

Table S1 ICD-10 Codes

Comorbidities	ICD Codes
COVID-19 Pneumonia	U07.1
Influenza pneumonia	J09.X1, J10.00, J10.01, J10.08, J11.00, J11.08
Asthma	J45
COPD	J43, J44, J41, J42
Chronic pulmonary disorders	I27.8, I27.9, J40.x – J47.x, J60.x – J67.x, J68.4, J70.1, J70.3
Cystic fibrosis	E84
Stroke	I67.81, I67.82, I63, G46, I69
Chronic kidney disease	N18
Paralysis	G81, G82, G83
Heart failure	I50
Cardiomyopathy	I42, I43
Ischemic heart disease	I20, I21, I22, I23, I24, I25
Mood or psychotic disorders	F28 to F33, F39, F21 to F25
HIV/AIDS	B20, Z21
Uncomplicated DM	E10.0, E10.1, E10.9, E11.0, E11.1, E11.9, E12.0, E12.1, E12.9, E13.0, E13.1, E13.9, E14.0, E14.1, E14.9
Complicated DM	E10.2 - E10.8, E11.2 - E11.8, E12.2 - E12.8, E13.2 - E13.8, E14.2 - E14.8
Uncomplicated hypertension	I10.x
Complicated hypertension	I11.x - I13.x, I15.x
Solid cancer	C00.x - C26.x, C30.x - C34.x, C37.x - C41.x, C43.x, C45.x - C58.x, C60.x - C76.x, C97.x, C77.x - C80.x
Dyslipidemia	E78.00, E78.01, E78.1, E78.2, E78.3, E78.41, E78.49, E78.5
Overweight and obesity	E66
Malnutrition	E43, E44, E46, D64
Primary immunodeficiency	D80 to D84
Nicotine abuse	F17, Z57.31, Z72.0, Z77.22, T65.2
Any transplant	Z94, T86
Substance abuse	F11 to F16, F18, F19, R78
Tuberculosis	A15, A17 to A19
Long term steroid or immunomodulators	Z92.241, Z92.25, Z79.52
Liver disease	B18.x, I85.x, I86.4, I98.2, K70.x, K71.1, K71.3 - K71.5, K71.7, K72.x - K74.x, K76.0, K76.2 - K76.9, Z94.4
Rheumatoid arthritis or collagen vascular disease	L94.0, L94.1, L94.3, M05.x, M06.x, M08.x, M12.0, M12.3, M30.x, M31.0 - M31.3, M32.x - M35.x, M45.x, M46.1, M46.8, M46.9
Obstructive sleep apnea	G47.33
Bronchiectasis	J47

Table S1 (continued)

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Comorbidities	ICD Codes
Pneumoconiosis	J60-J64
Pulmonary fibrosis	J84.10, J84.112
Lung cancer	C34
Primary pulmonary hypertension	I27.0
Secondary pulmonary hypertension	I27.81
Pneumothorax	J93
BIPAP/CPAP and HFNC	5A09357, 5A09358, 5A0935A, 5A09457, 5A09458, 5A0945A, 5A09557, 5A09558, 5A0955A
Intubation	0BH17EZ, 0BH18EZ, 0BH13EZ
ECMO	5A15
Cardiac arrest	I46

ICD-10, International Classification of Diseases, Tenth Revision; COVID-19, coronavirus disease 2019; COPD, chronic obstructive pulmonary disease; HIV, human immunodeficiency virus; AIDS, acquired immune deficiency syndrome; DM, diabetes mellitus; BIPAP, bilevel positive airway pressure; CPAP, continuous positive airway pressure; HFNC, high flow nasal cannula; ECMO, extracorporeal membrane oxygenation.

Table S2 Prevalence of pneumothorax based on severity of COVID-19 and associated mortality

Severity of COVID-19	Proportion of patients with pneumothorax (in %), median (range)	Mortality (%), median (range)
Asymptomatic	0.3 (0.2–0.3)	38 (32–45)
COVID-19 with lower respiratory tract infection (without pneumonia)	0.8 (0.6–1.2)	54 (37–70)
COVID-19 pneumonia	1.7 (1.7–1.8)	70 (69–71)
COVID-19 ARDS	9.0 (8.6–9.5)	76 (74–78)

COVID-19, coronavirus disease 2019.

Table S3 Multivariate logistic regression model of mortality

Risk factors	Adjusted	
	OR (95% CI)	P value
Pneumothorax	5.51 (4.87–6.23)	<0.001
Age (continuous)	1.06 (1.06–1.07)	<0.001
Female sex	0.83 (0.80–0.85)	<0.001
Race		
Whites	Reference	Ref
Blacks	0.90 (0.85–0.94)	<0.001
Hispanics	1.04 (0.98–1.10)	0.156
Asian or Pacific Islander	0.96 (0.87–1.05)	0.387
Native American	1.83 (1.55–2.15)	<0.001
Others	1.08 (0.99–1.18)	0.076
Insurance status		
Private insurance	Reference	Ref
Medicare	0.94 (0.89–1.91)	0.058
Medicaid	1.08 (1.01–1.15)	0.013
Self-pay	1.38 (1.22–1.56)	<0.001
No charge	0.88 (0.61–1.26)	0.492
Other	1.94 (1.73–2.18)	<0.001
Zip income quartile		
0–25 th percentile	Reference	Ref
26 th to 50 th percentile	0.88 (0.85–0.92)	<0.001
51 st to 75 th percentile	0.80 (0.77–0.84)	<0.001
76 th to 100 th percentile	0.80 (0.76–0.85)	<0.001
Hospital bed size		
Small	Reference	Ref
Medium	1.09 (1.02–1.16)	0.007
Large	1.05 (0.99–1.12)	0.071
Hospital type		
Rural	Reference	Ref
Urban non-teaching	1.11 (1.02–1.21)	0.011
Urban teaching	1.18 (1.09–1.27)	<0.001
Hospital region		
Northeast	Reference	Ref
Midwest	0.66 (0.60–0.71)	<0.001
South	0.75 (0.70–0.81)	<0.001

Table S3 (continued)**Table S3** (continued)

Risk factors	Adjusted	
	OR (95% CI)	P value
West	0.77 (0.71–0.84)	<0.001
Stroke	1.53 (1.35–1.72)	<0.001
Chronic kidney disease	1.32 (1.26–1.38)	<0.001
Paralysis	0.87 (0.73–1.05)	0.173
Heart failure	1.20 (1.15–1.25)	<0.001
Controlled diabetes mellitus	1.11 (1.07–1.16)	<0.001
Uncontrolled diabetes mellitus	1.08 (1.04–1.11)	<0.001
Controlled hypertension	0.74 (0.71–0.77)	<0.001
Uncontrolled hypertension	0.84 (0.80–0.89)	<0.001
Solid tumor	1.38 (1.28–1.49)	<0.001
Primary immunodeficiency	1.21 (0.85–1.72)	0.270
Malnutrition	1.10 (1.05–1.14)	<0.001
Nicotine use	0.76 (0.72–0.81)	<0.001
Tuberculosis	1.21 (0.57–2.56)	0.613
Asthma	0.76 (0.72–0.81)	<0.001
COPD	1.01 (0.93–1.10)	0.730
Cystic fibrosis	2.35 (0.80–6.89)	0.118
Obstructive sleep apnea	0.77 (0.73–0.81)	<0.001
Bronchiectasis	0.85 (0.69–1.04)	0.128
Pneumoconiosis	0.91 (0.59–1.42)	0.705
Pulmonary fibrosis	1.47 (1.30–1.66)	<0.001
Lung cancer	1.47 (1.26–1.72)	<0.001
Primary pulmonary hypertension	1.22 (0.54–2.73)	0.618
Secondary pulmonary hypertension	1.10 (1.03–1.18)	0.005
Chronic liver disease	2.00 (1.89–2.11)	<0.001
HFNC/BIPAP/CPAP	3.89 (3.67–4.12)	<0.001
Intubation	23.55 (22.39–24.78)	<0.001
ECMO	7.19 (4.96–10.42)	<0.001

OR, odds ratio; CI, confidence interval; COPD, chronic obstructive pulmonary disease; HFNC, high flow nasal cannula; BIPAP, bilevel positive airway pressure; CPAP, continuous positive airway pressure; ECMO, extracorporeal membrane oxygenation.

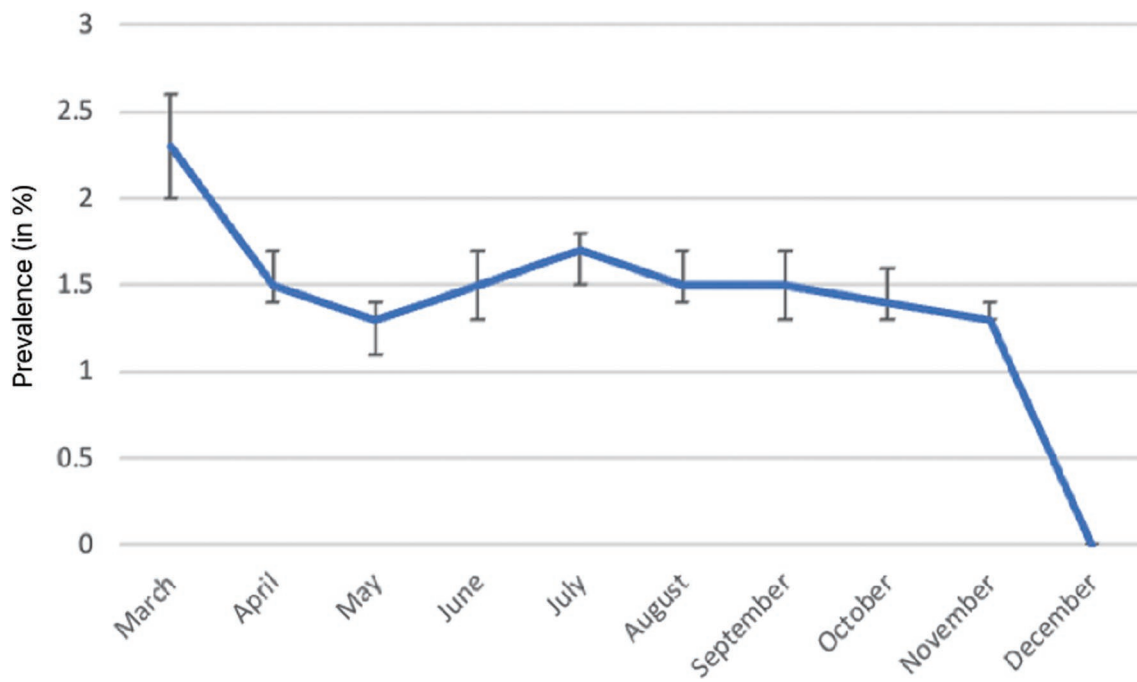


Figure S1 Trend of the prevalence of COVID-19 pneumothorax from March 2020 to December 2020. COVID-19, coronavirus disease 2019.

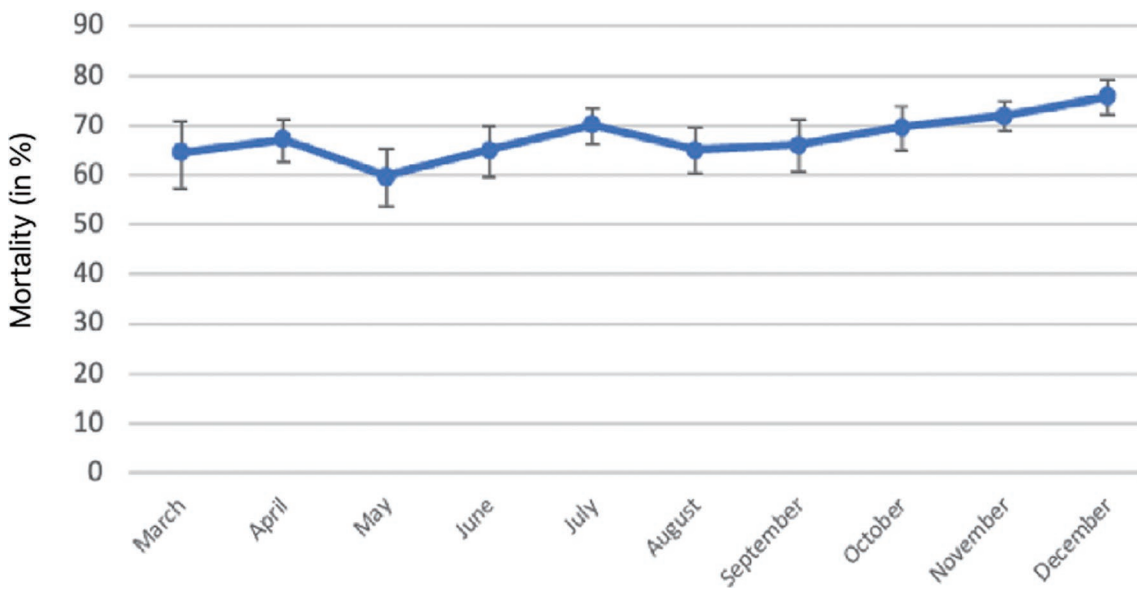


Figure S2 Trend of the mortality of COVID-19 pneumothorax from March 2020 to December 2020. COVID-19, coronavirus disease 2019.