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

**Disclosures.** Amy Joyce, NP, Kadmon (Advisor or Review Panel member) Lewis A. Novack, MS, Lumicell Inc. (Scientific Research Study Investigator, Research Grant or Support) Precision Healing, Inc. (Scientific Research Study Investigator, Research Grant or Support) David Walt, PhD, Quanterix Corporation (Board Member, Shareholder) Robert Soiffer, MD, alexion (Consultant) gilead (Advisor or Review Panel member) Jazz (Advisor or Review Panel member) Juno/ bms (Advisor or Review Panel member) kiadis (Board Member) precision bioscience (Consultant) Rheos (Consultant) takeda (Consultant) Nicolas C. Issa, MD, AiCuris (Scientific Research Study Investigator) Astellas (Scientific Research Study Investigator) GSK (Scientific Research Study Investigator) Merck (Scientific Research Study Investigator)

**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**

Kelly Zalocusky, PhD; Devika Chawla, PhD MSPH; Margaret Neighbors, PhD; Shemra Rizzo, PhD; Larry Tsai, MD; Genentech, Inc., South San Francisco, California

**Session:** O-06. COVID-19 Complications, Co-infections and Clinical Outcomes 1

**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^-4) and age (RR: 1.02, 95% CI: 1.01, 1.03; P=4.63 x 10^-4) 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^-3), number of high-risk comorbidities (RR: 1.18, 95% CI: 1.12, 1.24; P=3.85 x 10^-3), 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 (+) | PValue |
|-----------------------------|---------|---------|---------|---------|--------|
| n                           | 22,813  | 22,503  | 110     |         | <0.001 |
| Age, median (Q1, Q3), years | 55.0 (40.0, 66.0) | 54.0 (40.0, 66.0) | 64.0 (58.0, 71.0) |         | <0.001 |
| US region, n (%)            |         |         |         |         | 0.037  |
| Midwest                     | 728     | 7128    | 36.2    | 36.2    | 46.2   |
| Northwest                   | 7854    | 7784    | 35.8    | 35.7    | 41    |
| South                       | 4059    | 4014    | 21.3    | 21.3    | 17.5   |
| West                        | 1475    | 1467    | 6.7     | 6.6     | 5.4    |
| African American            | 5222    | 5070    | 35.7    | 35.6    | 19.2   |
| Race, n (%)                 |         |         |         |         | 0.012  |
| Asian                       | 726     | 712     | 4.2     | 4.2     | 5.5    |
| Caucasian                   | 10.46   | 10.39   | 67      | 67      | 73.8   |
| Ethnicity, n (%)            |         |         |         |         | 0.582  |
| Hispanic                    | 2289    | 2298    | 23.5    | 23.5    | 20.9   |
| Non-Hispanic                | 15.540  | 15.463  | 77      | 77      | 77.9   |
| Sex, n (%)                  |         |         |         |         | 0.43   |
| Female                      | 0       | 11,230  | 49.7    | 49.7    | 49.5   |
| Male                        | 11,333  | 11,323  | 50.3    | 50.3    | 50     |
| Overweight, n (%)           | 0       | 14.910  | 64.4    | 64.4    | 67.3   |
| Yes                         | 8103    | 8056    | 35.8    | 35.8    | 47.2   |

---

**Table 2. Percent Responders after Vaccine Series Completion**

| Local Events | Systemic Events |
|--------------|-----------------|
| Reaction     | Reaction        |
| Percentage   | Percentage      |

---

**Figure 1. Response Rate to COVID-19 Vaccination**

**Figure 2: Response Rate to COVID-19 Vaccination**

**Figure 3. Solicited Local and Systemic Adverse Events**

---

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

**Disclosures.** Amy Joyce, NP, Kadmon (Advisor or Review Panel member) Lewis A. Novack, MS, Lumicell Inc. (Scientific Research Study Investigator, Research Grant or Support) Precision Healing, Inc. (Scientific Research Study Investigator, Research Grant or Support) David Walt, PhD, Quanterix Corporation (Board Member, Shareholder) Robert Soiffer, MD, alexion (Consultant) gilead (Advisor or Review Panel member) Jazz (Advisor or Review Panel member) Juno/ bms (Advisor or Review Panel member) kiadis (Board Member) precision bioscience (Consultant) Rheos (Consultant) takeda (Consultant) Nicolas C. Issa, MD, AiCuris (Scientific Research Study Investigator) Astellas (Scientific Research Study Investigator) GSK (Scientific Research Study Investigator) Merck (Scientific Research Study Investigator)
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.

Disclosures. Kelly Zalocusky, PhD, F. Hoffmann-La Roche Ltd (Shareholder)Genentech, Inc. (Employee)Genentech, Inc. (Employee)Devika Chawla, PhD MSPH, F. Hoffmann-La Roche Ltd. (Shareholder)Genentech, Inc. (Employee)Margaret Neighbors, PhD, F. Hoffmann-La Roche Ltd. (Shareholder)Genentech, Inc. (Employee)Shemra Rizzo, PhD, F. Hoffmann-La Roche Ltd. (Shareholder)Genentech, Inc. (Employee)Larry Tsai, MD, F. Hoffmann-La Roche Ltd (Shareholder)Genentech, Inc. (Employee)

Session: O-06. COVID-19 Complications, Co-infections and Clinical Outcomes 1

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 2. Selected Baseline Risk Factors for Incident Dyspnea

| Risk Factors | Missing | Overall | Dyspnea | Dyspnea (%) | P Value |
|-------------|---------|---------|---------|-------------|---------|
| Age, median (Q1, Q3), years | 0 | 59.0 | 54.0 | 58.0 | <0.001 |
| US region, n (%) | Midwest | 728 (36.2) | 750 (36.0) | 418 (41.8) | <0.001 |
| Race, n (%) | Asian | 726 (4.2) | 686 (4.2) | 28 (3.2) | 0.11 |
| Ethnicity, n (%) | Hispanic | 2290 | 4774 (23.5) | 4625 (23.9) | 149 (15.5) | 0.075 |
| Sex, n (%) | Male | 11383 | 10980 (50.3) | 543 (52.4) | <0.001 |
| Overweight, n (%) | Yes | 8103 (35.8) | 7628 (35.4) | 475 (45.8) | <0.001 |

Table 1. Co-infections and antimicrobial use in patients hospitalized with COVID-19

| Number of subjects | First wave (n=4307) | Late Pandemic (n=7213) | Total (n=11510) |
|-------------------|---------------------|------------------------|-----------------|
| Blood culture sent | 2454 (57.5%) | 1540 (53.0%) | 3994 (54.6%) |
| Blood cultures positive < 48 hours of admission | 68 (1.5%) | 47 (1.4%) | 115 (1.6%) |
| Total positive blood cultures | 236 (4.8%) | 125 (4.3%) | 361 (3.1%) |
| Sputum culture sent | 768 (17.8%) | 359 (12.4%) | 1127 (15.9%) |
| Sputum cultures positive < 48 hours of admission | 59 (1.2%) | 25 (1.2%) | 96 (1.3%) |
| Total positive sputum cultures | 307 (7.1%) | 130 (4.5%) | 437 (3.8%) |
| Non-SARS-CoV-2 respiratory pathogens positive on multiplex PCR | 16 (0.4%) | 5 (0.2%) | 21 (0.2%) |
| Antimicrobial received | 3558 (72.6%) | 1565 (51.1%) | 5123 (44.6%) |
| Anti-inflammatory antimicrobial received | 3051 (70.8%) | 1465 (40.4%) | 4516 (40.2%) |
| Anti-inflammatory steroid/LAXT prec honoured | 1187 (27.6%) | 627 (21.6%) | 1814 (15.8%) |
| 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 1, 2020) and late pandemic, along with rates of antimicrobial use observed during these respective periods of observation.