each successive time point. 1 (5%) was positive at enrollment, 9 (17%) were positive at midyear and 47 (96%) were positive in May.

Table 1. Key characteristics of TOSCANA participants

	Subjects N = 181	%	Subjects N = 17	Subjects N = 80
			SARS-CoV-2 seropositive n (%)	SARS-CoV-2 seronegative n (%)
Gender				
Male	120	66%	10 (59%)	52 (65%)
Female	61	34%	7 (41%)	28 (35%)
Ethnicity				
Hispanic or Latino	25	14%	4 (24%)	8 (10%)
Non-Hispanic or Latino	156	86%	13 (76%)	72 (90%)
Race				
White	138	76%	13 (76%)	64 (80%)
Black or African American	5	3%	1 (6%)	1 (1%)
Asian	9	5%	2 (12%)	3 (4%)
American Indian or Alaskan Native	0	0%	0 (0%)	0 (0%)
Native Hawaiian or other Pacific Islander	2	1%	0 (0%)	0 (0%)
Multiracial	25	14%	1 (6%)	12 (15%)
Other	2	1%	0 (0%)	0 (0%)
Anticipated Year of Graduation				
2021	35	19%	3 (18%)	19 (24%)
2022	60	33%	5 (29%)	34 (43%)
2023	22	12%	1 (6%)	8 (10%)
2024	64	35%	13 (47%)	19 (24%)
Prior to arrival at the Naval Academy, exposed to suspected or confirmed COVID-19 infection?				
Yes	17	9%	3 (18%)	3 (4%)
No	138	76%	14 (82%)	64 (80%)
Don't Know	26	14%	0 (0%)	13 (16%)
Prior to your arrival at the Naval Academy, tested for / diagnosed with COVID-19 infection?				
Yes	16	9%	4 (24%)	74 (93%)
No	165	91%	13 (76%)	6 (8%)

Table 1. Key characteristics of TOSCANA participants

Conclusion. SAR-CoV-2 prevalence in a sample of USNA midshipmen was < 20% at enrollment. A small proportion of subjects seroconverted between the September and December visits. SARS-CoV-2 positivity rose in May, following a COVID-19 outbreak in February and COVID-19 vaccination efforts in March at USNA.

Disclosures. **Jitu Modi, MD**, **GSK** (Speaker's Bureau)

1343. Viral and Bacterial Pneumonia Hospitalizations — New York City, 2001–2016

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Session: P-74. Respiratory Infections - Viral

Background. This study was to investigate the burden and trend of viral and bacterial pneumonia hospitalization in New York City (NYC) from 2001 to 2016.

Methods. We analyzed hospital discharge data for NYC residents during 2001–2016 using Statewide Planning and Research Cooperative System. Annual crude hospitalization rate and percentage of in-hospital all causes death were calculated, using NYC population as denominator. Poisson regression was performed to assess temporal trends of pneumonia hospitalization rate and percentage of in-hospital death from 2001 to 2016.

Results. During 2001–2016, there were 122,324 pneumonia hospitalizations with identified viral or bacterial pathogen in NYC, of which 7,826 (6.4%) were influenza, 13,059 (10.7%) were other viruses, 11,847 (9.7%) were pneumococcus, and 89,592 (73.2%) were other bacteria. From 2001 to 2016, there was significantly increased viral and bacterial pneumonia hospitalization rate, except for pneumococcal pneumonia, and pneumococcal pneumonia had significantly decreased hospitalization rate (p< 0.0001). From 2001 to 2016, the percentage of in-hospital death for viral pneumonia except influenza significantly increased (p=0.0002), whereas decreased for bacterial pneumonia (p< 0.0001). Patients aged ≥65 years old had the highest percentage of in-hospital death among all ages for both viral and bacterial pneumonia, especially there was 19.5% of in-hospital death for pneumococcal pneumonia and 23.4% for other bacterial pneumonia.

Conclusion. While hospital discharge data are subject to limitations particularly for large amount of un-identified pathogens for pneumonia, our analysis showed increased viral activities considering the changes in hospitalization rate and percentage of in-hospital death in NYC during 2001–2016. There was a reduced pneumococcal pneumonia hospitalization rate and percentage of in-hospital death, likely related to the increased vaccine uptake, and a reduced percentage of in-hospital death for overall bacterial pneumonia, likely related to improved antibiotic treatment management. Further studies are warranted to evaluate the necessity of increasing the pneumococcal vaccine coverage in elderly, as well as reducing antimicrobial resistance to improve the management of bacterial infection.

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

1344. Predicting Measles Outbreaks in the United States: Application of Different Modeling Approaches

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Session: P-74. Respiratory Infections - Viral

Background. Although measles is still rare in the United States (U.S.), there have been recent resurgent outbreaks in the U.S. To improve the accuracy of prediction given the rarity of measles events, we used machine learning (ML) algorithms to model measles case predictions at the U.S. county level.

Methods. The main outcome was occurrence of ≥1 measles case at the U.S. county level. Two ML prediction models were developed (HDBSCAN, a clustering algorithm, and XGBoost, a gradient boosting algorithm) and compared with traditional logistic regression. We included 28 predictors in the following categories: sociodemographics, population statistics, measles vaccination coverage, healthcare access, and exposure to measles via international air travel. The models were trained on 2014 case data and validated on 2018 case data. Models were compared using area under the receiver operating curve (AUC), sensitivity, specificity, positive predictive value (PPV), and F2 score (combined measure of sensitivity and PPV).

Results. There were 667 measles cases in 2014 and 375 in 2018 in the U.S. We identified U.S. counties for 635 (95.2%) cases in 2014 and 366 (97.6%) cases in 2018 through published sources, corresponding to 81/3143 (2.6%) counties in 2014 and 64/3143 (2.0%) counties in 2018 with ≥1 measles case. HDBSCAN had the highest sensitivity (0.92), but lowest AUC (0.68) and PPV (0.04) (Table). XGBoost had the highest F2 score (0.49), best balance of sensitivity (0.72) and specificity (0.94), and AUC = 0.92. Logistic regression had high AUC (0.91) and specificity (1.00) but the lowest sensitivity (0.16).

Table. Performance statistics from models predicting measles cases (≥1 case) in U.S. counties

	Sensitivity	Specificity	PPV	F2 score	AUC
Logistic regression	0.16	1.00	0.50	0.18	0.91
XGBoost	0.72	0.94	0.22	0.49	0.92
HDBSCAN	0.92	0.43	0.04	0.16	0.68

XGBoost: Extreme Gradient Boosting; HDBSCAN: hierarchical density-based spatial clustering of applications with noise; PPV: positive predictive value; F2 score: (5 * PPV * Sensitivity) / (4 * PPV + Sensitivity); AUC: area under the receiver operating curve

Conclusion. Machine learning approaches outperformed logistic regression by maximizing sensitivity to predict counties with measles cases, an important criterion to consider to prevent or prepare for future outbreaks. XGBoost or logistic regression could be considered to maximize specificity. Prioritizing sensitivity versus specificity may depend on county resources, priorities, and measles risk. Different modeling approaches could be considered to optimize surveillance efforts and develop effective interventions for timely response.

Disclosures. **Stephanie Kujawski, PhD MPH**, **Merck & Co., Inc.** (Employee, Shareholder) **Boshu Ru, Ph.D.**, **Merck & Co. Kenilworth, NJ (NYSE: MRK)** (Employee, Shareholder) **Amar K. Das, MD, PhD**, **Merck** (Employee) **richard baumgartner, PhD**, **Merck** (Employee) **Shuang Lu, MBA, MS**, **Merck** (Employee) **Matthew Pillsbury, PhD**, **Merck & CO.** (Employee, Shareholder) **Joseph Lewnard, PhD**, **Merck** (Consultant, Grant/Research Support) **James H. Conway, MD, FAAP**, **GSK** (Advisor or Review Panel member)**Merck** (Advisor or Review Panel member)**Moderna** (Advisor or Review Panel member)**Pfizer** (Advisor or Review Panel member)**Sanofi Pasteur** (Research Grant or Support) **Manjiri D. Pawaskar, PhD**, **Merck & Co., Inc.** (Employee, Shareholder)

1345. Patient Perspectives and Journey with Influenza and Seeking Care from US National Survey

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Session: P-74. Respiratory Infections - Viral

Background. In the 2017-2018 influenza season, 49 million people in the US presented with influenza symptoms, resulting in substantial morbidity, mortality, and a significant humanistic and economic burden. Although there are currently four FDA-approved antivirals for influenza, such treatments continue to be widely underutilized. The aim of this study was to better understand the patients' perspective and experience with a flu episode and seeking care during the 2019-2020 influenza season.

Methods. Data were obtained from an online quantitative survey of influenza patients. Participants were recruited from two data sources: A pool of respondents who previously completed the National Health and Wellness Survey (NHWS) (N=74,977) or from Lightspeed M3 Global online "General Panel" (N=500,000+) in the US from January 2020 through May 2020. The sample included patients >18 years of age and having a self-reported diagnosis of influenza by a healthcare professional within the last 90 days. Outcomes related to patient demographics, health-related characteristics and perspectives on the influenza episode were collected.

Results. 1,005 patients were included. Of those, 30.2% visited their primary health care professional (HCP) in person, 20.2% visited urgent care walk-in facility and 19.2% called their HCP. Important aspects of flu treatment included: feeling better quickly (69.5%), not transmitting to others (51.5%), and ease of administration (40.7%); 375 patients were treated with an antiviral. Of those, it took~4.6 days to feel generally better and ~8.8 days to feeling totally better. About 73% of patients took all of their antiviral medication, 9% took "some". 43.9% of respondents considered themselves to be more likely to get serious flu-related complications, 52.5% reported that they were told by an HCP that they belong to a high-risk group that may be more likely

to get flu-related complications. 41.3% reported they did not experience any high risk factors while experiencing influenza.

Conclusion. Influenza patients reported different attitudes and treatment approaches to handling their infection. It is critical to understand what matters most to patients regarding both influenza and treatment to optimally provide outreach and care.

Disclosures. **Nate Way, PhD, Genentech, Inc.** (Grant/Research Support)**Kantar Health** (Employee) **Ashley Martin, PhD, Genentech, Inc.** (Grant/Research Support)**Kantar Health** (Employee) **Chris Wallick, PharmD, MS, Genentech, Inc.** (Employee, Shareholder) **Edward Neuberger, PharmD, MBA, MS, Genentech, Inc.** (Employee, Shareholder) **Mitra Corral, MS, MPH, Genentech, Inc.** (Employee, Shareholder)

1346. The Risk of Readmission after RSV Hospitalization Among Children Younger than 5 Years

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Session: P-74. Respiratory Infections - Viral

Background. Respiratory Syncytial Virus (RSV) is one of the most common causes of childhood lower respiratory tract infection (LRTI) leading to hospitalization worldwide. Readmissions following viral LRTI hospitalization are common, however rates, timing and causes of readmission following RSV LRTI hospitalization are understudied. We evaluated readmissions occurring during 1-year post-discharge of RSV hospitalization.

Methods. We prospectively identified children < 5 years of age hospitalized with laboratory-confirmed RSV LRTI at Primary Children's and Riverton hospitals in Salt Lake City, Utah during the 2019-2020 RSV season. An electronic alert system identified all-cause readmission between November 2019 and April 2021. Discharge diagnoses of readmissions were reviewed by two pediatricians. We calculated the incidence rate of all-cause and respiratory-related readmission.

Results. A total of 297 children had laboratory-confirmed RSV LRTI hospitalizations during the 2019-2020 RSV season, with 24% admitted to the intensive care unit (ICU) during index RSV hospitalization and 24% having a chronic medical condition. During the 1-year follow-up period, 59 readmissions occurred among 47 patients (Table 1). The incidence rate of all-cause and respiratory-related readmission was 19.9 (95%CI 15.5-24.9) and 13.1 (95%CI 9.5-17.5) per 100 patients, respectively. Median age of readmitted patients was 11 months (interquartile range 5.9-11 months). Median number of readmissions was 1 (range: 1-4), with initial readmissions occurring within 28 days (median) of index admission; most (74%) due to a respiratory-related illness. Second and 3rd admissions were less common and occurred at 67 (median) and 160 (median) days respectively. During all readmissions, 19% of children required ICU admission and 25% had chronic medical conditions.

Table 1. Characteristics of readmissions after RSV hospitalization

Characteristics	The number of readmissions per patient			
	One admission (n=47)	Two admissions (n=7)	Three or more admissions (n=5)	All admissions (n=59)
Age at readmission (months)				
Mean (SD)	15.2 (15.1)	18.6 (13.2)	21.4 (9.3)	16.1 (14.5)
Median (IQR)	10.2 (5-20.4)	20.5 (7.7-22.2)	22.2 (21.7-25.3)	11 (5.9-11)
≥1 chronic medical condition (%)	14 (30)	1 (14)	0	15 (25)
Interval between initial admission and readmission (Days)				
Mean (SD)	55.2 (73)	79.4 (28)	185.6 (124.7)	69 (82)
Median (IQR)	28 (4-68.5)	67 (60.5-101)	160 (151-175)	45 (4.4-102)
LOS during readmission (Days)				
Mean (SD)	2.1 (1.6)	3.1 (3.2)	8.8 (7.8)	2.8 (3.3)
Median (IQR)	2 (1-3)	2 (1-3.5)	10 (1-13)	2 (1-3)
PICU admission (%)	8 (17)	2 (29)	1 (20)	11 (19)
Respiratory related (%)	35 (74)	3 (43)	1 (20)	39 (66)
PICU admission (%)	8 (23)	0	0	8 (21)

SD=standard deviation; IQR=Interquartile range; LOS=length of stay; and PICU=pediatric intensive care unit

Conclusion. All cause and respiratory readmission after Initial hospitalization with RSV LRTI commonly occurred among children < 5 years. These data support the need for RSV vaccines and immunoprophylaxis to prevent RSV hospitalization. A further study with a control group is needed to determine the role of RSV in readmission.

Disclosures. **Yoonyoung Choi, PhD, MS, RPh, Merck** (Employee) **Lyn Finelli, DrPH, MS, Merck** (Employee)

1347. Comparison Between SARS-Cov-2, non-SARS-Cov-2 Coronavirus, Influenza and RSV Infections Among Solid Organ Transplant Recipients

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Session: P-74. Respiratory Infections - Viral

Background. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic has been raging since the end of 2019 and has shown worse outcomes in solid organ transplant recipients (SOTR). The clinical differences as well as outcomes between these respiratory viruses have not been well defined in SOTR.

Methods. This is a retrospective cohort study of adult SOTR with nasopharyngeal swab or bronchoalveolar lavage PCR positive for either SARS-CoV-2, non-SARS-CoV-2 coronavirus, influenza, or respiratory syncytial virus (RSV) from January 2017 to October 2020; both inpatient and outpatient. The follow up period was up to three months. Clinical characteristics and outcomes were evaluated. Development of lower respiratory tract infection (LRTI) was defined as new pulmonary infiltrates with or without symptoms. For statistical analysis, Fischer's exact test and log rank test were performed.

Results. During study period, 157 SARS-CoV-2, 72 non-SARS-CoV-2 coronavirus, 100 influenza, 50 RSV infections were identified. Patient characteristics and outcomes are shown in tables 1 and 2, respectively. Secondary infections were not statistically significantly different between SARS-CoV-2 vs. non-SARS-CoV-2 coronavirus and influenza (p=0.25, 0.56) respectively, while it was statistically significant between SARS-CoV-2 and RSV (p=0.0009). Development of LRTI was higher in SARS-CoV-2 when compared to non-SARS-CoV-2 coronavirus (p=0.03), influenza (p=0.0001) and RSV (p=0.003). Admission to ICU was higher with SARS-CoV-2 compared to non-SARS-CoV-2 coronavirus (p=0.01), influenza (p=0.0001) and RSV (p=0.007). SARS-CoV-2 also had higher rates of mechanical ventilation when compared to non-SARS-CoV-2 coronavirus (p=0.01), influenza (p=0.01) and RSV (p=0.03). With time to event analysis, higher mortality with SARS-CoV-2 as compared to non-SARS-CoV-2 coronavirus, influenza, and RSV (p=0.01) was shown (Figure 1).

Table 1: Patient characteristics

Data	SARS-COV-2 N=157	Non-SARS-COV-2 N=72	Influenza N=100	RSV N=50
Gender (female)	64 (40.8%)	33 (46.0%)	43 (43.0%)	29 (58.0%)
Age (years)	55 (46 – 63)	60.5 (42.3-66)	49.5 (39-62)	57 (44 – 68)
Time to infection post- SOT (months)	25 (7.8 – 73)	15 (7.3-40.2)	33 (9.4 – 90)	14.4 (4-44.5)
Maintenance IS				
Prednisone	94 (59.8%)	37 (51.4%)	49 (49.0%)	29 (58.0%)
Calcineurin inhibitor	130 (82.8%)	37 (51.4%)	86 (86.0%)	12 (24%)
Antimetabolites	131 (83.4%)	51 (70.8%)	78 (78.0%)	37 (74.0%)
Kidney transplant	113 (71.9%)	27 (38%)	58 (58.0%)	26 (52.0%)
Liver transplant	15 (9.6%)	6 (%)	10 (10.0%)	7 (14.0%)
Lung transplant	3 (1.9%)	20 (27.8%)	6 (6.0%)	7 (14.0%)
Heart transplant	12 (7.6%)	9 (12.5%)	13 (13.0%)	2 (4.0%)
Other/combined transplant	14 (8.9%)	10 (13.9%	13 (13.0%)	7 (14.0%)
ANC (10^3 cells/μL)	3.7 (2.4 – 6.1)	4.5 (3.2 – 7.2)	4.3 (3 – 6.7)	4.9 (3.5-8.4)
ALC (10^3 cells/μL)	0.7 (0.4 – 1.2)	0.7 (0.5 – 1.2)	0.6 (0.3–1.2)	0.5 (0.3-1.1)

Table 2: Outcomes

	SARS-COV-2 N=157	Non-SARS-COV-2 N=72	Influenza N=100	RSV N=50
Lower respiratory tract infection	103/130 (79.2%)	38/60 (63.3%)	45/95 (47.4%)	26/46 (56.5%)
Secondary infection	43 (27.4%)	17 (23.6%)	24 (24.0%)	3 (6.0%)
Intensive care unit admission	44 (28.0%)	9 (12.5%)	7 (7.0%)	5 (10.0%)
Mechanical ventilation	25 (15.9%)	3 (4.2%)	6 (6.0%)	2 (4.0%)
Rejection	13 (8.2%)	4 (5.6%)	7 (7.0%)	4 (8.0%)
Mortality at 90 days	21 (13.4%)	3 (4.2%)	5 (5.0%)	1 (2.0%)

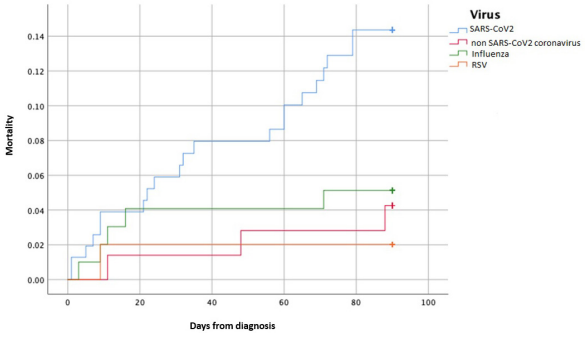

Figure 1. Kaplan Meier Curve: Comparison of Mortality between SARS-CoV-2, non-SARS-CoV-2 coronavirus, influenza and RSV