Figure 1. Cumulative enrollment of subjects by day

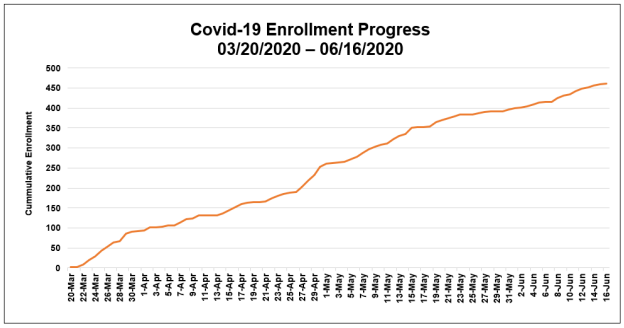
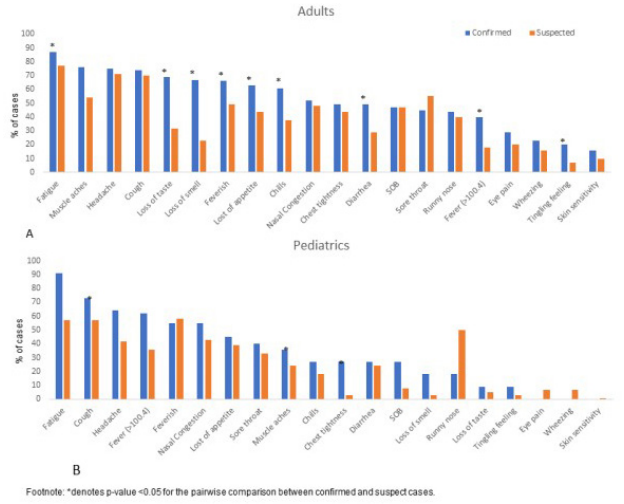


Table 1. Sociodemographic characteristics among confirmed and suspected COVID-19 cases

	Adult-confirmed n=164	Adult-suspected n=111	P-value	Pediatric-confirmed n=13	Pediatric-suspected n=78	P-value
Age, years, median [IQR]	40.9 [33.1-51.9]	41.0 [34.4-46.8]	0.297	9.5 [6.8-10.8]	7.5 [3.7-10.8]	0.301
Sex, Male	87/163 (53%)	51 (46%)	0.227	7 (54%)	42 (54%)	1.000
Race, White	137/160 (86%)	105 (95%)	**0.011**	10/11 (91%)	73 (94%)	0.830
Ethnicity, Hispanic	28 (17%)	6 (5%)	**0.004**	3 (23%)	4/77 (5%)	**0.026**
Underlying medical condition(s)	77 (47%)	38 (34%)	**0.036**	4 (31%)	12 (15%)	0.177
Smoking	14 (9%)	5 (5%)	0.196	0	0	--
Smoke exposure	23/163 (14%)	9/110 (8%)	0.135	3 (23%)	3/77 (4%)	**0.010**
Travel*	69/163 (42%)	56/110 (51%)	0.163	1 (8%)	27/77 (35%)	**0.049**

Footnote: * Travel denotes anywhere out of Nashville since January 1, 2020

Figure 2. Adults and pediatrics, confirmed and suspected cases, by clinical presentation



Footnote: *denotes p-value <0.05 for the pairwise comparison between confirmed and suspect cases.

Conclusion: We observed differences of clinical presentation between confirmed and suspected cases among both pediatric and adult participants. Further research is needed to determine whether these differences are due to disease severity or absence of proven COVID-19. We are collecting serial nasal swabs, blood and stool specimens, on which future testing will confirm SARS-CoV-2 infection in suspected subjects.

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59. Persistence of Respiratory and Non-respiratory Symptoms Among COVID-19 Patients Seeking Care at an Ambulatory COVID-19 Center

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Background: While hospitalized COVID-19 patients are well described in the literature, studies of the natural history and ambulatory cases are limited. We aim to describe the symptoms and clinical course of COVID-19 among ambulatory patients seen at the Emory University multidisciplinary Acute Respiratory Clinic (ARC) developed to care for patients with confirmed or suspected COVID-19.

Methods: PCR-confirmed COVID-19 cases seen at ARC from 4/3–5/16/2020 were included in a retrospective chart review. Encounters were classified as acute, subacute, or convalescent depending on the duration since illness onset (< 1, 1–4, or >4 weeks, respectively). Demographic, clinical, physical exam, diagnostic test, and disposition data were abstracted and analyzed with standard descriptive statistics.

Results: Among 404 visits at ARC, 127 (31.4%) were for confirmed COVID-19 illness (107 unique patients with 1–4 visits). The majority (75.7%) of patients were female, and the median age was 55 years (range 24–89). Patients presented during acute, subacute, and convalescent phases of illness (15.7%, 58.3%, and 26.0%, respectively; Table). Prevalent co-morbidities included hypertension (39.3%), obesity (27.1%), diabetes (20.6%), and asthma (21.5%). While measured or subjective fever was reported in the majority of acute visits (60.0%), it was less common in subacute and convalescent encounters (27.0% and 30.3%). Cough was commonly reported in acute, subacute, and convalescent visits (70.0%, 79.7%, 66.7%), as were dyspnea on exertion (45.0%, 70.3%, 66.7%) and chest tightness (40.0%, 40.5%, 60.6%). Although smell or taste alteration was present in almost half of acute and subacute patients, it was only reported in a quarter of convalescent patients. Among the three stages of illness, transfers from ARC to the ED or direct hospitalizations occurred in 15.0%, 23.0%, and 12.1% of acute, subacute and convalescent visits, respectively.

Table: Timecourse of Symptoms among COVID-19 Patients in the Ambulatory Context

Symptom	All patients n=127	Illness Stage		
		Acute (n=20)	Subacute (n=74)	Convalescent (n=33)
Fever	42 (33.1)	12 (60.0)	20 (27.0)	10 (30.3)
Chills	31 (24.4)	8 (40.0)	17 (23.0)	6 (18.2)
Body aches	44 (34.6)	12 (60.0)	24 (32.4)	8 (24.2)
Headache	46 (36.2)	9 (45.0)	29 (39.2)	8 (24.2)
Sore throat	24 (18.9)	5 (25.0)	13 (17.6)	6 (18.2)
Rhinorrhea	9 (7.1)	5 (25.0)	3 (4.1)	1 (3.0)
Nasal congestion	43 (33.9)	8 (40.0)	25 (33.8)	10 (30.3)
Cough	95 (74.8)	14 (70.0)	59 (79.7)	22 (66.7)
Dyspnea	51 (40.2)	4 (20.0)	33 (44.6)	14 (42.4)
Dyspnea on exertion	83 (65.4)	9 (45.0)	52 (70.3)	22 (66.7)
Chest tightness	58 (45.7)	8 (40.0)	30 (40.5)	20 (60.6)
Wheezing	18 (14.2)	3 (15.0)	13 (17.6)	2 (6.1)
Altered taste or smell	50 (39.4)	9 (45.0)	33 (44.6)	8 (24.2)
Diarrhea	28 (22.0)	6 (30.0)	18 (24.3)	4 (12.1)

Table. Number and percentages of COVID-19 patients reporting symptoms of illness at the time of presentation to the Emory Acute Respiratory Clinic, April 3 to May 16, 2020. Illness stages defined as acute (< 7 days), subacute (7-28 days), or convalescent (>28 days).

Conclusion: Following acute illness, COVID-19 patients can experience persistent symptoms, primarily respiratory symptoms, which can be severe enough to warrant hospitalization. Clinics evaluating recovering patients should prepare to manage these symptoms. Further study of the pathophysiology and treatment of persistent pulmonary symptoms in COVID-19 is needed.

Disclosures: **All Authors**: No reported disclosures

60. New Prognostic Markers for COVID-19 Disease

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Background: A few COVID-19 related retrospective studies have established that older age, elevated neutrophil-lymphocyte ratio (NLR), and decreased lymphocyte-CRP ratio (LCR) were associated with worse outcome. Herein, we aim to identify new prognostic markers associated with mortality.

Methods: We conducted a retrospective hospital cohort study on patients ≥ 18 years old with confirmed COVID-19, who were admitted to our hospital between 03/15/2020 and 05/25/2020. Study individuals were recruited if they had a complete CBC profile and inflammatory markers such as CRP, ferritin, D-dimer and LDH, as well as a well-defined clinical outcomes (discharged alive or expired). Demographic, clinical and laboratory data were reviewed and retrieved. Univariate and multivariate logistic regression methods were employed to identify prognostic markers associated with mortality.

Results: Out of the 344 confirmed COVID-19 hospitalized patients during the study period, 31 who did not have a complete blood profile were excluded; 303 patients were included in the study, 89 (29%) expired, and 214 (71%) were discharged alive. Demographic analysis was tabulated in Table 1.

The univariate analysis showed a significant association of death with absolute neutrophil count (ANC, p=0.022), NLR (p=002), neutrophil-monocyte ratio (NMR, p=< 0.0001), LCR (p=0.007), lymphocyte-LDH ratio (LLR, p=< 0.0001), lymphocyte-D-dimer ratio (LDR, p=< 0.0001), lymphocyte-ferritin ratio (LFR, p=< 0.0001), and platelets (p=0.037) with mortality. With multivariable logistic regression analysis, the only values that had an odds of survival were high LDR (odds ratio [OR] 1.763; 95% confidence interval [CI], 1.20–2.69), and a high LFR (OR 1.136, CI 1.01–1.34).

We further build up a model which can predict >85% mortality in our cohorts with the utilization of D-dimer (>500 ng/ml), Ferritin (>200 ng/ml), LDR (< 1.6), LFR (< 4) and ANC (>2.5). This new model has a ROC of 0.68 (p< 0.0001).

Table 1: Analysis of Clinical Characteristic and Demographics

	All Patients (n=303)	Survival (n=214)	Expired (n=89)	p-value
Clinical Characteristic and Demographics				
Age	61.67 + 15.1	60.08 + 15.4	65.48 + 13.7	0.0044
Gender				
• Male	187 (62%)	123 (57%)	64 (72%)	0.0185
• Female	116 (38%)	91 (43%)	25 (28%)	
Ethnicity				
• Hispanic	135 (45%)	97 (45%)	38 (43%)	
• African American	130 (43%)	92 (43%)	38 (43%)	0.3216
• Caucasian	18 (6%)	14 (7%)	4 (4%)	
• Others	20 (6%)	11 (5%)	9 (10%)	
BMI				
• <30	139 (46%)	102 (48%)	37 (42%)	0.4627
• ≥30	164 (54%)	112 (52%)	52 (58%)	
Comorbidities				
• HTN	188 (62%)	135 (63%)	53 (60%)	0.6088
• DM	122 (40%)	80 (37%)	42 (47%)	0.1136
• CAD/CHF	66 (22%)	45 (21%)	21 (24%)	0.254
• CKD/ESRD	60 (20%)	34 (16%)	26 (29%)	0.005
• COPD	32 (11%)	26 (15%)	6 (7%)	0.1641
Need of Mechanical Ventilation	79 (26%)	25 (8%)	54 (61%)	<0.0001

Conclusion: This retrospective cohort study of hospitalized patients with COVID-19 suggests LDR and LFR as potential independent prognostic indicators. A new model with combination of D-dimer, Ferritin, LDR, LFR and ANC, was able to predict >85% mortality in our cohort with ROC of 0.68, it will need to be validated in a prospective cohort study.

Disclosures: **Jihad Slim, MD**, **Abbvie** (Speaker's Bureau)**Gilead** (Speaker's Bureau)**Jansen** (Speaker's Bureau)**Merck** (Speaker's Bureau)**ViiV** (Speaker's Bureau)

61. Using Machine Learning for Prediction of Poor Clinical Outcomes in Adult Patients Hospitalized with COVID-19

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Background: As the ongoing COVID-19 pandemic develops, there is a need for prediction rules to guide clinical decisions. Previous reports have identified risk factors using statistical inference model. The primary goal of these models is to characterize the relationship between variables and outcomes, not to make predictions. In contrast, the primary purpose of machine learning is obtaining a model that can make repeatable predictions. The objective of this study is to develop decision rules tailored to our patient population to predict ICU admissions and death in patients with COVID-19.

Methods: We used a de-identified dataset of hospitalized adults with COVID-19 admitted to our community hospital between March 2020 and June 2020. We used a Random Forest algorithm to build the prediction models for ICU admissions and death. Random Forest is one of the most powerful machine learning algorithms; it leverages the power of multiple decision trees, randomly created, for making decisions.

Results: 313 patients were included; 237 patients were used to train each model, 26 were used for testing, and 50 for validation. A total of 16 variables, selected according to their availability in the Emergency Department, were fit into the models. For the survival model, the combination of age >57 years, the presence of altered mental status, procalcitonin ≥3.0 ng/mL, a respiratory rate >22, and a blood urea nitrogen >32 mg/dL resulted in a decision rule with an accuracy of 98.7% in the training model, 73.1% in the testing model, and 70% in the validation model (Table 1, Figure 1). For the ICU admission model, the combination of age < 82 years, a systolic blood pressure of ≤94 mm Hg, oxygen saturation of ≤93%, a lactate dehydrogenase >591 IU/L, and a lactic acid >1.5 mmol/L resulted in a decision rule with an accuracy of 99.6% in the training model, 80.8% in the testing model, and 82% in the validation model (Table 2, Figure 2).

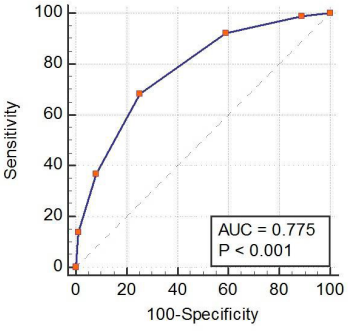
Table 1. Measures of Performance in Predicting Inpatient Mortality

Criterion	Sensitivity	95% CI	Specificity	95% CI	LR	95% CI	PPV	95% CI	NPV	95% CI
≥0	100	96.4 - 100.0	0	0.0 - 1.8	1	1.0 - 1.0	33.8	33.8 - 33.8	NA	NA
≥1	99.01	94.6 - 100.0	11.11	7.1 - 16.3	1.11	1.1 - 1.2	36.2	35.0 - 37.5	95.7	75.1 - 99.4
≥2	92.08	85.0 - 96.5	40.91	34.0 - 48.1	1.56	1.4 - 1.8	44.3	41.1 - 47.5	91	83.6 - 95.3
≥3	68.32	58.3 - 77.2	74.75	68.1 - 80.6	2.71	2.1 - 3.6	58	51.2 - 64.5	82.2	77.4 - 86.2
≥4	36.63	27.3 - 46.8	91.92	87.2 - 95.3	4.53	2.7 - 7.7	69.8	57.5 - 79.8	74	70.9 - 76.8
≥5	13.86	7.8 - 22.2	98.99	96.4 - 99.9	13.72	3.2 - 59.2	87.5	61.9 - 96.8	69.3	67.5 - 70.9

Data are presented as percentage with 95% confidence interval.
Abbreviations: LR, likelihood ratio; NPV, negative predictive value; PPV, positive predictive value.
Youden index J 0.4306, Associated criterion >2; Sensitivity 68.32, Specificity 74.75

Conclusion: We created decision rules using machine learning to predict ICU admission or death in patients with COVID-19. Although there are variables previously described with statistical inference, these decision rules are customized to our patient population; furthermore, we can continue to train the models fitting more data with new patients to create even more accurate prediction rules.

Figure 1. Receiver Operating Characteristic (ROC) Curve for Inpatient Mortality



Criterion	Survivor	Non-survivor
0	22 (11.1%)	1 (1%)
1	59 (29.8%)	7 (6.9%)
2	67 (33.8%)	24 (23.8%)
3	34 (17.2%)	32 (31.7%)
4	14 (7.1%)	23 (22.8%)
5	2 (1%)	14 (13.9%)
Total	198	101

Data are presented as absolute value (percentage).
Abbreviations: AUC, area under the curve.

Table 2. Measures of Performance in Predicting Intensive Care Unit Admission

Criterion	Sensitivity	95% CI	Specificity	95% CI	LR	95% CI	PPV	95% CI	NPV	95% CI
≥0	100	96.3 - 100.0	0	0.0 - 1.7	1	1.0 - 1.0	31.3	31.3 - 31.3	NA	NA
≥1	98.98	94.4 - 100.0	3.26	1.3 - 6.6	1.02	1.0 - 1.1	31.8	31.1 - 32.5	87.5	46.6 - 98.2
≥2	94.9	88.5 - 98.3	33.49	27.2 - 40.2	1.43	1.3 - 1.6	39.4	36.9 - 41.9	93.5	85.7 - 97.2
≥3	66.33	56.1 - 75.6	73.95	67.5 - 79.7	2.55	2.0 - 3.3	53.7	47.1 - 60.2	82.8	78.3 - 86.5
≥4	32.65	23.5 - 42.9	97.21	94.0 - 99.0	11.7	5.1 - 27.1	84.2	69.7 - 92.5	76	73.4 - 78.5
≥5	5.1	1.7 - 11.5	100	98.3 - 100.0	NA	NA	100	NA	69.8	68.8 - 70.8

Data are presented as percentage with 95% confidence interval.
Abbreviations: LR, likelihood ratio; NPV, negative predictive value; PPV, positive predictive value.
Youden index J, 0.4028, Associated criterion >2; Sensitivity 66.33, Specificity 73.95.