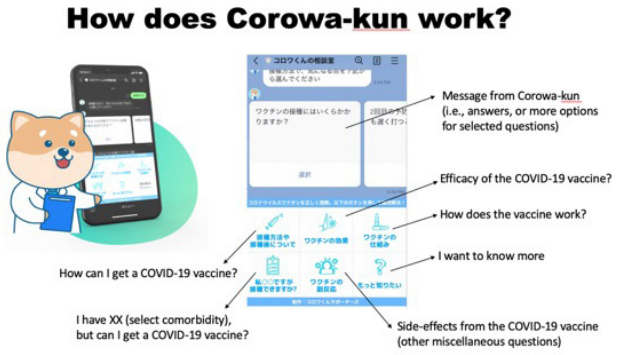
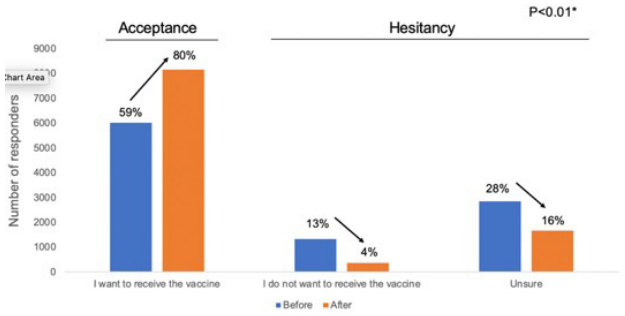


Corowa-kun is the mascot of an online chatbot. This chatbot in LINE is used to answer COVID-19 vaccine frequently asked questions (FAQs) via text messages. As of May 10th, 70 FAQs are available.

Results. A total of 59,676 persons used Corowa-kun during February to April 2021. The most commonly accessed message categories were: "I have (select comorbidity), can I get a COVID-19 vaccine?" (23%); followed by questions on adverse reactions (22%) and how the vaccine works (20%). 10,192 users (17%) participated in the survey. Median age was 55 years (range 16 to 97), and most were female (74%). Intention to receive a COVID-19 vaccine increased from 59% to 80% after using Corowa-kun ($p < 0.01$). Overall, 20% remained hesitant: 16% (1,675) were unsure, and 4% (364) did not intend to be vaccinated. Factors associated with vaccine hesitancy were: age 16 to 34 (odds ratio [OR] = 3.7, 95% confidential interval [CI]: 3.0–4.6, compared to age ≥65), female sex (OR = 2.4, Cl: 2.1–2.8), and history of another vaccine side-effect (OR = 2.5, Cl: 2.2–2.9). Being a physician (OR = 0.2, Cl: 0.1-0.4) and having received a flu vaccine the prior season (OR = 0.4, Cl: 0.3-0.4) were protective.

COVID-19 vaccine acceptance increased and hesitancy decreased after using Corowa-kun, Japan, 2021 (n=10,192)



*There was a statistically significant difference in responses between before and after using Corowa-kun ($p < 0.01$, Chi-square test).

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Univariable logistic regression models of factors associated with COVID-19 vaccine hesitancy, Japan, 2021 (n=10,192)

	Vaccine hesitancy N=2,039		Vaccine acceptance N=8,153		Odds ratio
Age					
16-34	229	11.2%	569	7.0%	3.7 (3.0-4.6)
35-49	648	31.8%	2046	25.1%	2.9 (2.5-3.5)
50-64	953	46.7%	3609	44.3%	2.4 (2.1-2.9)
≥65	209	10.3%	1929	23.7%	Ref
Sex					
Male	278	13.63%	2278	27.9%	Ref
Female	1727	84.7%	5816	71.3%	2.4 (2.1-2.8)
Other	3	0.2%	14	0.2%	NA
No answer	31	1.5%	45	0.6%	5.6 (3.5-9.1)
Educational attainment					
Elementary or junior high school	57	2.8%	151	1.9%	1.4 (1.0-1.9)
High school	660	32.4%	2008	24.6%	1.2 (1.1-1.3)
College or professional school	730	35.8%	2635	32.3%	Ref
Undergraduate school	536	26.3%	2966	36.4%	0.7 (0.6-0.7)
Postgraduate school	56	2.8%	393	4.8%	0.5 (0.4-0.7)
Employment status					
Full-time	724	35.5%	3142	38.5%	Ref
Part-time	631	31.0%	2097	25.7%	1.3 (1.2-1.5)
Student	27	1.3%	73	0.9%	1.6 (1.0-2.5)
Retied	59	2.9%	681	8.4%	0.4 (0.3-0.5)
Homemaker	437	21.4%	1555	19.1%	1.2 (1.1-1.4)
Unemployed due to COVID-19	37	1.8%	91	1.1%	1.8 (1.2-2.6)
Unemployed irrelevant to COVID-19	124	6.1%	514	6.3%	1.0 (0.8-1.3)
Healthcare worker					
Physician	7	0.3%	164	2.0%	0.2 (0.1-0.4)
Yes, but not physician	323	15.8%	1400	17.2%	0.9 (0.8-1.01)
No	1709	83.8%	6589	80.8%	Ref
Living with persons at age<16	452	22.2%	1506	18.5%	1.3 (1.1-1.4)
Living with persons at age≥65	647	31.8%	2994	36.7%	0.8 (0.7-0.9)
Have you had a flu shot within the past year?	1039	51%	5998	73.6%	0.4 (0.3-0.4)
Self-reported history of COVID-19					
Yes (I tested positive)	48	0.6%	10	0.5%	0.8 (0.4-1.7)
Yes (I had the symptoms but did not receive a positive test)	60	0.7%	23	1.1%	1.5 (0.9-2.5)
No	8045	80%	2006	98.4%	Ref
Have you had any vaccine side-effects?					
Yes	331	16.2%	644	7.9%	2.5 (2.2-2.9)
No	1424	69.8%	7051	86.5%	Ref
Unsure	284	13.9%	458	5.6%	3.1 (2.6-3.6)
Pregnancy status					
Pregnant	31	1.5%	36	0.4%	3.3 (2.0-5.3)
Not pregnant	1072	52.57 %	4087	50.1%	Ref
Desire to be pregnant	84	4.1%	144	1.8%	2.2 (1.7-2.9)
Not applicable	852	41.8%	3886	47.7%	0.8 (0.8-0.9)

Ref: reference NA: Logistic regression was not performed due to too small number (n≤3)

Conclusion. Corowa-kun reduced vaccine hesitancy by providing COVID-19 vaccine information in a messenger app. Mobile messenger apps could be leveraged to increase COVID-19 vaccine acceptance.

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

440. Detection of COVID-19 Patients Requiring Escalation to ICU Status Using a Naïve Bayes Classifier

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Background. A naïve Bayes classifier is a popular tool used in assigning variables an equal and independent contribution to a binary decision. With respect to COVID-19 severity, the naïve Bayes classifier can consider different variables, such as age, gender, race/ethnicity, comorbidities, and initial laboratory values to determine the probability a patient may need to be admitted or transferred to an intensive care unit (ICU). The aim of this study was to develop a screening tool to detect COVID-19 patients that may require escalation to ICU status.

Methods. Patients hospitalized with COVID-19 were gathered from the end of March 2020 to the end of May 2020 from four hospitals in our metropolitan area. We began searching for potential variables to include in the classification model using chi-square analysis or calculating the optimal cutpoint to separate ICU and non-ICU status. After identifying significant variables, we began using standard procedures to construct a classifier. The dataset was split 7:3 to create samples for training and testing. To appraise the model's performance, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), area under the curve (AUC), and the Matthew's correlation coefficient (MCC) were calculated.

Table 1. Univariate analysis of variables in the COVID-19 dataset dichotomized by ICU status

Variable	Non-ICU (n = 397)	ICU (n=177)	P value
Age ≥ 55 years	260 (65.5)	150 (84.7)	<0.001
Male	175 (44.1)	101 (57.1)	0.005
African American	143 (36.0)	63 (35.6)	0.997
Hypertension	276 (69.5)	132 (74.6)	0.257
Chronic kidney disease	67 (16.9)	60 (33.9)	<0.001
Chronic obstructive pulmonary disease	58 (14.6)	40 (22.6)	0.026
Obstructive sleep apnea	49 (12.3)	42 (23.7)	0.001
Diabetes mellitus type II	136 (34.3)	91 (51.4)	<0.001
Presenting with fever	252 (63.5)	122 (68.9)	0.242
Presenting with diarrhea	123 (31.0)	37 (20.9)	0.017
C-reactive protein ≥ 10 mg/L	39 (9.8)	35 (19.8)	0.002
Lactate dehydrogenase ≥ 400 U/L	145 (36.5)	95 (53.7)	<0.001
Ferritin ≥ 550 ng/mL	162 (40.8)	104 (58.8)	<0.001
Troponin-I ≥ 0.1 ng/mL	27 (6.8)	45 (25.4)	<0.001

Results. A total of 574 COVID-19 patients were included in the study. There were 402 patients in the training sample and 172 patients in the testing sample. The naïve Bayes classifier demonstrated an overall accuracy result of 75.6% (95% CI; 68.5% – 81.8%) using the 14 variables listed in Table 1. The model was able to correctly classify 84.9% of ICU status patients (sensitivity), but only 54.7% of non-ICU status patients (specificity). The PPV and the NPV were 80.1% and 61.7%, respectively. The AUC was 0.717 (95% CI; 0.629 – 0.805) and the MCC was 0.410.

Conclusion. Our naïve Bayes classifier operates by recognizing certain aspects of severe COVID-19 cases and looking for the probability of the variables in said patients. We present a classification model that potentially could be used alongside other tools to screen patients with COVID-19 early in their hospital course to identify those needing escalation to ICU level care.

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441. The Effects of Race and Comorbidity Burden on Inflammatory Biomarkers Among Persons Hospitalized with COVID-19.

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Session: P-21. COVID-19 Research

Background. African Americans (AA) and Latinos, compared with Whites, experience disproportionately higher rates of morbidity and mortality in COVID-19. Exuberant inflammatory responses may explain, in part, the differences in disease severity in COVID-19 observed among different demographic groups.

Methods. In a retrospective cohort study, we analyzed data from patients aged ≥18 years hospitalized for COVID-19 (confirmed by positive SARS-CoV-2 PCR) from 3/1/2020 – 12/31/2020 at Emory Healthcare hospitals. Patient demographics, clinical characteristics, and peak levels of high-sensitivity C-reactive protein (hs-CRP) during hospitalization were abstracted from electronic medical record. Comorbidity burden was defined as the number of six total comorbidities assessed per patient. Multivariable logistic regression (adjusted for age, sex, body mass index [BMI], smoking status) assessed the effects of race and comorbidity burden on peak hs-CRP level.

Results. 3,860 patients, median age 60 [18-108] years, 51% female, 57% AA, 28% White, 6% Latino and 9% other races were enrolled. Median comorbidity burden per patient was 2 (Q1-Q3, 1-3), with prevalent comorbidities distributed as follows: 68% had hypertension, 43% renal disease, 42% diabetes, 16% cardiovascular disease, 12% lung disease, and 5% cancer. Unadjusted peak hs-CRP (mg/L) levels were highest among Latino patients (144.9) followed by other races (137), AA (130.3), and Whites (122.2). In adjusted models (including race), the mean difference in peak hs-CRP (mg/L) compared with patients who had no comorbidities was 18.7 (p=0.108), 56.7 (p< 0.001), and 78.2 mg/L (p< 0.001) for 1, 2, and ≥3 comorbidities, respectively. In adjusted models (including comorbidity burden), the mean level of peak hs-CRP, compared with Whites, was 34.2 (p< 0.001), 38.4 (p=0.003), and 36.0 mg/L (p=0.06) higher in AA, Latinos, and other races, respectively.

Conclusion. Among patients hospitalized with COVID-19, non-White race and comorbidity burden were associated with significantly higher levels of inflammation. These findings suggest that exuberant inflammatory responses may be driving, in part, the differences in COVID-19 disease severity observed across different demographic groups.

Disclosures. **Lauren F. Collins, MD, MSc**, Nothing to disclose

442. Sex-Related Differences in Mortality from COVID-19: Survival Analysis of Patients from an Urban Hospital

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Session: P-21. COVID-19 Research

Background. Mortality from COVID-19 is associated with male sex, older age, black race, and comorbidities including obesity. Our study identified risk factors for in-hospital mortality from COVID-19 using survival analysis at an urban center in Detroit, MI.

Methods. This was a single-center historical cohort study. We reviewed the electronic medical records of patients positive for severe acute respiratory syndrome coronavirus 2 (the COVID-19 virus) on qualitative polymerase-chain-reaction assay, who were admitted between 3/8-6/14/20. We assessed risk factors for mortality using Kaplan-Meier analysis and Cox proportional hazards models.

Results. We included 565 patients with mean age (standard deviation) 64.4 (16.2) years, 52.0% male (294) and 77.2% (436) black/African American. The overall mean body mass index (BMI) was 32.0 (9.02) kg/m^2. At least one comorbidity was present in 95.2% (538) of patients. The overall case-fatality rate was 30.4% (172/565). The unadjusted mortality rate among males was 33.7% compared to 26.9% in females (p=0.08); the median time to death (range) for males was 16.8 (0.3, 33.9) compared to 14.2 (0.32, 47.7) days for females (p=0.04). Univariable survival analysis with Cox proportional hazards models revealed that age (p=< 0.0001), admission from a facility (p=0.002), public insurance (p< 0.0001), respiratory rate ≥ 22 bpm (p=0.02), lymphocytopenia (p=0.07) and serum albumin (p=0.007) were additional risk factors for mortality (Table 1). From multivariable Cox proportional hazards modeling (Table 2), after controlling for age, Charlson score and qSofa, males were 40% more likely to die than females (p=0.03).

Table 1. Univariate analysis with Cox proportional hazards model on factors associated with mortality in patients with COVID-19

Variables	HR (95% CI)	*p* value
Age ≥ 60 yrs.	2.4 (1.6, 3.4)	<0.0001
Male Sex	1.4 (1.02, 1.9)	0.04
Race	0.74 (0.5, 1.01)	0.06
Nursing facility	1.6 (1.6, 4.5)	0.003
Public Insurance	2.7 (1.6, 4.5)	<0.0001
Obesity	0.75 (0.6, 1.01)	0.06
Respiratory Rate ≥ 22 breaths per minute	1.5 (1.07, 2.0)	0.02
Lymphocytopenia on hospital admission	1.3 (1.0, 1.8)	0.07
Serum albumin (<3.5 gm/dl)	1.6 (1.12, 2.2)	0.008

Abbreviations: HR: Hazard ratio, CI: Confidence interval

Table 2. Multivariable analysis with Cox proportional hazards model on factors associated with mortality in patients with COVID-19

Variables	HR (95% CI)	*p* value
Age	1.03 (1.02, 1.04)	<0.0001
Male Sex	1.4 (1.03, 1.9)	0.03
CWIC at hospital admission	1.3 (1.04, 1.18)	0.002
qSOFA at hospital admission	1.3 (1.1, 1.6)	0.006

Abbreviations: HR: Hazard ratio, CI: Confidence interval, CWIC: Charlson weighted index of comorbidity, qSOFA: Quick sepsis related organ failure assessment

Conclusion. After controlling for risk factors for mortality including age, comorbidity and sepsis-related organ failure assessment, males continued to have a higher hazard of death. These demographic and clinical factors may help healthcare providers identify risk factors from COVID-19.

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443. Pre-vaccination Antibody Titers Against Seasonal Coronaviruses And Antibody Responses to the Pfizer-BioNTech BNT162b2 COVID-19 mRNA Vaccine in Healthcare Workers

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Background. The Prospective Assessment of SARS-CoV-2 Seroconversion (PASS) study is following over 200 healthcare workers who have received the Pfizer-BioNTech BNT162b2 COVID-19 mRNA vaccine. A major aim of the study is to determine whether baseline antibody titers against the seasonal human coronaviruses are associated with altered levels of vaccine-induced antibody responses to SARS-CoV-2.

Methods. Serial serum samples obtained pre-vaccination and 1 month after the second dose were tested for IgG antibodies against the full pre-fusion spike protein and the receptor binding domain (RBD) of SARS-CoV-2, as well as the full pre-fusion spike proteins of OC43, HKU1, 229E, and NL63. Antibodies were measured using highly sensitive and specific multiplex assays based on Luminex-xMAP technology.

Results. Preliminary analyses of the first 103 subjects in whom we have 1 month post-vaccination serum demonstrate development of high IgG geometric mean titers (GMT) to both the full spike protein (GMT: 13,685, 12,014-15,589, 95% CI) and the RBD (GMT: 19,448, 17,264-21,908, 95% CI) of SARS-CoV-2 after the 2nd vaccine dose. Preliminary analysis demonstrates no association between baseline antibody titers against spike protein of OC43 and antibody titers against SARS-CoV-2 spike protein (Pearson's r-value= 0.13, *P*-value= 0.21) or RBD (Pearson's r-value= 0.09, *P*-value= 0.36) one month after vaccination. Future analyses will evaluate whether there is an association with baseline seasonal coronavirus antibody titers and either SARS-CoV-2 neutralization titers or anti-SARS-CoV-2 spike protein titers at 6 months after vaccination.

Conclusion. These preliminary results suggest that baseline antibody responses to seasonal coronaviruses neither boost nor impede SARS-CoV-2 vaccine-induced antibody responses. Longitudinal sampling will enable assessment of vaccine durability and determination of whether baseline seasonal coronavirus antibody levels are associated with altered duration of detectable COVID-19 vaccine-induced antibody responses.

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444. County-level COVID-19 Case Fatality Rate in Medicaid Expansion States Compared to Non-Expansion States

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Session: P-21. COVID-19 Research

Background. Medicaid expansion has been adopted by 38 states and the District of Columbia,[1,2] contributing to lower rates of uninsured individuals in the US.[3] During