care centers, only a few patients from each center are included in this preliminary analysis. Future steps for the Tennessee and Mississippi consortium include analysis of the full patient population in the periods immediately before and after approval of ELX/TEZ/IVA to determine the effects of ELX/TEZ/IVA and the pandemic on observed CF outcomes. Culture positivity for acid-fast bacilli will be assessed. Data from children with CF will be compared with data from adults with CF.

Acknowledgements: CF Center Registry Coordinators for Tennessee and Mississippi, Rumana Siddique, PhD, Statistician, Memphis, TN

References

[1] Heijerman HGM, McKone EF, Downey DG, Van Braeckel E, Rowe SM, Tullis E, *et al.* Efficacy and safety of the elexacaftor plus tezacaftor plus ivacaftor combination regimen in people with cystic fibrosis homozygous for the F508del mutation: a double-blind, randomised, phase 3 trial. *Lancet* 2019; 394(10212):1940–8.

[2] Middleton PG, Mall MS, Dřevínek P, Lands LC, McKone EF, Polineni D, *et al.* Elexacaftor-tezacaftor-ivacaftor for cystic fibrosis with a single Phe508del allele. *N Engl J Med* 2019;381(19):1809–19.

[3] U.S. Food and Drug Administration. Novel Drug Approvals for 2019. https://www.fda.gov/drugs/new-drugs-fda-cders-new-molecular-entities-and-new-therapeutic-biological-products/novel-drug-approvals-2019.

[4] Zemanick ET, Taylor-Cousar JL, Davies J, Gibson RL, Mall MA, McKone EF, *et al.* A phase 3 open-label study of elexacaftor/tezacaftor/ivacaftor in children 6 through 11 years of age with cystic fibrosis and at least one F508del allele. *Am J Respir Crit Care Med* 2021;203(12):1522–32.

[5] Miller AC, Harris LM, Cavanaugh JE, Alaiwa MA, Stoltz DA, Hornick DB, *et al.* The rapid reduction of infection-related visits and antibiotic use among people with cystic fibrosis after starting elexacaftor-tezacaftor-ivacaftor. *Clin Infect Dis* 2022; ciac117. https://doi:10.1093/cid/ciac117.

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Trends in Canadian cystic fibrosis health care use amidst the COVID-19 pandemic

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Background: The COVID-19 pandemic has resulted in widespread changes in health care use for Canadians with cystic fibrosis (CF). The objective of this analysis is to describe the impact of the COVID-19 pandemic on the delivery of usual CF health care.

Methods: The Canadian Cystic Fibrosis Registry is a national repository of longitudinal data from 42 CF clinics across Canada. This study included data on clinic visits (including virtual and telemedicine), hospitalizations, home intravenous (IV) medicine courses, and microbiology cultures recorded in the registry from 2016 to 2020. Clinical measurements typically collected during clinic visits include height, weight, and lung function—measured as percentage predicted forced expiratory volume in 1 minute (FEV_1pp). Lung function is not typically measured in young children, so analyses of FEV_1pp are restricted to individuals aged 6 and older. Health care use is described as the proportion of individuals who had at least one recorded measurement or encounter in the reporting year.

Results: The number of clinic visits, hospitalizations, and home IV medicine courses recorded monthly in the registry remained relatively stable from 2016 to 2019, averaging 1,528 clinic visits, 130 hospitalizations, and 81 home IV medicine courses per month from 2016 to 2019. With the declaration of the COVID-19 pandemic in early March 2020, the overall number of CF health care encounters decreased substantially. There were 29.7% fewer clinic visits in April 2020 than in April 2019, 67.6% fewer pulmonary exacerbation (PEx) hospitalizations, and 39.6% fewer home IV courses. Looking at month-to-month changes in 2020, the trends in health care encounters appear to be inversely related to the number of COVID-19 cases recorded in Canada—although infection rates increased, CF health care use decreased. The proportion of individuals with at least one FEV_1pp measurement decreased from a mean of 97.0% during 2016 to 2019 to 89.0% in 2020, PEx hospitalizations decreased from a mean of 20.9% during 2016 to 2019 to 14.8% in 2020, and microbiology cultures (excluding COVID-19) decreased from a mean of 92.6% during 2016 to 2019 to 85.4% in 2020. It follows that the mean number of health care encounters (e.g., FEV_1pp and body mass index measurements, clinic visits, microbiology cultures) recorded per individual was also lower in 2020 than over the previous 4 years (Figure 1).

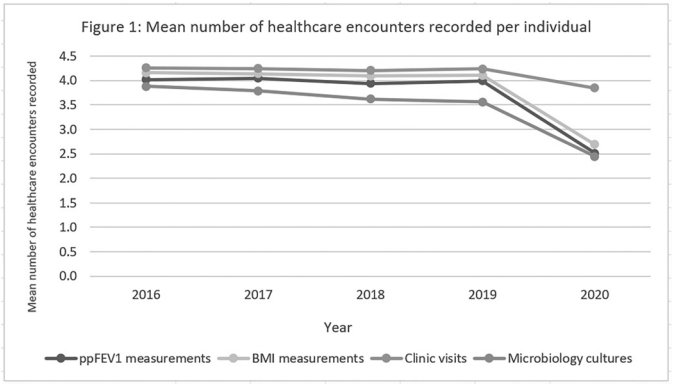

Figure 1. Mean number of health care encounters recorded per individual

Conclusions: The reduction in number of health care encounters for Canadians with CF provides insight into the impact of COVID-19 on delivery of CF care in 2020. The resulting lack of objective measurements typically assessed during clinic visits, such as lung function or new-onset infections, may not be appreciated or recognized until later than usual. Coinciding with the COVID-19 pandemic, some Canadians with CF also became eligible for the highly effective modulator therapy elexacaftor/tezacaftor/ivacaftor, which could be a confounding factor in the decrease in number of clinic visits or hospitalizations. Disentangling the combined effects of these events on the delivery of CF care will be an important subject for future analysis.

Acknowledgements: We would like to acknowledge the involvement and continued participation of those living with CF who consent to having their data submitted and the exceptional effort and contribution from CF clinic team members who collect and enter the data.

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Cutaneous rash with elexacaftor/tezacaftor/ivacaftor in children with cystic fibrosis

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Background: Elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA) is a triple-therapy modulator used to treat patients with cystic fibrosis (CF) since late 2019. It was approved in June 2021 for clinical use in children aged 6 to 11. Clinical trials of ELX/TEZ/IVA have reported skin rash as a commonly observed side effect. The rash is reported to be mild to moderate in severity and self-resolving in most cases. Clinical trials have also reported that the rash is more commonly seen in younger children (24% in aged 6–11) and children and adults with a single delta F508 mutation [1–3].

Methods: A retrospective chart review was conducted in all pediatric patients aged 6 and older with CF prescribed ELX/TEZ/IVA between October 2019 and April 2022. Patients were excluded if they were started on this

therapy from an outside institution or never started therapy. The primary endpoint was occurrence of rash. Age, sex, genotype, and incidence of rash were compared between the younger (6–11 years, n = 14) and older (≥12, n = 22) children. Data analysis included descriptive statistics and chi-square.

Results: Of 39 patients prescribed ELX/TEZ/IVA during the study period, 36 were included in the study. Two patients were excluded because they never started therapy and one because they started therapy at an outside CF center. The rash was observed in 28.6% of younger children and 9% in older children ($p = 0.13$). Of the six total children that had the rash, four had a single delta F508 mutation: three in the younger children and one in the older children ($p = 0.54$). Four children required interruption of therapy, and one child had a recurring rash after the medication was restarted (Figure 1). The rash was described as a mildly pruritic, erythematous, maculopapular rash mostly observed on the back, abdomen, and extremities, sparing the palms, soles, and face.

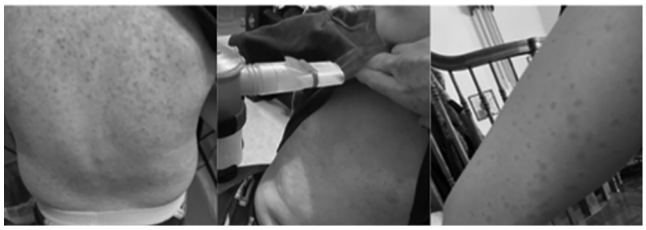

Figure 1. Rash after therapy initiation with elexacaftor/tezacaftor/ivacaftor

Conclusions: We have noted a higher incidence of rash in younger children and a higher percentage of rash in children with a single delta F508, which is similar to the observation in clinical trials. Even though one patient presented with recurrent rash, all patients eventually experienced resolution of rash. The pathophysiology of the rash with this triple therapy modulator remains unclear.

References

[1] Middleton PG, Mall MA, Dřevínek P, Lands LC, McKone EF, Polineni D, *et al.* Elexacaftor/tezacaftor/ivacaftor for cystic fibrosis with a single Phe508del allele. *N Engl J Med* 2019;381(19):1809–19.

[2] Heijerman HGM, McKone EF, Downey DG, Van Braeckel E, Rowe SM, Tullis E, *et al.* Efficacy and safety of the elexacaftor plus tezacaftor plus ivacaftor combination regimen in people with cystic fibrosis homozygous for the F508del mutation: A double-blind, randomised, phase 3 trial. *Lancet* 2019;394(10212):1940–8.

[3] Zemanick ET, Taylor-Cousar JL, Davies J, Gibson RL, Mall MA, McKone EF, *et al.* A phase 3 open-label study of elexacaftor/tezacaftor/ivacaftor in children 6 through 11 years of age with cystic fibrosis and at least one *F508del* allele. *Am J Respir Crit Care Med* 2021;203(12):1522–32.

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Relationship between post-transfer outcomes and continuity of recommended care during health care transitions in cystic fibrosis

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Background: During health care transitions, adolescents and young adults (AYAs) with cystic fibrosis (CF) are at risk of discontinuity of recommended care. Despite efforts to improve transitions, outcomes after transfer to adult care remain poorly understood. Although biomedical (e.g., body mass index (BMI), lung function) and behavioral (e.g., clinic attendance) outcomes are important indicators of successful transition for AYAs with CF, little research has explored the effect of gaps in care during transitions on post-transfer outcomes. The purpose of this study was to examine post-transfer biomedical and behavioral outcomes for AYAs at one academic medical center. We hypothesized that outcomes would be poorer for AYAs who experienced a gap in care of longer than 90 days (e.g., not maintaining recommended quarterly visits).

Methods: We analyzed 2008 to 2019 data from the Cystic Fibrosis Foundation Patient Registry. Patients who transferred from the pediatric to the adult CF clinic at one medical center were included; patients were excluded if a pediatric visit occurred after an adult visit or if patients transferred to a different adult CF clinic. Gap in care was measured as longer than 90 days between the last pediatric outpatient visit and the first adult care outpatient visit. Variables of interest included demographic characteristics (sex, ethnicity), biomedical outcomes (lung function measured as Global Lung Initiative percentage predicted forced expiratory volume in 1 second predicted (FEV_1pp), BMI), and behavioral outcomes (clinic attendance measured as number of annual visits). BMI and lung function measured at the annual review were used. AYAs with missing outcome data were excluded from analysis. Data were analyzed using descriptive statistics and paired T-tests stratified according to gap in care with SAS statistical software (Version 9.4).

Results: During 2008 to 2019, 49 AYAs transferred from pediatric to adult care (47% female, 25% Hispanic). Median days between pediatric and adult care was 194 (interquartile range 156 days). Only 14.3% (n = 7) were seen for a first adult CF visit within 90 days, with 85.7% (n = 42) experiencing a gap longer than 90 days. Lung function was significantly lower in adult care than in pediatric care for those with a gap longer than 90 days than for those without a gap. There were no changes in BMI or annual clinic visits for either group (Table 1).

Conclusions: In this sample, gaps in care longer than 90 days during the transition period were associated with a decrease in lung function; maintenance of recommended quarterly visits may support preservation of lung function during transition. We recommend that future research develop and test interventions to decrease gaps in care. In addition, analysis of larger data sets followed over longer time periods may help determine whether lost lung function is regained, as well as the effect of recent CF modulator therapies on post-transfer outcomes. Limitations of this study include small sample size with only 1 year of follow up data,

Table 1 (abstract 39):

Table 1.
Biomedical and behavioral outcomes stratified by gap in care

Gap in care	Outcome	n	Mean value, pediatric care (SD)	Mean value, adult care (SD)	*p* value
>90 days	FEV1% pred.	38	73.6% (22.4)	69.4% (25.9)	**<0.01**
No gap	FEV1% pred.	<5	76.6% (11.8)	77.6% (16.2)	0.73
>90 days	BMI	38	20.7 (2.3)	20.9 (2.6)	0.26
No gap	BMI	<5	24 (4.4)	23.7 (4.4)	0.30
>90 days	Annual visits	42	4.8 (2.1)	4.9 (2.7)	0.89
No gap	Annual visits	6	4.3 (1.8)	5.3 (3)	0.20