

**Supplemental Table 1**

<b>Variables</b>	<b>Non-COVID Cohort 1 (2017-2018)</b>	<b>Non-COVID Cohort 2 (2016- 2017 and 2018-2019)</b>
n	3278	627
Age, yr, mean +/-SD	65.84 ± 14.6	63.93 ± 14.9
Gender		
Male, n (%)	1453 (44.3)	288 (45.9)
Female, n (%)	1825 (55.7)	339 (54.1)
Race or ethnicity		
White, n (%)	820 (25)	144 (23)
Black, n (%)	1410 (43)	288 (46)
Other, n(%)	1048 (32)	195 (31)
<b>ARDS Determination</b>		
PaO <sub>2</sub> /FiO <sub>2</sub> Ratio < = 300, n (%)	2586 (78.9)	625 (78.9)
CXR interpretation		
Yes (consistent with ARDS), n (%)	1327 (40.5)	231 (36.8)
Indeterminant, n (%)	225 (6.9)	88 (6.9)
No (not consistent with ARDS), n (%)	1951 (59.5)	308 (59.5)
Risk Factors		
Aspiration, n (%)	319 (9.7)	88 (14.0)
Shock, n (%)	1273 (38.9)	246 (39.2)
Pneumonia, n (%)	1276 (38.9)	254 (40.5)
Sepsis, n (%)	1540 (47.0)	345 (55.0)
Pancreatitis, n (%)	35 (1.1)	7 (1.1)
Burn, n (%)	3 (0.1)	0
Overdose, n (%)	79 (2.4)	19 (3.0)
Transfusion, n (%)	1075 (32.8)	115 (18.4)
Congestive Heart Failure, n (%)		
Presence of at least 1 risk factor, n (%)	2282 (69.6)	457 (72.9)
<b>Clinical Outcomes</b>		
Mechanically ventilated, n (%)		
ARDS, n (%)	1327 (40.8)	319 (50.9)
In-hospital Mortality, n (%)	786 (24.0)	247 (39.4)

Supplemental table 2:

Variable Field Name	Field Type	validation	variable range (normal)	worse numbers (min)	worse numbers (max)	unidirectional	bidirectional
Description	Field Type	data range	normal range for values	minimum cutoff for abnormal	maximum cutoff for abnormal	Worse value as only minimum or maximum	Worse value can be both minimal or maximum
<b>Demographics</b>							
Age	numeric	18-999					
gender	dichotomous	1 = Male 0= Female					
Race	categorical						
Ethnicity	categorical						
<b>Vital Signs</b>							
Respiratory Rate	numeric	0-60	14-24	<12	>24	no	yes
Temperature	numeric	0-110	97-99	<97	>99	no	yes
Heart rate/pulse	numeric	0-220	50-99	<50	>99	no	yes
Mean arterial blood pressure	numeric	0-200	80-90	<65		min	no
SpO2	numeric	0-100	92-100	<90		min	no
Systolic blood pressure	numeric	0-250	90-150	<90		min	no
Diastolic blood pressure	numeric	0-220	60-80	<60		min	no
Weight	numeric	0-999					
Height	numeric	0-999					
<b>Ventilator settings</b>							
Respiratory rate (Ventilator)	numeric	0-60	10-25	<10	>35	no	yes
Tidal volume (ventilator)	numeric	0-1000	around 350- 450 (unusual)				yes
Tidal volume expired (ventilator)	numeric	0-100	around 350-450 (unusual)				yes
Intubation (Mechanical Ventilation)	dichotomous	1=YES 0= NO					yes
Peak pressure (ventilator)	numeric	0-100	10-30		>40	max	no
Mean airway pressure	numeric	0-100	5-30		>20	max	no
PEEP (ventilator)	numeric	0-40	5-10		>10	max	no
Set FiO2 (ventilator)	numeric	21-100	21-40		>40	max	no
O2 support devices	Categorical						
<b>Lab Values</b>							
Sodium	numeric	0-999	135-150	<135	>145	no	yes
Potassium	numeric	0-20	3.5-5	<3.5	>5	no	yes
Chloride	numeric	0-999	70-140	<70	>115	no	yes
Carbon Dioxide	numeric	0-50	23-29	<23		no	yes

Bicarbonate	numeric	0-50	23-29	<23		min	no
Anion Gap	numeric	0-40	8-16		>16		yes
BUN	numeric	0-300	7-20		>20	max	no
Creatinine	numeric	0-20	0.2-1.2		>1.2	no	yes
Glucose	numeric	0-9999	80-120	<80	>120	no	yes
Calcium (Ca)	numeric	0-20	8.5-10.5	<7	>9	no	yes
Magnesium (Mg)	numeric	0-10	1.7-2.2	<1.7		min	no
Phosphate (Phos)	numeric	0-10	2.5-4.5	<2.5	>4.5	max	yes
HEMOGLOBIN	numeric	0-30	11-15	<10	>15	no	yes
HEMATOCRIT	numeric	0-100	20-40	<20	>40	no	yes
WBC	numeric	0-999	4-10	<4	>10	no	yes
Platelet Count	numeric	0-100000	150-450	<150	>450	no	yes
Neutrophil %	numeric	0-100	55-70			no	yes
Band %	numeric	0-100	0-4		>4	max	no
Alkaline phosphatase	numeric	> 0	20-140		>140	max	no
BILIRUBIN TOTAL	numeric	0-80	0.1-1.2		>1.2	max	no
Direct Bilirubin	numeric	0-80	0.1-1.2		>1.2	max	no
Total Protein	numeric	0-10	6-8.3	<6		max	no
ALBUMIN	numeric	0-10	2.5-5	<2.5		max	no
AST (aspartate aminotransferase)	numeric	0-10000	10-40		>40	max	no
Alanine Transferase (ALT)	numeric	0-10000	7-50		>50	max	no
Lipase	numeric	0-10000	0-160		>160		no
Amylase	numeric	0-10000	20-80		>140		no
PH VENOUS	numeric	6.0-9.0	7.35-7.45	<7.4	>7.55	no	yes
PH ARTERIAL	numeric	6.0-9.0	7.35-7.45	<7.4	>7.55	no	yes
PO2 ARTERIAL	numeric	0-999	60-80	<60		min	no
PO2 VENOUS	numeric	0-999	40-80	<40		min	no
PCO2 ARTERIAL	numeric	0-999	35-45	<35	>45	no	yes
PCO2 VENOUS	numeric	0-999	40-50	<40	>50	no	yes
Lactate	numeric	0-100	<2		>2	max	no
Influenza A	dichotomous	1=YES 0= NO					
Influenza A	dichotomous	1= positive, 0 = negative					
Influenza B	dichotomous	1=YES 0= NO					
Influenza B	dichotomous	1= positive, 0 = negative					
Respiratory Syncytial Virus (RSV)	dichotomous	1=YES 0= NO					
RSV result	dichotomous	1= positive, 0 = negative					
Legionella Antigen, Urine	dichotomous	1=YES 0= NO					

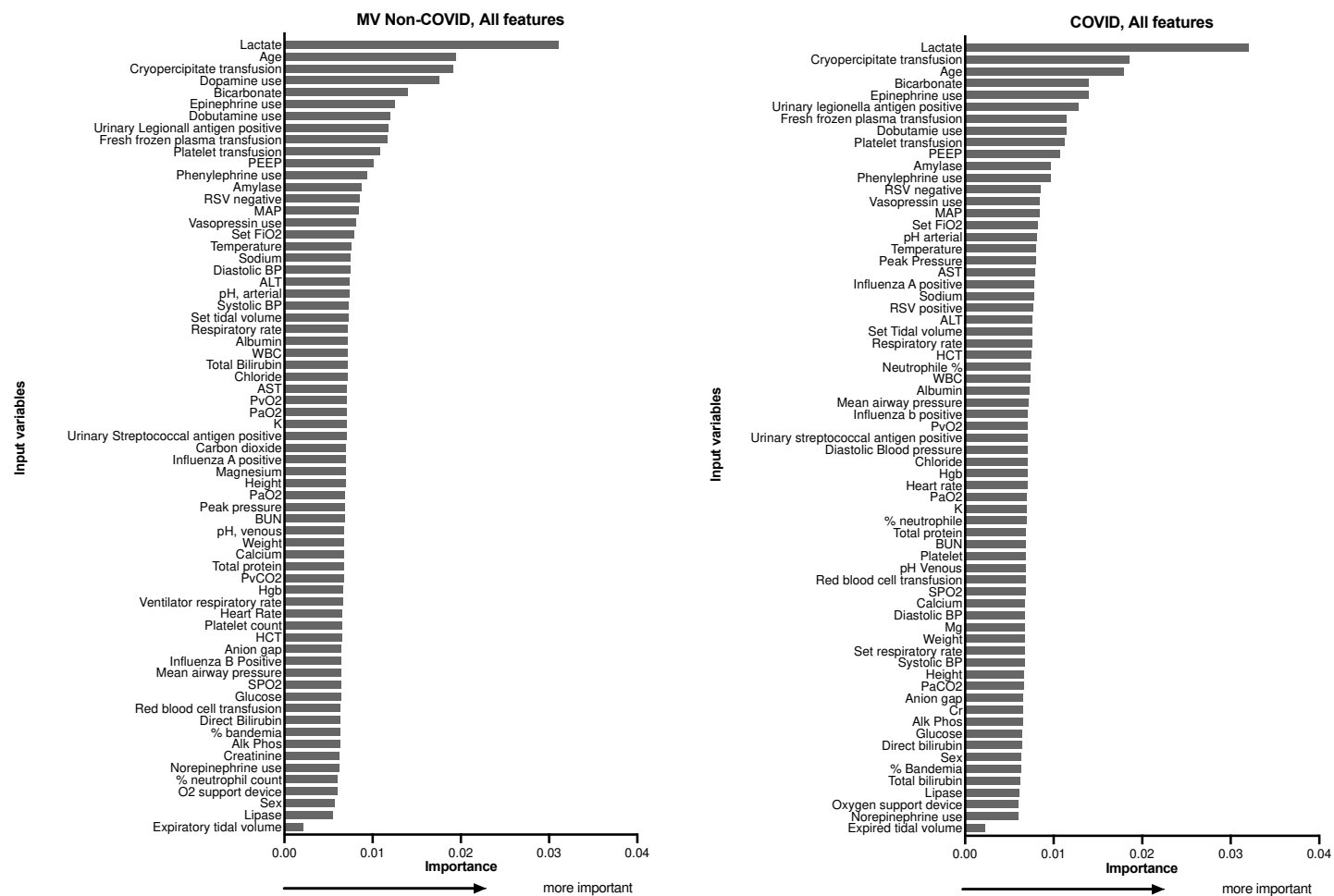
Legionella antigen test result	dichotomous	1= positive, 0 = negative					
Streptococcus pneumoniae Antigen, Urine	dichotomous	1=YES 0= NO					
Streptococcus pneumoniae urinary antigen test result	dichotomous	1= positive, 0 = negative					
<b>Medications</b>							
dobutamine use	dichotomous	1= YES 0= NO					
dobutamine	numeric	0-50	0-25		>0	max	no
dopamine use	dichotomous	1= YES 0= NO					
dopamine	numeric	0-100	0-25		>0	max	no
epinephrine use	dichotomous	1= YES 0= NO					
epinephrine	numeric	0-100	0-100		>0	max	no
norepinephrine use	dichotomous	1= YES 0= NO					
norepinephrine	numeric	0-100	0-100		>0	max	no
vasopressin use	dichotomous	1= YES 0= NO					
Vasopressin	numeric	0-20	0-12		>0	max	no
phenylephrine use	dichotomous	1= YES 0= NO					
phenylephrine	numeric	0-1000	0-500		>0	max	no
<b>Transfusions</b>							
PRBC	dichotomous	1= YES 0= NO			>0	yes	no
FFP	dichotomous	1= YES 0= NO			>0	yes	no
Platelet	dichotomous	1= YES 0= NO			>0	yes	no
Cryoprecipitate	dichotomous	1= YES 0= NO			>0	yes	no
Blood transfusion	dichotomous	1= YES 0= NO			>0	yes	no

Supplemental Table 3

vital Signs	MV Non-COVID Cohort								COVID Cohort							
	count	mean	std	min	25%	50%	75%	max	count	mean	std	min	25%	50%	75%	max
Temperature	503168	98.53	2.13	32	98	98.4	99	109	183738	98.75	1.88	0.3	98	98.5	99.3	109.2
Heart Rate	1164782	88.25	18.6	0	75	87	100	220	282025	89.79	19.01	0	77	89	101	220
Respiratory Rate	1111556	20.64	6.04	0	17	20	24	60	263097	22.03	5.97	0	18	20	25	60
Systolic Blood Pressure	878855	123.7	22.58	0	108	122	138	250	232955	125.73	21.33	0	111	124	139	249
Diastolic Blood Pressure	878888	65.93	15.44	0	56	65	75	211	232958	68.81	13.86	0	59	68	78	201
Mean Arterial Blood Pressure	285389	79.15	15.88	0	69	77	87	200	54093	81.08	16.19	0	70	79	90	199
Pulse Oximetry (SPO2)	1158316	97.58	3.74	0	96	99	100	100	289133	95.98	4.25	0	94	97	99	100
Height	6123	167.89	10.77	116	160.02	167.64	175.26	167.89	4548	167.23	10.74	121.92	160.02	167.64	173.74	167.23
Weight	28652	83.71	24.4	22	66.9	80	95.98	83.71	8054	83.95	23.44	16.9	68.04	80.55	94.87	83.95
<b>Ventilator Setting</b>																
Vent Respiratory Rate	226974	22.69	6.21	0	18	22	26	60	25572	26.47	6.41	0	22	26	31	60
Set FiO2	641611	47.09	16.47	21	40	40	50	100	86027	57.15	21.99	21	40	50	70	100
PEEP	189652	6.4	2.99	0	5	5	7.5	40	21618	10.06	4.79	0	5	10	14	40
Mean Airway Pressure	183169	11.1	4.24	0	8	10	13	100	19746	15.58	5.8	0	11	15	20	100
Peak Pressure	189223	21.36	7.38	0	16	20	26	96	21101	26.42	8.81	0	20	26	32	96
Tidal Volume	166210	405.5	58.28	0	360	400	450	980	19839	387.82	55.21	0	350	400	420	800
Oxygen support device	383870	2.73	2.14	0	1	2	5	5	18663	1.96	1.94	0	0	1	3	5
expiratory tidal volume	1718	36.55	31.78	0	6	29	64	100	155	33.37	29.68	0	11	23	55	100
<b>Laboratory tests</b>																
<b>Serum chemistry</b>																
sodium	103001	139.85	9.38	1	137	140	144	194	36774	139.98	7.31	90	136	139	143	170
potassium	102581	4.2	0.79	1	3.8	4.2	4.6	14.5	35478	4.39	0.73	2	3.9	4.3	4.8	9
chloride	102750	100.9	8.64	1	97	101	105	151	36699	101.04	8.12	70	96	100	105	140
carbon dioxide	87810	23.32	5.27	1	20	23	26	50								
bicarbonate	8927	24.48	5.63	5	21	24	27	40	11992	25.58	5.67	5	22	25	29	40
blood urea nitrogen	102797	34.58	26.39	1	16	26	46	292	37025	41.85	36.87	5	15	28	57	300
creatinine	103026	1.96	1.85	0.1	0.8	1.2	2.46	19.88	37054	2.44	2.87	0.2	0.8	1.2	2.7	20
anion gap	102494	15.44	4.7	0	12	15	18	40	36464	16.16	4.77	1	13	15	19	40
calcium	102840	8.42	0.9	1	7.9	8.4	8.9	17.9	37023	8.53	0.78	3	8.1	8.5	9	15
magnesium	86171	2.09	0.37	0.4	1.9	2.1	2.3	10	25576	2.25	0.46	0.5	2	2.2	2.5	8.5
Total Protein	44435	5.64	1.07	0.7	4.9	5.6	6.3	10	20423	6.39	0.89	1	5.8	6.4	7	10
Albumin	44462	2.87	0.67	1	2.4	2.8	3.3	6.6	20673	3.18	0.64	2	2.7	3.2	3.6	5.7
Total bilirubin	44265	2.68	5.67	0	0.4	0.8	2	76.7	20366	0.75	1.28	0	0.3	0.5	0.7	30.6
direct bilirubin	44261	1.65	3.72	0.1	0.2	0.4	1.1	74.8	20366	0.47	1.04	0.2	0.2	0.2	0.4	20
alanine transferase	44271	130.27	457.63	1	16	30	69	10000	20555	66.37	221.76	6	20	33	59	7000
aspartate aminotransferase	44114	169.34	677.51	1	23	39	79	10000	20013	86.87	414.22	11	27	41	66	10000
alkaline phosphatase	44259	140.5	155.66	0	68	98	154	4995	20360	102.02	73.29	0	63	83	114	2100
glucose	102800	150.25	79.28	1	a	130	173	1932	36942	170.55	107.95	20	104	134	204	2000
<b>Complete blood count</b>																

White blood cell count	97575	12.07	7.55	0	7.6	10.7	14.8	321.5	32297	10.41	8.15	0	6.2	8.8	12.7	326.2
hemoglobin	97576	9.29	1.95	1.4	7.9	8.9	10.3	21.7	32297	10.98	2.52	1.8	8.9	11	12.9	21
hematocrit	97576	28.61	6.35	4	24.5	27.5	32	66.6	32297	34.75	7.82	4	28.7	35.2	40.5	70
platelet count	97577	220.1	133.28	1	124	199	289	1483	32297	260.47	125.61	0	173	240	328	1089
Neutrophile %	97513	65.28	26.02	0	60	74	83	100	32290	8.02	5.37	0	4.3	6.8	10.4	94.7
Band %	8876	5.63	9.12	0	0	2	7	78	4813	4.28	7.64	0	0	1	5	81
<b>Blood Gas</b>																
Arterial pH	58252	7.38	0.09	6.66	7.34	7.4	7.45	7.77	11994	7.35	0.11	6.8	7.29	7.37	7.43	7.73
Arterial PaO2	58341	138.78	83.29	1	83.2	116	162	602	11991	47.7	13.3	13	39	46	54	100
Arterial PaCO2	58382	41.03	10.91	1	34.5	39.6	45.4	132	11991	47.7	13.3	13	39	46	54	100
Venous pH	16825	7.34	0.1	6.34	7.29	7.35	7.4	7.86	5802	7.35	0.1	6.8	7.32	7.37	7.41	7.57
Venous PaO2	16844	49.65	37.5	1	33.4	40.1	52.3	613	5795	42.27	26.53	10	26	37	49	370
Venous PaCO2	16854	46.3	13.39	1	39	44.6	50.5	187	5801	45.4	10.8	12.8	38.7	44.2	50.1	100
<b>Other Chemistry</b>																
Lactate	8798	2.15	2.52	1	1	1.3	2	25	26314	1.94	1.58	1	1.2	1.5	2.1	25
amylase	1809	137.69	258.56	1	42	74	129	4952	469	159.98	368.07	20	51	74	123	4131
lipase	3074	127.75	384.01	5	20	36	81	8457	2198	116.36	489.58	20	24	41	73	8950
<b>Microbiology/Infectious lab</b>																
Urinary Streptococcus pneumoniae Antigen	1295	1	0	1	1	1	1	1	1511	1	0	1	1	1	1	1
Urinary Legionella Antigen	272	1	0	1	1	1	1	1	1558	1	0	1	1	1	1	1
Influenza A	2014	1	0	1	1	1	1	1	402	1	0	1	1	1	1	1
Influenza B	2125	1	0	1	1	1	1	1	1798	1	0	1	1	1	1	1
Respiratory syncytial virus	1415	1	0	1	1	1	1	1								
<b>Medications and Transfusion</b>																
For transfusion and medication, we use binary values, which show if the transfusion or medication is given to the patients or not. The below numbers show how many percent of encounters are given each of the transfusions and medications:																
Packed Red Blood Cells	0.4								0.083							
Platelet	0.14								0.008							
Fresh Frozen Plasma	0.12								0.01							
Cryoprecipitate	0.06								0.0003							
Norepinephrine	0.63								0.153							
Epinephrine	0.15								0.009							
phenylephrine	0.233								0.004							
vasopressin	0.33								0.017							
Dopamine	0.06								0.005							
Dobutamine	0.13								0.0003							

Supplemental Figure 1: Feature importance, LIME explanation of important features in identifying ARDS or in-hospital mortality



Expiratory tidal volume in both cohorts were largely missing. Laboratory electronic health record labels for measurement of serum bicarbonate had changed from “carbon dioxide” to “bicarbonate” were changed over the years. In 2020, serum bicarbonate was only available as “bicarbonate.” RSV was not available in the COVID cohort and both influenza b and influenza a tests were seldom preformed in the COVID cohort