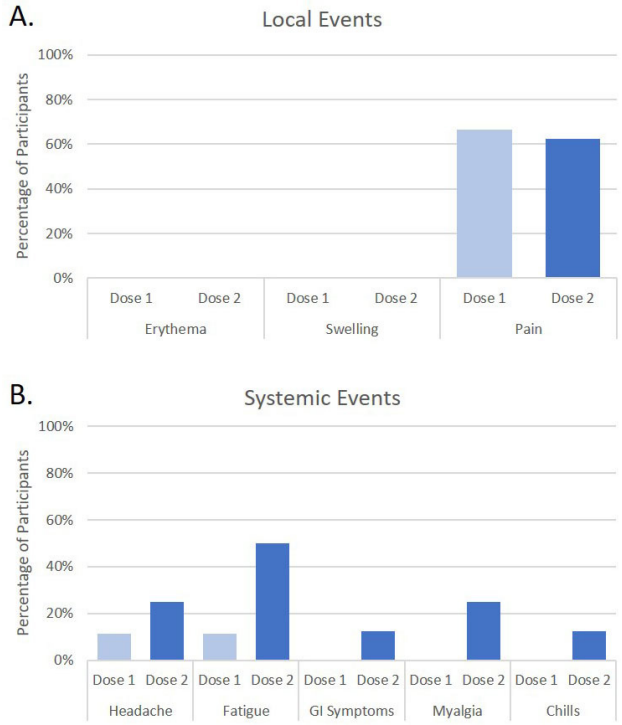
vaccination. IgG levels were measured quantitatively using multiplexed single molecule array (Simoa) immunoassays, and are reported as Normalized Average Enzymes per Bead (AEB). Allogeneic stem cell transplant recipients (mauve) showed significantly lower anti-S, S1, and RBD IgG responses as compared to healthy controls (mint). Low titers of anti-N IgG demonstrates no history of COVID-19 natural infection during the course of the study.

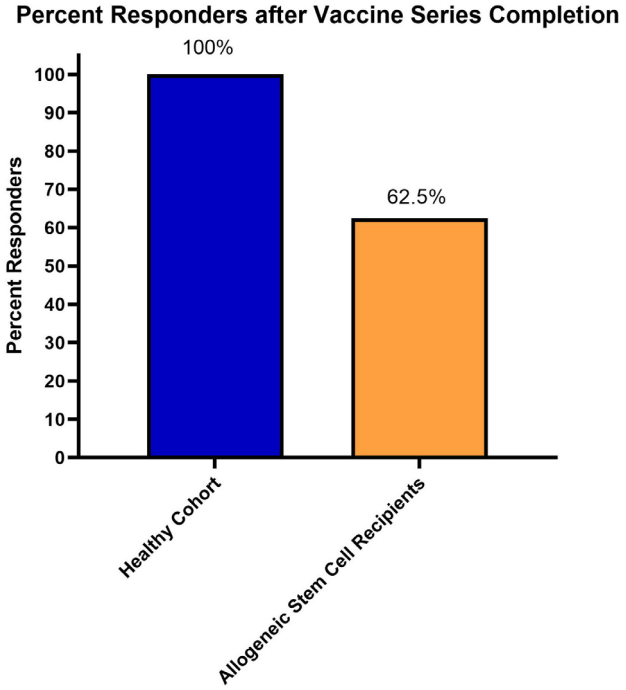
Figure 3. Solicited Local and Systemic Adverse Events



10 allogeneic stem cell transplant recipients completed at least one diary for 7 days after vaccination. Reactions after dose 1 are shown in light blue, and reactions after dose 2 are shown in dark blue. Local reactions (A) were reported by 67% (6/9) of participants after dose 1, and 63% (5/8) after dose 2. Systemic reactions (B) were reported by 22% (2/9) of participants after dose 1, and 50% (4/8) after dose 2. All reported events were mild (Grade 1).

Conclusion. Among SCT recipients, mRNA COVID-19 vaccines were well-tolerated but less immunogenic than in healthy controls. Further study is warranted to better understand heterogeneous characteristics that may affect the immune response in order to optimize COVID-19 vaccination strategies for SCT recipients.

Figure 2: Response Rate to COVID-19 Vaccination



An internally validated threshold for responders was established using pre-pandemic sera from healthy adults. A positive antibody response was was defined as individuals with anti-Spike IgG levels above the 1.07 Normalized AEB threshold.

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26. Risk of Post–COVID-19 Dyspnea and Interstitial Lung Disease (ILD) in a Real-World Cohort of Patients Hospitalized with COVID-19 in the United States

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Background. While COVID-19 carries substantial morbidity and mortality, the extent of long-term complications remains unclear. Reports suggest that acute lung damage associated with severe COVID-19 can result in chronic respiratory dysfunction. This study: (1) estimated the incidence of dyspnea and ILD after COVID-19 hospitalization, and (2) assessed risk factors for developing dyspnea and ILD in a real-world cohort of patients hospitalized with COVID-19 using US electronic health records (EHR).

Methods. Patients in the Optum de-identified COVID-19 EHR database who were hospitalized for COVID-19 (lab confirmed or diagnosis code) between February 20 and July 2020 and had at least 6 months of follow-up were eligible for analysis. Dyspnea and ILD were identified using diagnosis codes. The effects of baseline characteristics and hospitalization factors on the risk of incident dyspnea or ILD 3 to 6 months' post discharge were evaluated.

Results. Among eligible patients (n=26,339), 1705 (6.5%) had dyspnea and 220 (0.8%) had ILD 3 to 6 months after discharge. Among patients without prior dyspnea or ILD (n=22,613), 110 (0.5%) had incident ILD (**Table 1**) and 1036 (4.6%) had incident dyspnea (**Table 2**) 3 to 6 months after discharge. In multivariate analyses, median (IQR) length of stay (LOS; 5.0 [3.0, 9.0] days in patients who did not develop ILD vs 14.5 [6.0, 26.0] days in patients who developed ILD; RR: 1.12, 95% CI: 1.08, 1.15; P=4.34 x 10^{-10}) and age (RR: 1.02, 95% CI: 1.01, 1.03; P=4.63 x 10^{-3}) were significantly associated with ILD. Median (IQR) LOS (5.0 [3.0, 9.0] days in patients who did not develop dyspnea vs 7 [4.0, 14.0] days in patients who developed dyspnea; RR: 1.04, 95% CI: 1.02, 1.06; P=8.52 x 10^{-4}), number of high-risk comorbidities (RR: 1.18, 95% CI: 1.12, 1.24; P=3.85 x 10^{-9}), and obesity (RR: 1.52, 95% CI: 1.25, 1.86; P=2.59 x 10^{-4}) were significantly associated with dyspnea.

Table 1. Selected Baseline Risk Factors for Incident ILD

Risk Factors for Incident ILD						
		Missing	Overall	ILD (-)	ILD (+)	*P* Value
n			22,613	22,503	110	
Age, median (Q1, Q3), years		0	55.0 (40.0, 66.0)	54.0 (40.0, 66.0)	64.0 (56.0, 71.0)	<0.001
US region, n (%)	Midwest	728	7928 (36.2)	7882 (36.2)	46 (42.2)	0.307
	Northeast		7824 (35.8)	7783 (35.7)	41 (37.6)	
	South		4658 (21.3)	4641 (21.3)	17 (15.6)	
	West		1475 (6.7)	1470 (6.8)	5 (4.6)	
Race, n (%)	African American	5222	6207 (35.7)	6188 (35.8)	19 (20.9)	0.012
	Asian		726 (4.2)	721 (4.2)	5 (5.5)	
	Caucasian		10,458 (60.1)	10,391 (60.1)	67 (73.6)	
Ethnicity, n (%)	Hispanic	2299	4774 (23.5)	4754 (23.5)	20 (20.6)	0.582
	Not Hispanic		15,540 (76.5)	15,463 (76.5)	77 (79.4)	
Sex, n (%)	Female	0	11,230 (49.7)	11,180 (49.7)	50 (45.5)	0.43
	Male		11,383 (50.3)	11,323 (50.3)	60 (54.5)	
Overweight, n (%)	No	0	14,510 (64.2)	14,447 (64.2)	63 (57.3)	0.158
	Yes		8103 (35.8)	8056 (35.8)	47 (42.7)	
N high risk comorbidities, median (Q1, Q3)		0	1.0 (0.0, 2.0)	1.0 (0.0, 2.0)	2.0 (1.0, 3.0)	<0.001

Table 2. Selected Baseline Risk Factors for Incident Dyspnea

Risk Factors for Incident Dyspnea						
		Missing	Overall	Dyspnea (-)	Dyspnea (+)	*P* Value
n			22,613	21,577	1036	
Age, median (Q1, Q3), years		0	55.0 (40.0, 66.0)	54.0 (40.0, 66.0)	58.0 (47.0, 67.0)	<0.001
US region, n (%)	Midwest	728	7928 (36.2)	7510 (36.0)	418 (41.6)	<0.001
	Northeast		7824 (35.8)	7408 (35.5)	416 (41.4)	
	South		4658 (21.3)	4522 (21.7)	136 (13.5)	
	West		1475 (6.7)	1439 (6.9)	36 (3.6)	
Race, n (%)	African American	5222	6207 (35.7)	5906 (35.8)	301 (33.9)	0.11
	Asian		726 (4.2)	698 (4.2)	28 (3.2)	
	Caucasian		10,458 (60.1)	9899 (60.0)	559 (63.0)	
Ethnicity, n (%)	Hispanic	2299	4774 (23.5)	4625 (23.9)	149 (15.5)	<0.001
	Not Hispanic		15,540 (76.5)	14,730 (76.1)	810 (84.5)	
Sex, n (%)	Female	0	11,230 (49.7)	10,687 (49.5)	543 (52.4)	0.075
	Male		11,383 (50.3)	10,890 (50.5)	493 (47.6)	
Overweight, n (%)	No	0	14,510 (64.2)	13,949 (64.6)	561 (54.2)	<0.001
	Yes		8103 (35.8)	7628 (35.4)	475 (45.8)	
N high risk comorbidities, median (Q1, Q3)		0	1.0 (0.0, 2.0)	1.0 (0.0, 2.0)	2.0 (1.0, 3.0)	<0.001

Conclusion. In a real-world cohort, 4.6% and 0.5% of patients developed dyspnea and ILD, respectively, after COVID-19 hospitalization. Multivariate analyses suggested that LOS, age, obesity, and comorbidity burden may be risk factors for post-COVID-19 respiratory complications. Limitations included sensitivity of diagnosis codes, availability of labs, and care-seeking bias.

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27. Co-infections and antimicrobial use in patients hospitalized with COVID-19

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Background. In-hospital antimicrobial use among COVID-19 patients is widespread due to perceived bacterial and fungal co-infections. We aim to describe the incidence of these co-infections and antimicrobial use in patients hospitalized with COVID-19 to elucidate data for guiding effective antimicrobial use in this population.

Methods. This retrospective study included all patients admitted with COVID-19 from January 1, 2020, to February 1, 2021 at any of the three teaching hospitals of the NYU Langone Health system. Variables of interest were extracted from the health system's de-identified clinical database. The nadir of hospital admissions between the first and second peaks of hospital admissions in the dataset was used to delineate the First Wave and Late Pandemic periods of observation. A cut-off of 48 hours after admission was used to differentiate Co-infections and Secondary infections respectively among isolates of clinically relevant bacterial or fungal pathogens in blood or sputum samples. Population statistics are presented as median with interquartile range (IQR) or total numbers with percentages.

Results. 663 of 7,213 (9.2%) inpatients were found to have a positive bacterial or fungal culture of the respiratory tract or blood during the entire course of their initial admission at our hospitals for COVID-19. Positive respiratory cultures were found in 437 (6.1%) patients, with 94 (1.3%) being collected within 48 hours of admission. Blood culture positivity occurred in 333 patients (4.6%), with 115 (1.6%) identified within 48 hours of admission. Infection-free survival decreased with duration of hospitalization, with rate of secondary infections steadily rising after the second week of hospitalization as seen in Figure 1. 70.2% of inpatients received antimicrobials for a median duration of 6 antimicrobial days (IQR 3.0 – 12.0) per patient. A higher proportion of patients received antimicrobials in the first wave than in the late pandemic period (82.6% vs. 51.8%).

Table 1.

		Grouped by hospital			
		Overall	NYU LANGONE BROOKLYN	NYU LANGONE HOSPITAL - LONG ISLAND	TISCH HOSPITAL
n		7213	2184	2431	2618
Sex, n (%)	Female	3007 (41.7)	892 (41.2)	1047 (43.1)	1068 (40.8)
	Male	4206 (58.3)	1272 (58.8)	1384 (56.9)	1550 (59.2)
Approx Age, median (range)		65.0 (20.0-94.0)	65.0 (20.0-94.0)	65.0 (20.0-94.0)	65.0 (20.0-94.0)
Deceased, n (%)		1413 (19.6)	561 (25.9)	467 (19.2)	385 (14.7)
Length of Stay (days), median (IQR)		5.9 (3.1-11.2)	5.1 (2.9-10.1)	6.5 (3.9-12.0)	6.0 (3.0-11.8)
Time Period, n (%)	First Wave	4307 (59.7)	1272 (58.8)	1378 (56.7)	1657 (63.3)
	Late Pandemic	2906 (40.3)	892 (41.2)	1053 (43.3)	961 (36.7)
Tobacco Use, n (%)	Current Smoker	232 (3.2)	69 (3.2)	54 (2.2)	109 (4.2)
	Former Smoker	1525 (21.1)	364 (16.8)	548 (22.5)	613 (23.4)
	Never Smoker	3777 (52.4)	1005 (46.4)	1217 (50.1)	1555 (59.4)
	Unknown	1679 (23.3)	726 (33.5)	612 (25.2)	341 (13.0)
Asthma, n (%)		940 (13.0)	274 (12.7)	299 (12.3)	367 (14.0)
Bronchiectasis, n (%)		115 (1.6)	27 (1.2)	29 (1.2)	59 (2.3)
Cystic Fibrosis, n (%)		2 (0.0)			2 (0.1)
COPD, n (%)		710 (9.8)	231 (10.7)	237 (9.7)	242 (9.2)
ILD, n (%)		212 (2.9)	67 (3.1)	68 (2.8)	77 (2.9)
Admit Max O2 Req, n (%)	Ventilator	477 (6.6)	154 (7.1)	147 (6.0)	176 (6.7)
	High flow nasal cannula	721 (10.0)	176 (8.1)	245 (10.1)	300 (11.5)
	Nasal Cannula	3973 (55.1)	1151 (53.2)	1446 (59.5)	1376 (52.6)
	Room Air	2042 (28.3)	683 (31.6)	593 (24.4)	766 (29.3)
Inpatient Max O2 Req, n (%)	Ventilator	1165 (16.2)	379 (17.5)	380 (15.6)	406 (15.5)
	High flow nasal cannula	987 (13.7)	227 (10.5)	396 (16.3)	364 (13.9)
	Nasal Cannula	3602 (49.9)	1082 (50.0)	1246 (51.3)	1274 (48.7)
	Room Air	1459 (20.2)	476 (22.0)	409 (16.8)	574 (21.9)
Peak WHO Score - First 48h, median (IQR)		5.0 (4.0-6.0)	5.0 (5.0-6.0)	5.0 (5.0-6.0)	5.0 (4.0-6.0)
Peak WHO Score, median (IQR)		5.0 (5.0-6.0)	5.0 (5.0-9.0)	5.0 (5.0-6.0)	5.0 (5.0-6.0)
Ventilator Days, median (IQR)		10.0 (4.0-19.0)	6.0 (2.0-13.0)	10.0 (5.0-19.0)	14.0 (6.0-23.0)
Central Line Placed, n (%)		997 (13.8)	320 (14.8)	371 (15.3)	306 (11.7)

Baseline characteristics of patients admitted with COVID-19 across the three teaching hospitals of the NYU Langone Health System

Table 2

Number of subjects	First wave (n=4307)	Late Pandemic (n=2906)	Total (n=7213)
Blood culture sent	2454 (57.5%)	1540 (53.0%)	3994 (55.4%)
Blood cultures positive < 48 hours of admission	68 (1.5%)	47 (1.6%)	115 (1.6%)
Total positive blood cultures	208 (4.8%)	125 (4.3%)	333 (4.6%)
Sputum culture sent	768 (17.8%)	359 (12.4%)	1127 (15.6%)
Sputum cultures positive < 48 hours of admission	59 (1.4%)	35 (1.2%)	94 (1.3%)
Total positive sputum cultures	307 (7.1%)	130 (4.5%)	437 (6.1%)
Non-SARS-CoV-2 respiratory pathogens positive on multiplex PCR	16 (0.4%)	5 (0.2%)	21 (0.3%)
Antimicrobial received	3557 (82.6%)	1505 (51.8%)	5062 (70.2%)
Non-Azithromycin antimicrobial received	3051 (70.8%)	1465 (50.4%)	4516 (62.6%)
Anti-pseudomonal Beta-Lactam received	1187 (27.6%)	627 (21.6%)	1814 (25.1%)
Antimicrobial Days Median (IQR)	6.0 (3.0 - 12.0)	6.0 (2.0 - 12.0)	6.0 (3.0 - 12.0)

Rates of co-infections and secondary infections classified by the first wave (before July 15, 2020) and late pandemic, along with rates of antimicrobial use observed during these respective periods of observation.