechanical ventilation, the mean PEEP was 10.3 cmH_2O in the COVID-19 group and 7.0 cmH_2O in the non-COVID-19 group ($P < 0.001$). COVID-19 patients also had higher plateau pressures and slightly lower driving pressures. However, over time, driving pressure in the COVID-19 group showed an increasing trend, suggesting disease progression requiring higher respiratory support. Respiratory system compliance was slightly lower in the COVID-19 group and declined more over time (decrease of approximately 4 mL/cmH_2O from day 1 to day 7) compared with the non-COVID-19 group (decrease of approximately 2.7 mL/cmH_2O), suggesting that COVID-19-associated ARDS may be accompanied by more severe pulmonary parenchymal stiffness or fibrotic tendency.

After propensity score matching, the mean difference in respiratory system compliance between COVID-19 and non-COVID-19 patients during the first 7 days of mechanical ventilation was 1.82 mL/cmH_2O (95% CI: −1.53 to 5.17 mL/cmH_2O, $P = 0.28$), indicating no significant difference.

Subgroup Analysis by ARDS Severity

Subgroup analysis stratified by P/F ratio revealed that COVID-19 patients had higher mortality than non-COVID-19 patients across all severity levels of ARDS. In patients with mild ARDS ($P/F > 200$), COVID-19 patients had a mortality rate of 38.7% compared with 24.6% in non-COVID-19 patients ($P = 0.002$). In patients with moderate ARDS ($100 < P/F \leq 200$), mortality was 40.4% versus 27.3% ($P = 0.001$). In patients with severe ARDS ($P/F \leq 100$), mortality was 48.7% versus 32.4% ($P = 0.001$).

Notably, in patients with mild ARDS ($P/F > 200$), the duration of mechanical ventilation did not differ significantly between groups (67.25 hours vs. 79.02 hours, $P = 0.597$), and COVID-19 patients even showed a trend toward earlier liberation from mechanical ventilation. However, in patients with moderate and severe ARDS, COVID-19 patients required significantly longer mechanical ventilation.

Discussion

In this large retrospective cohort study comparing patients with severe COVID-19 pneumonia and those with severe pneumonia of other etiologies, we found that mechanically ventilated COVID-19 patients had higher in-hospital mortality, longer duration of mechanical ventilation, and longer hospital stays, despite similar respiratory mechanics after propensity score matching.

In terms of baseline characteristic comparisons, a 2020 study published in American Journal of Respiratory and Critical Care Medicine recruited patients with moderate-to-severe COVID-19-associated ARDS and reported a higher prevalence of diabetes in the COVID-19 group ($P = 0.03$), consistent with our findings. With regard to mechanical ventilation settings and respiratory mechanical parameters, there were no significant intergroup differences in ventilator parameters, driving pressure, or respiratory system compliance[9] .

Mortality and Clinical Outcomes

The in-hospital mortality rate of 42.1% in our COVID-19 cohort is consistent with the 40–50% mortality rates reported in other international studies of critically ill COVID-19 patients[10–12]. The mortality rate of 25.5% in our non-COVID-19 cohort is similar to previously reported 30-day mortality rates of approximately 27% for severe community-acquired pneumonia and 34.5% for ventilator-associated pneumonia in Chinese populations[13]. These findings confirm that COVID-19 pneumonia is associated with worse outcomes than other etiologies of severe pneumonia.

Duration of Mechanical Ventilation

We observed that COVID-19 patients required significantly longer mechanical ventilation than non-COVID-19 patients, consistent with findings from other studies[14–15]. Several factors may contribute to this prolonged ventilatory requirement. Pathophysiologically, SARS-CoV-2 primarily invades airway epithelial cells, inducing apoptosis and necrosis while driving local and systemic inflammatory responses, ultimately leading to ARDS[16]. COVID-19-associated ARDS is characterized by a higher proportion of microthrombosis and a greater tendency toward acute fibrinous and organizing pneumonia. In October 2020, a landmark study [17] demonstrated that SARS-CoV-2 hijacks the complement system and coagulation pathways through structural mimicry, and the aberrantly activated complement system triggers sustained and intense inflammatory responses that directly determine the risk of severe disease and death in COVID-19.

Additionally, COVID-19 is associated with higher doses of sedative medications, and restrictions on family visits during the early pandemic may have increased the risk of delirium and prolonged mechanical ventilation duration[18–19] .

Respiratory Mechanics

The higher proportion of hypoxemia in COVID-19 patients compared with severe community-acquired pneumonia patients may be explained by the higher proportion of multi-lobar infiltration in COVID-19 patients[20]. This reflects the widespread or diffuse interstitial inflammatory features of viral pneumonia, which have a greater impact on oxygen exchange, whereas bacterial pneumonia typically presents with lobar, segmental, or lobular consolidation that, even when coalescing, rarely shows widespread or diffuse distribution and therefore has a relatively smaller impact on oxygen exchange.

Our finding that respiratory system compliance did not differ significantly between groups after propensity score matching is noteworthy. This suggests that the higher PEEP and plateau pressure observed in COVID-19 patients reflected clinical management decisions rather than fundamental differences in lung mechanics. In the early pandemic period, Gattinoni et al. [21]identified a similar phenomenon. Through CT quantitative analysis and respiratory mechanics studies in 32 mechanically ventilated ARDS patients, they found that in the early and mild stages of ARDS, the pathological core was severe pulmonary vascular endothelial injury and widespread microthrombosis, with relatively preserved lung compliance. Severe hypoxemia was primarily due to reduced perfusion of ventilated lung units. However, as ARDS progressed, the mechanical properties of the lungs changed fundamentally, with severely reduced lung volume characterized by large dead space, consolidation, and low compliance regardless of etiology.

Strengths and Limitations

This study has several strengths. First, to our knowledge, this is one of the largest comparative studies of mortality between mechanically ventilated patients with COVID-19 pneumonia and those with non-COVID-19 pneumonia. Second, our data were derived from the MIMIC-IV database, which integrates data from multiple intensive care units (medical, surgical, cardiac, neurological, etc.) at BIDMC over many years. Although still a single-center study, the diversity of ICU types and patient sources enhances the generalizability of our findings. The MIMIC database is highly curated, de-identified, and standardized, offering excellent reproducibility. Third, we used rigorous analytical methods, including propensity score matching and doubly robust estimation, to account for observed differences between groups.

Several limitations should be acknowledged. First, the MIMIC data are primarily from a single academic medical center (BIDMC), and the patient population and clinical practices may differ from community hospitals or institutions in other countries and regions, so caution is needed in generalizing our conclusions. Second, as a retrospective study, inherent biases exist, including potential misclassification of non-COVID-19 pneumonia based on ICD codes, incomplete recording of certain physiological parameters, and unmeasured confounders such as specific medication details (e.g., timing of corticosteroid use). Third, comparing patients from 2008–2019 (non-COVID) with those from 2020 and later (COVID) introduces potential confounding by temporal changes in medical technology, supportive care, and clinical experience. To assess this, we adjusted for calendar year in multivariable models, restricted non-COVID-19 controls to 2017–2019, and performed a negative-control analysis within the pre-pandemic period. In all these sensitivity analyses, the effect estimates remained materially unchanged (e.g., adjusted HR for mortality ranged from 2.35 to 2.51), supporting the robustness of our primary findings. Nonetheless, residual confounding from unmeasured time-varying factors, such as evolving supportive care and pandemic-related strain, cannot be entirely ruled out.Fourth, during the peak of the COVID-19 pandemic, intensive care units may have been operating at or beyond capacity, potentially leading to reduced nurse-to-patient ratios and affecting quality of care. Finally, the surge of critically ill patients during the pandemic may have influenced clinicians' decisions regarding intubation timing, and relative shortages of ventilators and dialysis machines may have affected treatment outcomes. Future multicenter, prospective studies integrating microbiological and imaging data with multi-omics approaches, as well as cross-validation with other databases such as eICU, are needed.

Conclusions

Using data from a large, well-curated public database, we found that mechanically ventilated patients with severe COVID-19 pneumonia had similar respiratory mechanics but higher in-hospital mortality and longer duration of mechanical ventilation compared with patients with severe pneumonia of other etiologies. Notably, clinicians should be aware that patients with mild ARDS (P/F > 200) due to COVID-19 may have relatively preserved lung compliance and maintain oxygenation through compensatory mechanisms such as intrapulmonary shunting, but their condition may progress. Close monitoring and timely intervention are warranted in this subgroup.

Declarations

Author contributions

All authors took part in designing and writing the manuscript. All authors read and approved the final manuscript.

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Data availability

The datasets of the current study are available at Medical Information Mart for Intensive Care IV database (version 2.2, https://mimic.mit.edu/).

Ethics approval and consent to participate

The Medical Information Mart for Intensive Care IV database project received approval from the Institutional Review Boards of both the Massachusetts Institute of Technology and Beth Israel Deaconess Medical Center. Patient information was anonymized, thereby obviating the need for informed consent from individual patients for this study.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Tables

Table 1. Cohort Demographic Characteristics Before and After Full Propensity Score Matching

	Before matching			After full matching		
	Patients, No. (%)			Patients, %		
Variable	With COVID-19	With non–COVID-19	P value	With COVID-19	With non–COVID-19	P
Demographics						
Age, mean (SD), y	63.8 (15.3)	65.1 (16.1)	0.079	63.8 (15.3)	63.1 (16.8)	0.
Sex			0.271	31.9 (12.6)	31.0 (8.4)	0.
Female	239 (38.4)	758 (40.9)	0.292	38.4	35.9	0.
Male	384 (61.6)	1097 (59.1)		61.6	64.1	
Body mass index, mean (SD)	30.6 (8.3)	29.3 (8.2)	<0.001	30.6 (8.3)	31.2 (10.4)	0.
Race			<0.001			0.
Minoritized group	248 (39.8)	1119 (60.3)		39.8	37.2	
White	375 (60.2)	736 (39.7)		60.2	62.8	
Comorbidities						
Diabetes	256 (41.1)	538 (29.0)	<0.001	41.1	20.9	<(
Cardiovascular Disease	97 (15.6)	402 (21.7)	0.001	15.6	12.6	0.
COPD	150 (24.1)	582 (31.4)	0.001	24.1	24.8	0.
Chronic kidney disease	160 (25.7)	386 (20.8)	0.013	25.7	13.0	0.
Dementia	32 (5.1)	72 (3.9)	0.216	3.6	5.3	0.
Charlson Comorbidity Index, mean (SD)	4.6 (2.9)	5.9 (2.9)	<0.001	5.1	3.4	0.
Clinical parameters on admission, mean (SD)						
Lowest white blood cell count, cells/mm3	14.9 (20.1)	14.4 (9.9)	0.438	14.9 (20.1)	14.4 (10.3)	0.
Temperature, °C	36.92 (0.41)	36.90 (0.50)	0.195	36.9 (0.4)	36.9 (0.5)	0.
Clinical parameters on first day of mechanical ventilation, mean (SD)						
SOFA score	4.1 (3.1)	4.6 (3.3)	0.001	4.1 (3.1)	4.3 (3.5)	0.
PaO2/FiO2	138.1 (115.0)	189.94 (131.3)	<0.001	138.1 (115.0)	141.8 (111.7)	0.
Clinical outcomes						
Hospital stay(days	20.8 (11.84,35.17)	16.97 (10.19,26.39)	<0.001	21.1(11.96,35.3)	16.84(10.42,25.98)	<(
Mechanical ventilation hours	139.45 (46.68,287)	88.83 (35.86,190.81)	<0.001	139.47 (46.58,287.2)	88.81 (35.12,192.3)	<(
Hospital mortality	262 (42.1)	515 (27.8)	<.001	42.1	25.5	0.

Table 2. Single Variable and Multivariable Models for Time to Death Within 90 Days, Time to Liberation From Mechanical Ventilation Within 90 Days, and Time to Hospital Discharge Alive Within 90 Days Before and After Propensity Score Matching

	OR (95% CI)			HR (95% CI)					
				Mechanical ventilation			Hospital discharge		
	Before matching			Before matching			Before matching		
	Single variable (separate models for each factor)	Multiple variable	After full matching and doubly robust estimation	Single variable (separate models for each factor)	Multiple variable	After full matching and doubly robust estimation	Single variable (separate models for each factor)	Multiple variable	After full matching and doubly robust estimation
COVID-19	1.89 (1.56 ~ 2.28)	2.47 (1.99 ~ 3.07)	2.44 (1.98 ~ 3.02)	1.06 (0.91 ~ 1.24)	1.41 (1.2 ~ 1.66)	1.38 (1.13 ~ 1.69	1.24 (1.07 ~ 1.44)	1.3 (1.11 ~ 1.53)	1.31 (1.08 ~ 1.6)
Age, y, 1-IQR	1.92 (1.7 ~ 2.18)	1.48 (1.26 ~ 1.73)	NA	2.09 (1.87 ~ 2.32)	1.66 (1.46 ~ 1.89)	NA	1.9 (1.71 ~ 2.11)	1.62 (1.43 ~ 1.84)	NA
Male sex	0.97 (0.81 ~ 1.15)	0.97 (0.81 ~ 1.17)	NA	0.88 (0.76 ~ 1.01)	0.9 (0.78 ~ 1.04)	NA	0.9 (0.78 ~ 1.04)	0.93 (0.8 ~ 1.07)	NA
Body mass index, 1-IQR increment	0.84 (0.76 ~ 0.93)	0.83 (0.73 ~ 0.93)	NA	0.79 (0.72 ~ 0.86)	0.86 (0.78 ~ 0.94)	NA	0.86 (0.79 ~ 0.95)	0.89 (0.81 ~ 0.98)	NA
Minoritized rac	1.3 (1.1 ~ 1.54)	1.37 (1.14 ~ 1.65)	NA	1.02 (0.88 ~ 1.17)	1.12 (0.97 ~ 1.29)	NA	1.18 (1.03 ~ 1.36)	1.25 (1.08 ~ 1.45)	NA
SOFA score	2.36 (2.03 ~ 2.75)	1.98 (1.63 ~ 2.41)	NA	1.36 (1.23 ~ 1.49)	1.62 (1.41 ~ 1.87)	NA	1.4 (1.27 ~ 1.54)	1.39 (1.2 ~ 1.61)	NA
Charlson Comorbidity Index	1.77 (1.56 ~ 2.02)	1.75 (1.52 ~ 2.02)	NA	2.17 (1.94 ~ 2.42)	1.29 (1.16 ~ 1.44)	NA	1.9 (1.7 ~ 2.13)	1.35 (1.22 ~ 1.5)	NA
PaO2/FiO2, mmHg, 1-IQR increment	0.76 (0.67 ~ 0.85)	0.85 (0.75 ~ 0.96)	NA	0.93 (0.84 ~ 1.03)	0.96 (0.86 ~ 1.07)	NA	0.8 (0.73 ~ 0.89)	0.84 (0.76 ~ 0.93)	NA

Table 3

	P/F > 200			100 < P/F ≤ 200		
Variable	With COVID-19	With non–COVID-19	P value	With COVID-19	With non–COVID-19	P
Demographics						
Age, mean (SD), y	64.1 (17.5)	64.3 (16.7)	0.877	64.0 (14.8)	64.8 (15.6)	0
Sex			0.203			0
Male	77 (64.7)	423 (58.0)		136 (63.8)	341 (60.0)	
Female	42 (35.3)	306 (42.0)		77 (36.2)	227 (40.0)	
Body mass index, mean (SD)	28.8 (8.0)	28.2 (7.2)	0.426	31.1 (8.2)	30.3 (8.2)	0
Race			<.001			<
Minoritized group	49 (41.2)	430 (59.0)		85 (39.9)	349 (61.4)	
White	70 (58.8)	299 (41.0)		128 (60.1)	219 (38.6)	
Comorbidities						
Diabetes	50 (42.0)	199 (27.3)	0.002	86 (40.4)	164 (28.9)	0
Cardiovascular Disease	27 (22.7)	143 (19.6)	0.514	33 (15.5)	127 (22.4)	0
COPD	24 (20.2)	200 (27.4)	0.120	62 (29.1)	199 (35.0)	0
Chronic kidney disease	36 (30.3)	130 (17.8)	0.002	53 (24.9)	123 (21.7)	0
Dementia	24 (3.3)	6 (5.0)	0.489	21 (3.7)	11 (5.2)	0
Charlson Comorbidity Index, mean (SD)	5.0 (2.9)	5.7 (3.0)	0.010	4.5 (2.9)	5.9 (2.7)	<
Clinical parameters on admission, mean (SD)						
Lowest white blood cell count, cells/mm3	14.0 (9.9)	13.7 (8.9)	0.796	13.1 (9.0)	14.8 (11.0)	0
Temperature, °C	36.9 (0.3)	36.9 (0.6)	0.269	36.9 (0.3)	36.9 (0.5)	0
Clinical parameters on first day of mechanical ventilation, mean (SD)						
SOFA score	4.4 (3.1)	3.8 (3.0)	0.050	4.2 (3.1)	4.9 (3.3)	0
PaO2/FiO2	322.8 (128.1)	322.7 (104.1)	0.995	141.7 (28.0)	145.6 (28.9)	0
Clinical outcomes						
Hospital stay(days	20.15 (11.18,30.72)	17.35 (10.9,28.16)	0.396	20.3 (12.84,36.09)	17.71 (10.47,27.85)	0
Mechanical ventilation hours	67.25 (25.42,174.99)	79.02 (29,180.5)	0.597	156.23 (64,317.98)	91.38 (38.73,186.75)	<
Hospital mortality	46 (38.7)	179 (24.6)	0.002	86 (40.4)	155 (27.3)	0

Figures

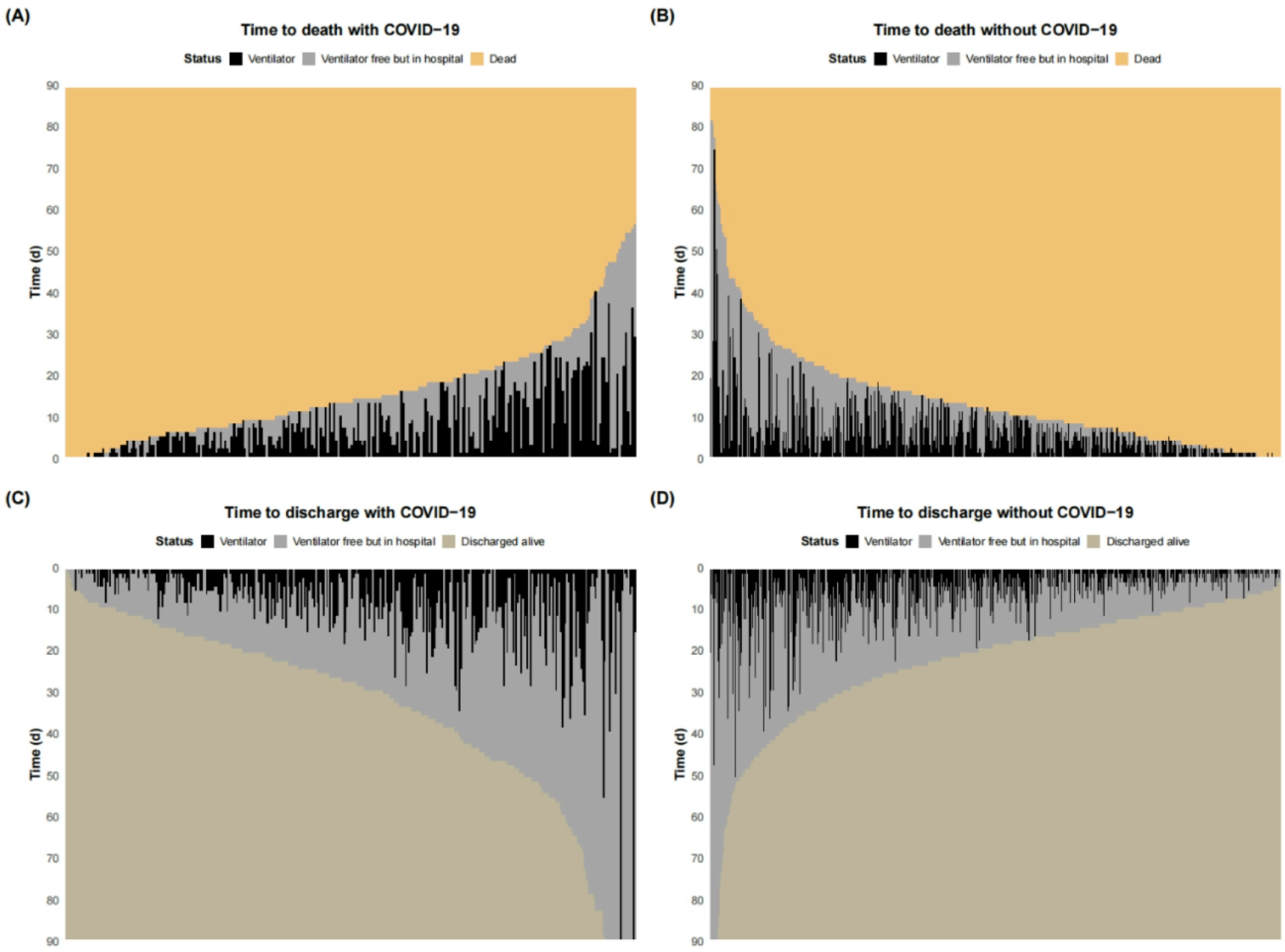


Figure 1

Time to Death and to Time to Discharge Alive for Mechanically Ventilated Patients With COVID-19 and Non–COVID-19 Pneumonia Before Propensity Score Adjustment

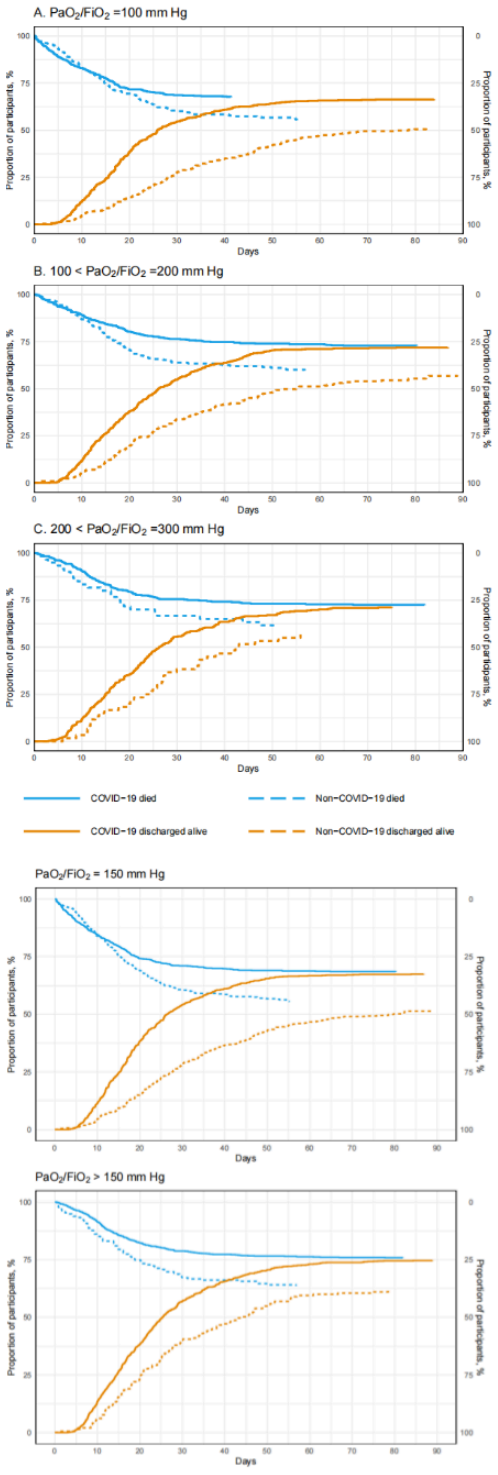


Figure 2

Cumulative Subdistribution Curves for Hospital Mortality and Discharge Home Alive at 90 Days Stratified by the Ratio of Partial Pressure Arterial Oxygen and Fraction of Inspired Oxygen (PaO2/FiO2) on the First Day of Mechanical Ventilation Before Propensity Score Adjustment

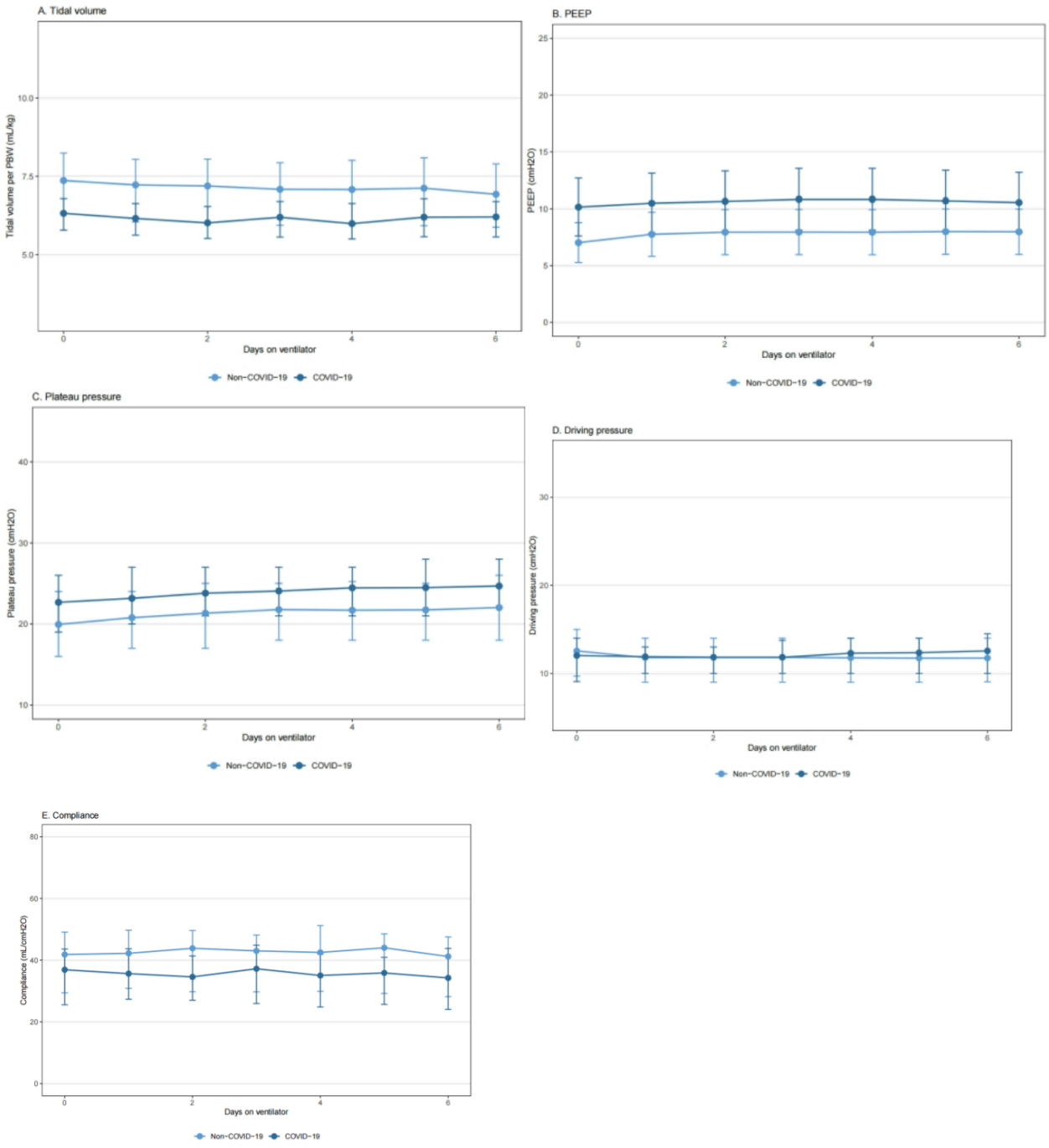


Figure 3

Mean Tidal Volume, Positive End-Expiratory Pressure, Plateau Pressure, Driving Pressure, Respiratory System Compliance, and Ventilatory Ratio for Patients With COVID-19 and Non–COVID-19 Pneumonia During the First Week of Mechanical Ventilation