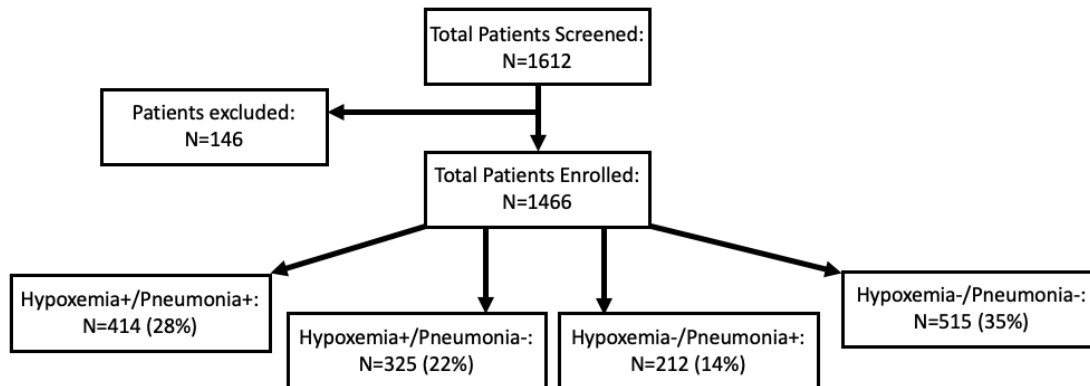


1 ONLINE SUPPLEMENTARY FIGURES & TABLES



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Supplementary Figure 1: Consort Diagram

4 A total of 1,612 patients were screened for study enrollment, with 146 patients being excluded due
5 to no chest x-ray (CXR) imaging being conducted within the emergency department (ED) or on
6 day 1 of admission or being admitted from long term care (LTC) due isolation as opposed to
7 medical issues. Out of the 1603 patients enrolled in this retrospective study, 414 (25.8%) were in
8 the hypoxemia⁺/pneumonia⁺ group, 325 (20.3%) in the hypoxemia⁺/pneumonia⁻ group, 212
9 (13.2%) in the hypoxemia⁻/pneumonia⁺ group, and 515 (35.1%) in the hypoxemia⁻/pneumonia⁻
10 group.

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	All Patients (N=1466)	Hypoxemia ⁻ Pneumonia ⁻ (N=515)	Hypoxemia ⁻ Pneumonia ⁺ (N=212)	Hypoxemia ⁺ Pneumonia ⁻ (N=325)	Hypoxemia ⁺ Pneumonia ⁺ (N=414)	P Values
Age (Mean, SD)	70.4 (17.1)	70.6 (19.1)	66.9 (18.4)	73.7 (14.3)	69.3 (15.5)	<0.001*
Sex (Male)	798 (54.4%)	268 (52.0%)	126 (59.4%)	180 (55.4%)	224 (54.1%)	0.33
Rural Hospital Site	788 (53.7%)	257 (49.9%)	111 (52.4%)	193 (59.4%)	227 (54.8%)	0.006*
City Hospital Site	678 (46.3%)	258 (50.1%)	101 (47.6%)	132 (40.6%)	187 (45.2%)	
Comorbidities:						
Hypertension, no. (%)	874 (59.6%)	304 (59.0%)	109 (51.4%)	200 (61.5%)	261 (63.0%)	0.04*
Coronary Artery Disease, no. (%)	296 (20.2%)	99 (19.2%)	43 (20.3%)	72 (22.2%)	82 (19.8%)	0.91
Heart Disease, no. (%)	225 (15.4%)	81 (15.7%)	28 (13.2%)	52 (16.0%)	64 (15.5%)	0.94
Diabetes (no insulin), no. (%)	331 (22.6%)	112 (21.8%)	47 (22.2%)	71 (21.9%)	101 (24.4%)	0.91
Diabetes (insulin), no. (%)	175 (11.9%)	66 (12.8%)	28 (13.2%)	41 (12.6%)	40 (9.7%)	0.69
Atrial Fibrillation, no. (%)	282 (19.2%)	106 (20.6%)	42 (19.8%)	67 (20.6%)	67 (16.2%)	0.59
Chronic Kidney Disease no. (%)	208 (14.2%)	84 (16.3%)	29 (13.7%)	41 (12.6%)	54 (13.0%)	0.67
Obesity, no. (%)	155 (10.6%)	45 (8.7%)	18 (8.5%)	39 (12.0%)	53 (12.8%)	0.12
Ischemic Stroke, no. (%)	166 (11.3%)	70 (13.6%)	21 (9.9%)	40 (12.3%)	35 (8.5%)	0.19
Asthma, no. (%)	134 (9.1%)	39 (7.6%)	20 (9.4%)	28 (8.6%)	47 (11.4%)	0.50
ED Symptoms:						
Days since sx onset, median (IQR)	3.0 (0.0-8.0)	1.0 (0.0-6.0)	5.0 (3.0-9.0)	3.0 (0.0-8.0)	5.0 (2.0-9.0)	<0.001*
Cough, no. (%)	786 (53.8%)	177 (34.6%)	155 (73.1%)	152 (47.1%)	302 (73.0%)	<0.001*
Productive Cough, no. (%)	226 (15.5%)	45 (8.8%)	56 (26.4%)	23 (7.1%)	102 (24.6%)	<0.001*
Dyspnea, no. (%)	812 (55.6%)	123 (24.1%)	152 (71.7%)	180 (55.7%)	357 (86.2%)	<0.001*
Fever, no. (%)	377 (25.7%)	78 (15.2%)	71 (33.5%)	73 (22.5%)	155 (37.4%)	<0.001*
Fatigue/Malaise, no. (%)	572 (39.2%)	157 (30.7%)	106 (50.0%)	115 (35.6%)	194 (46.9%)	<0.001*
Myalgia, no. (%)	150 (10.3%)	38 (7.4%)	35 (16.5%)	29 (9.0%)	48 (11.6%)	<0.002*
Headache, no. (%)	114 (7.8%)	30 (5.9%)	28 (13.2%)	16 (5.0%)	40 (9.7%)	<0.001*
Diarrhea, no. (%)	272 (18.6%)	70 (13.7%)	69 (32.6%)	46 (14.2%)	87 (21.0%)	<0.001*
Vomiting/Nausea, no. (%)	250 (17.1%)	69 (13.5%)	49 (23.1%)	50 (15.5%)	82 (19.8%)	0.005*
Altered LOC, no. (%)	304 (20.8%)	109 (21.3%)	33 (15.6%)	88 (27.1%)	74 (17.9%)	0.014*
Sore throat, no. (%)	89 (6.1%)	23 (4.5%)	21 (9.9%)	11 (3.4%)	34 (8.2%)	<0.002*
Rhinorrhea, no. (%)	65 (4.5%)	18 (3.5%)	13 (6.1%)	14 (4.3%)	20 (4.8%)	0.46
Chest Pain, no. (%)	154 (10.6%)	36 (7.1%)	39 (18.4%)	29 (9.0%)	50 (12.1%)	<0.001*

12 **Supplementary Table 1: Demographics and characteristics in patients with COVID-19**

13 *CLD: Chronic lung disease, LOC: Level of Consciousness, No: Number, SD: Standard Deviation, Sx: Symptom.*

14 This table demonstrates the patient demographics and characteristics across the four different phenotypes (with or without hypoxemia
15 and pneumonia). Between group comparisons were conducted with a one-way ANOVA. Statistical significance was set to P<0.05. All
16 values are the number of patients with percentage, unless otherwise stated.

Laboratory Investigations in patients with COVID-19 at initial hospital presentation

Total Patients N= 1466	Reference Values	All Patients (N= 1466)	Hypoxemia ⁻ Pneumonia ⁻ (N=515)	Hypoxemia ⁻ Pneumonia ⁺ (N=212)	Hypoxemia ⁺ Pneumonia ⁻ (N=325)	Hypoxemia ⁺ Pneumonia ⁺ (N=414)	P Values
ED Bloodwork:							
WBC x10 ⁹ /mL, median (IQR)	4-11	7.2 (5.3 – 10.2)	7.2 (5.2 – 10.8)	6.2 (4.7 – 8.3)	7.6 (5.7 – 11.1)	7.6 (5.5 – 10.3)	<0.001*
Neut x10 ⁹ /mL, median (IQR)	2-7	5.5 (3.7 – 8.1)	5.2 (3.4 – 8.3)	4.8 (3.3 – 6.4)	6.0 (4.0 – 8.8)	5.9 (4.0 – 8.4)	<0.001*
Eos x10 ⁹ /mL, median (IQR)	0-0	0.0 (0.0 – 0.0)	0.0 (0.0 – 0.1)	0.0 (0.0 – 0.0)	0.0 (0.0 – 0.1)	0.0 (0.0 – 0.0)	<0.001*
Lymph x10 ⁹ /mL, median (IQR)	1-4	0.9 (0.6 – 1.3)	1.0 (0.7 – 1.5)	0.8 (0.6 – 1.1)	0.9 (0.6 – 1.2)	0.8 (0.5 – 1.2)	<0.001*
Platelets x10 ⁹ /mL, median (IQR)	150-400	208.0 (160.0 – 269.0)	218.0 (161.0 – 281.0)	186.0 (149.0 – 246.0)	212.0 (158.0 – 272.0)	202.0 (162.0 – 265.0)	0.018*
Ferritin µg/L, median (IQR)	<100	560.0 (247.0 – 1039.0)	195.0 (125.0 – 375.0)	551.0 (283.0 – 897.6)	463.1 (195.5 – 1054.5)	830.0 (433.0 – 1390.0)	<0.001*
D-dimer mg/L, median (IQR)	<500	1.3 (0.7-3.0)	1.2 (0.6 – 2.2)	0.8 (0.5 – 1.6)	1.3 (0.6 – 3.7)	1.4 (0.8 – 3.6)	0.003*
CRP mg/L, median (IQR)	<10	79.5 (35.2 – 153.5)	41.7 (13.2 – 104.7)	50.4 (19.1 – 99.0)	99.9 (44.3 – 156.3)	122.0 (66.6 – 181.5)	<0.001*
CXR Features:							
Opacity, no. (%)	-	286 (19.5%)	14 (2.7%)	106 (50.0%)	12 (3.7%)	154 (37.2%)	<0.001*
Consolidation, no. (%)	-	378 (25.8%)	9 (1.8%)	99 (46.7%)	20 (6.2%)	250 (60.4%)	<0.001*
GGO, no. (%)	-	77 (5.3%)	2 (0.4%)	27 (12.7%)	3 (0.9%)	45 (10.9%)	<0.001*
Interstitial, no. (%)	-	189 (12.9%)	7 (1.4%)	46 (21.7%)	6 (1.9%)	130 (31.4%)	<0.001*
Effusion, no. (%)	-	155 (10.6%)	24 (4.7%)	19 (9.0%)	27 (8.3%)	85 (20.5%)	<0.001*

17 **Supplementary Table 2: Investigations at initial presentation to ED for all patients with COVID-19 infection**

18 This table demonstrates the laboratory and radiographical findings between all four patient phenotypes based on expression of
 19 hypoxemia and pneumonia. Between group comparisons were conducted with a one-way ANOVA. Statistical significance was set to
 20 P<0.05. All data are presented as median with interquartile range (IQR) or mean with percent.

21 *CRP: C-reactive protein, CXR: Chest x-ray, Eos: Eosinophils, GGO: Ground glass opacities, IQR: Interquartile range, Lymph:*
 22 *Lymphocytes, Neut: Neutrophils, WBC: White blood cell*

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Disease Course & Treatment in Hospital						
Total Patients N= 1466	All Patients (N=1466)	Hypoxemia ⁻ Pneumonia ⁻ (N=515)	Hypoxemia ⁻ Pneumonia ⁺ (N=212)	Hypoxemia ⁺ Pneumonia ⁻ (N=325)	Hypoxemia ⁺ Pneumonia ⁺ (N=414)	P Values
Respiratory Therapy:						
HFNC, no. (%)	96 (6.6%)	7 (1.4%)	9 (4.3%)	25 (7.7%)	55 (13.3%)	<0.001*
NIV, no. (%)	23 (1.6%)	1 (0.2%)	0 (0.0%)	8 (2.5%)	14 (3.4%)	<0.001*
Daily NIV, no. (%)	120 (8.3%)	21 (4.1%)	9 (4.3%)	35 (10.9%)	55 (13.4%)	<0.001*
IMV, no (%)	211 (14.4%)	36 (7.0%)	20 (9.4%)	59 (18.2%)	96 (23.2%)	<0.001*
Home Oxygen Therapy, no (%)	122 (8.3%)	14 (2.7%)	16 (7.55%)	32 (9.85%)	60 (14.5%)	<0.001*
Prone Ventilation, no (%)	121 (8.3%)	10 (2.0%)	19 (9.0%)	26 (8.2%)	66 (16.1%)	< 0.001*
Pharmacological Therapy:						
Corticosteroids, no. (%)	772 (53.3%)	171 (33.6%)	113 (53.6%)	194 (61.0%)	294 (71.5%)	<0.001*
Tocilizumab, no. (%)	61 (4.2%)	6 (1.2%)	13 (6.2%)	13 (4.1%)	29 (7.1%)	<0.001*
Antibiotics, no. (%)	1070 (73.8%)	308 (60.5%)	166 (78.7%)	233 (73.3%)	363 (88.3%)	<0.001*
ICU Admission	381 (26.0%)	79 (14.0%)	38 (18.0%)	96 (30%)	175 (42.0%)	<0.001*
Time to ICU transfer, median (IQR)	3.0 (2.0 – 6.0)	7.5 (2.0 – 11.0)	3.0 (2.0 – 4.0)	3.0 (2.0 – 8.0)	2.0 (2.0 – 5.0)	0.004*
ICU Duration, median (IQR)	8.0 (4.0 – 16.0)	5.0 (3.0 – 11.0)	8.0 (5.0 – 13.0)	9.0 (3.0 – 18.0)	8.5 (4.0 – 17.0)	0.011*
LOS Hospital, median (IQR)	11.0 (5.0 – 22.0)	12.0 (5.0 – 30.0)	8.0 (4.0 – 16.0)	10.0 (5.0 – 21.0)	10.0 (5.0 – 20.0)	<0.007*
Time to Death, median (IQR)	14.0 (8.0-24.0)	16.0 (9.0 – 31.0)	17.0 (13.0 – 26.0)	11.0 (7.0 – 21.0)	12.0 (7.0 – 23.0)	0.03*
Mortality, no. (%)	336 (22.9%)	93 (18.1%)	33 (15.6%)	101 (31.1%)	109 (26.3%)	<0.001*
Complications:						
Atrial Fibrillation, no. (%)	132 (9.1%)	40 (7.9%)	21 (10.0%)	28 (8.8%)	43 (10.5%)	0.35
ARDS, no. (%)	151 (10.4%)	20 (4.0%)	22 (10.4%)	32 (10.0%)	77 (18.7%)	<0.001*
Bacteremia, no. (%)	105 (7.3%)	44 (8.6%)	9 (4.3%)	27 (8.5%)	25 (6.1%)	0.21
Congestive Heart Failure, no. (%)	115 (7.9%)	30 (5.9%)	19 (9.0%)	28 (8.8%)	38 (9.3%)	0.33
Cardiac Ischemia, no. (%)	119 (8.2%)	41 (8.1%)	14 (6.6%)	31 (9.8%)	33 (8.0%)	0.62
Deep Vein Thrombosis, no. (%)	41 (2.8%)	5 (1.0%)	3 (1.4%)	20 (6.3%)	13 (3.2%)	<0.001*
Pulmonary Embolism, no. (%)	66 (4.6%)	14 (2.8%)	4 (1.9%)	21 (6.6%)	27 (6.6%)	<0.003*
Pleural Effusion, no. (%)	186 (12.8%)	57 (11.2%)	12 (5.7%)	53 (16.7%)	64 (15.6%)	<0.001*
Renal Failure (Acute), no. (%)	311 (21.5%)	98 (19.3%)	44 (20.9%)	68 (21.4%)	101 (24.6%)	0.41

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34 **Supplementary Table 3: COVID-19 Disease Course, Treatment, Complications and Outcomes**35 *HFNC: High flow nasal cannula, NIV: Non-invasive ventilation, IMV: Invasive mechanical ventilation, LOS: Length of stay, ARDS:*36 *Acute Respiratory Distress Syndrome, no=number, IQR=Interquartile range.*

37 This table demonstrates the differences in variables related to disease course, treatment, complications, and outcomes between all four

38 patient phenotypes based on expression of hypoxemia and pneumonia. Between group comparisons were conducted with a one-way

39 ANOVA. Statistical significance was set to P<0.05. All values are the number of patients with percentage, unless otherwise stated.

Effect	Point Estimate	95% Wald	
		Confidence Limits	
Age	1.007	0.994	1.019
Sex (Female vs Male)	0.952	0.651	1.393
Comorbidities 1 vs 0	0.732	0.373	1.434
Comorbidities 2 vs 0	0.903	0.448	1.821
Comorbidities 3 vs 0	0.784	0.370	1.664
Comorbidities 4 vs 0	1.393	0.663	2.929
Comorbidities 5 vs 0	0.62	0.272	1.411
Comorbidities 6+ vs 0	1.357	0.631	2.919
Respiratory Rate	1.016	0.974	1.06
Oxygen Saturation (SpO2)	0.733	0.66	0.815
Pneumonia (Yes or No)	2.055	1.378	3.063
Days Since Symptom Onset	1.005	0.998	1.02

Supplementary Table 4: Predictive Model for Developing Hypoxemia more than 24 hours after Hospital Admission.

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Outcomes based on hypoxemia time-course			
Total Patients N= 968	Hypoxemic <24 hours (N=739)	Hypoxemia ≥24 hours (N=229)	P Values
Home Oxygen Therapy, no. (%)	92 (12.5%)	30 (13.1%)	0.80
Non-Invasive Ventilation, no. (%)	90 (12%)	22 (9.6%)	0.50
High-Flow Nasal Canula, no. (%)	80 (10.8%)	8 (3.5%)	<0.001*
Invasive Ventilation, no. (%)	155 (21.0%)	25 (10.9%)	<0.001*
ICU Admission, no. (%)	270 (36.5%)	58 (25.3%)	0.002*
Mortality, no. (%)	210 (28.4%)	63 (27.5%)	0.79
Time to Death (days), median (IQR)	11 (7-23)	17 (10-27)	0.01*
Time to ICU transfer, median (IQR)	3.0 (2-5)	4 (2-8)	0.048*
LOS in ICU (days), median (IQR)	9 (4-17)	7 (4-13)	0.09
LOS in ICU (days), mean (SD)	14.22 (15)	8.9 (6.7)	<0.001*
LOS in Hospital (days), median (IQR)	10 (5-21)	12 (7-26)	0.003*

56 **Supplementary Table 5: Outcomes Based on Hypoxemia Time-Course during COVID Infection**

57 *LOS: Length of stay, IQR: Interquartile range, no: Number.*

58 This table demonstrates the differences in outcomes between patients with early (<24 hours) or emergent (≥ 24 hours) hypoxemia.

59 Comparisons were done with a chi-square for categorical values or unpaired t-test for nominal values. Statistical significance was set

60 to P<0.05. All values are the number of patients with percentage, unless otherwise stated.

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