BMI improved from 0.01 kg/m^2 (95% CI, −0.07–0.09 kg/m^2) to 0.33 kg/m^2 (95% CI, 0.23–0.43 kg/m^2). There was no change in BMI z-scores. Number of hospitalizations decreased from 2,656 to 1,957 ($p < 0.01$). Virtual outpatient consultations increased from 8% of toal outpatient consultations before pandemic onset to 47% during the pandemic. There was an increase in average number of consultations per patient from a median of 4 (interquartile range 2–5) to 5 (interquartile range 3–6) ($p < 0.01$).

Conclusions: In the 12 months after the onset of the COVID-19 pandemic, improvement was observed in the clinical outcomes of people with CF and the model of care delivery changed from the pre-pandemic period. Health care teams must consider how best to deliver care in light of improved outcomes observed during the COVID-19 pandemic.

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Medication adherence and lung function changes with elexacaftor/tezacaftor/ivacaftor treatment

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Background: Introduction of triple combination therapy (TCT) with elexacaftor/tezacaftor/ivacaftor improves clinical measures in many people with cystic fibrosis (PwCF). Anecdotally, many PwCF respond to improved clinical status by reducing adherence to routine CF care, including inhaled medications, but the extent to which this occurs and clinical consequences of reduced adherence are unknown.

Methods: To address this question, we identified all PwCF undergoing CFTR modulator therapy from our pharmacy database. Medication adherence measured according to medication possession ratio (actual months filled/prescribed months) for modulators and inhaled medications hypertonic saline (HTS) and dornase alpha were assessed and compared with clinical outcome measures.

Results: Three hundred eleven PwCF had three or more CFTR modulator prescriptions filled from November 2016 to August 2021, of whom 235 had three or more fills for TCT. Medication adherence was high across all modulators (0.99 ± 0.10 for ivacaftor alone, 0.98 ± 0.09 for lumacaftor/ivacaftor, 0.97 ± 0.11 for tezacaftor/ivacaftor, 1.02 ± 0.20 for TCT). Lung function values were available for 156 PwCF before and after TCT initiation, demonstrating the expected increase in percentage predicted forced expiratory volume in 1 minute (FEV_1pp) values with treatment (76.2 ± 24.6 vs 84.1 ± 24.8, $p < 0.003$), although rate of change in FEV_1 per year remained negative after modulator therapy, with a trend toward a more-negative slope after treatment initiation (−0.7 ± 5.1 vs −1.5 ± 6.1, $p = 0.15$). Adherence to HTS and dornase also declined after TCT initiation within the group as a whole (negative slope in medication possession ratio with time) and was most evident in those who regularly filled these prescriptions through our pharmacy (n = 46 and n = 37, respectively), in whom adherence was greater than 80% and steady over time before TCT but fell to 69% and 73%, respectively, with a negative slope over time after TCT (Figure 1). Adherence to pancreatic enzymes (n = 52) followed a similar pattern, although changes in adherence to HTS or dornase after modulator therapy were not associated with lung function or changes in lung function over time.

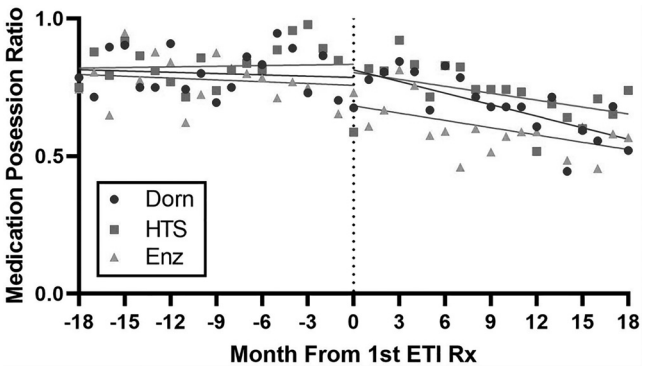

Figure 1. Medication possession ratio for dornase (Dorn), hypertonic saline (HTS), and pancreatic enzymes (Enz) relative to time before and after first prescription for elexacaftor/tezacaftor/ivacaftor (ETI)

Conclusions: In this real-world study, PwCF undergoing TCT were strongly adherent to modulator therapy, with substantial gains in lung function but continued decline in lung function over time. Although continued lung function decline on TCT could reflect the observed decrease in adherence to inhaled CF therapies, we did not observe a direct correlation between lung function and adherence. Further study will be needed to determine whether declines in lung function after TCT are sustained or reflect short-term changes in approach to CF care with highly effective modulator treatment.

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Multi-center cohort study exploring the impact of the first U.K. COVID-19 lockdown on nebulizer use in adults with cystic fibrosis in the CFHealthHub learning health system

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Background: Promoting adherence to preventative inhaled therapy in cystic fibrosis (CF) is challenging despite a clear association with better outcomes. Motivation to maintain adherence is one aspect of the complex process required for sustained behavior change. Fear is recognized as an acute motivator, and the COVID-19 pandemic created a significant fear stimulus, especially in people with underlying respiratory disease. The objective of this study was to explore changes in nebulizer use in response to the COVID-19 pandemic.

Methods: This 16-center cohort study involved more than 60% of adult CF centers in England through the CFHealthHub learning health system. CFHealthHub was established in 2015 to help promote adherence to nebulized therapy. It provides people with CF and their clinicians objective usage information through nebulizers with real-time electronic data capture capability. We explored the association between the first U.K. national lockdown (March 23, 2020, to May 28, 2020) and nebulizer use, using the mixed-effect multilevel model adjusted for potential confounders including age (fitted as a nonlinear term), sex, and deprivation index.

Results: We included 581 adults with CF participating in CFHealthHub between September 1, 2019, and August 21, 2020. Mean age was 34; 49% participants were female. The range of mean weekly nebulizations per patient increased from 9 to 12 to 12 to 14 in the week after the first U.K. national lockdown before decreasing to 11 to 12 throughout the rest of the study period (Figure 1). The association between lockdown and nebulizer

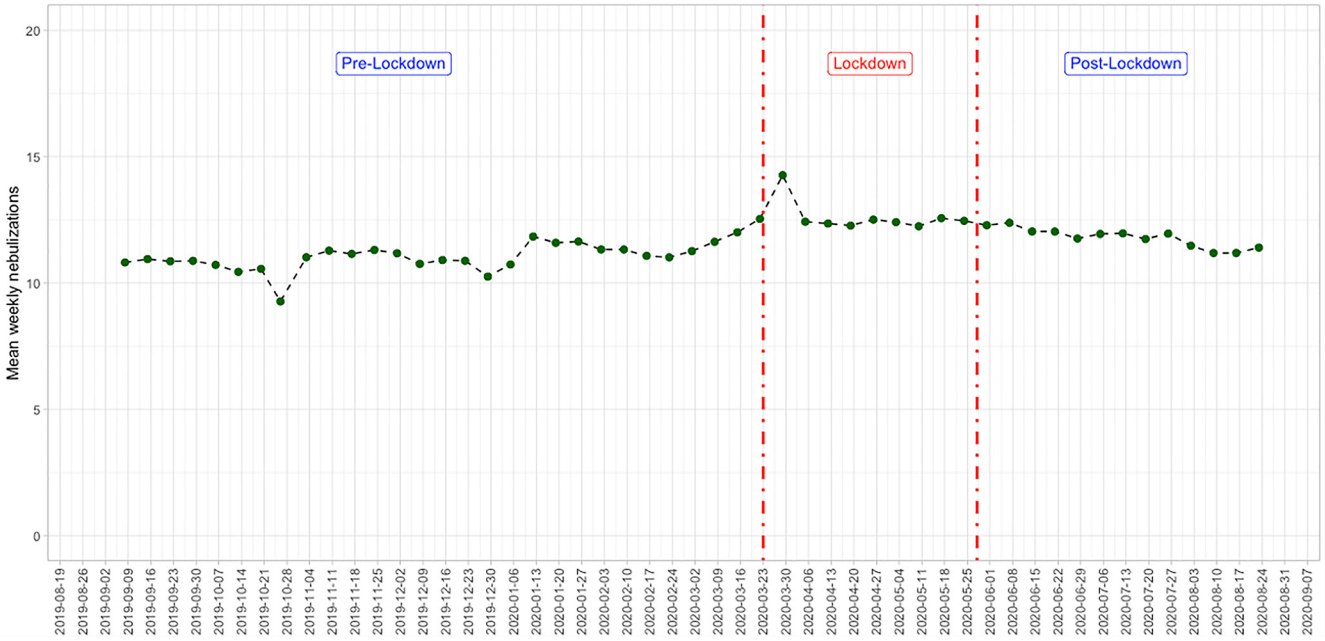

Figure 1 (abstract 50): Mean weekly nebulizations in 581 adults with cystic fibrosis at 16 U.K. centers between September 2019 and August 2020.

use was attenuated after adjusting for age, sex, and deprivation index (adjusted odds ratio = 0.96, 95% CI, 0.89–1.07).

Conclusions: We did not find a sustained change in nebulizer use in response to the first U.K. national lockdown. This may support the assertion that behavior change with respect to sustained increased nebulizer use may not be achieved when focusing on motivational aspects, especially fear, alone.

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Outcomes after SARS-CoV-2 infection in Canadians with cystic fibrosis: Analyses using the Canadian Cystic Fibrosis Registry

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Background: Two years into the COVID-19 pandemic, global studies, based mostly on data from the United States and Europe, have identified risks of severe disease after SARS-CoV-2 (the virus that causes COVID-19) infection, but literature on the impact of infection on clinical outcomes specific to the Canadian cystic fibrosis (CF) community is lacking. The objectives of this study were to determine the risk of hospitalization of Canadians with CF after SARS-CoV-2 infection and describe the change in lung function after infection.

Methods: Information on individuals with a confirmed SARS-CoV-2 infection between January 1, 2020, and December 31, 2021, was retrieved from the Canadian CF Registry; participants were followed until March 31, 2022. Age was defined as age at time of infection. Baseline clinical measurements were considered to the most recent measurement in the year before infection. Lung function was measured as percentage predicted forced expiratory volume in 1 second (FEV_1pp). Children younger than 6 were assumed to have FEV_1pp of 70% or greater. Nutritional status was measured using body mass index. For the first objective, the outcome of interest was hospitalization for which SARS-CoV-2 infection was a precipitating event. Factors associated with hospitalization were assessed using logistic regression and presented as odds ratios with confidence intervals. For the second objective, the outcome of interest was change in FEV_1pp from baseline to first measurement after infection, which was assessed using the Wilcoxon signed-rank test for matched pairs. For descriptive analyses, continuous variables were summarized using median and interquartile range and categorical variables using frequency and proportion. Some results may be suppressed to reduce risk of identification of individuals.

Results: There were 145 individuals (44 children; 101 adults aged ≥18) with a positive test for SARS-CoV-2 recorded in the Canadian CF Registry during the study period. The characteristics of these individuals are summarized in Table 1, stratified according to hospitalization status. Seven individuals were admitted to the intensive care unit, and fewer than five died during follow-up. After adjusting for sex, those post-transplant (n = 14 in hospitalized group, n = 6 in not hospitalized group) were significantly more likely to be hospitalized (OR 33.5, 95% CI, 10.1–111.0). In a subset of 71 patients with at least one FEV_1pp before and at least one after infection, there was no significant difference in median baseline FEV_1pp between those who were and were not hospitalized. Change in FEV_1pp was not significant in those hospitalized (median –0.5%, IQR –4.9–2.8%; p = 0.79) or not hospitalized (median 0.2%, IQR –3.7–3.9%; p = 0.49). Ongoing analyses to assess the impact of baseline FEV_1pp and time of infection on risk of hospitalization and to calculate the rate of decline in FEV_1pp after infection will be available for the North American Cystic Fibrosis Conference.

Conclusions: Canadian transplant recipients with CF were more likely than those not transplanted to be hospitalized after SARS-CoV-2 infection. Change in baseline lung function was neither clinically nor statistically significant, although this relationship should be further explored as more follow-up data become available.

Acknowledgements: We would like to acknowledge the involvement and continued participation of individuals with CF who consent to having their data submitted and the contribution of CF clinic team members who enter the data.