



RISKS OF LOW ADHERENCE IN PEDIATRIC PATIENTS WITH CYSTIC FIBROSIS

SPECIALTY PHARMACY SERVICES

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BACKGROUND

- Cystic fibrosis (CF) can require complex maintenance regimens averaging 10 (±5) medications a day¹
- Clinical outcomes for these patients include pulmonary exacerbations (PEX), hospitalizations, % predicted forced expiratory volume in 1 second (FEV₁), and BMI^{1,2}
- With CF transmembrane conductance regulator modulators (CFTRm), outcomes have improved, but adherence rates have dropped as patients start to feel better^{1,3,4}
- Proportion of days covered (PDC) is the preferred method for assessing adherence⁵
- PDC is the ratio of number of days a patient is "covered" by the medication to number of days the patient is eligible to have the medication on hand⁵

OBJECTIVES

To examine adherence profiles for different specialty medications in pediatric patients with CF and identify associated risks with low, medium, and high adherence to specific specialty medications: CFTRm, dornase alfa, and inhaled antibiotics.

METHODS

- Single-center, retrospective cohort study examining adherence of specialty medications filled at CHOC Specialty Pharmacy (stratified into high (PDC ≥80%), medium (PDC ≥50-80%), and low (PDC <50%) to explore associations with baseline characteristics and clinical outcomes
- Patients were excluded if they only had a single-fill at CHOC Specialty Pharmacy
- Primary outcome:** average PDC for each medication class
- Secondary outcomes:** PEX, hospitalizations, % predicted FEV₁, and changes in BMI.

Inclusion Criteria

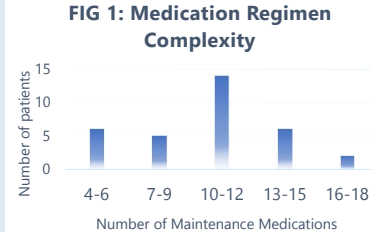
- Males and females <21 years old
 - Confirmed CF diagnosis
 - Enrolled into CHOC Specialty Pharmacy from January 1, 2021 to March 31, 2022
- AND ≥2 fills during the study period of the following
- Ivacaftor (Kalydeco)
 - Tezacaftor/Ivacaftor (Orkambi)
 - Lumacaftor/Ivacaftor (Symdeko)
 - Elexacaftor/Tezacaftor/Ivacaftor (Trikafta)
 - Dornase alfa (PULM)
 - Tobramycin inhalation powder/solution (TIP/TIS)
 - Colistimethate inhaled (COLI)

PATIENT POPULATION

TABLE 1: Baseline Characteristics

	n (%)	Mean (SD)
Age (years)		12.5 (5.1)
Gender		
Male	18 (54.5)	
Female	15 (45.5)	
Ethnicity		
Black	1 (3.0)	
Hispanic	18 (27.3)	
White	12 (36.4)	
Other	2 (6.1)	
On CFTRm	24 (32.8)	
On CFTRm prior to study	17 (51.5)	

- 40 patients with CF received a prescription from CHOC Specialty from 1/1/2021-3/31/22
- 7 patients had a single fill only and were transferred elsewhere
- 33 patients enrolled in CHOC Specialty pharmacy with ≥2 fills during the study period



RESULTS

TABLE 2: Average PDC and number of patients for each medication class per quarter

	Q1		Q2		Q3		Q4		Q5		Q1-5	
	N	avg PDC % (SD)	N	avg PDC % (SD)	N	avg PDC % (SD)	N	avg PDC % (SD)	N	avg PDC % (SD)	N	avg PDC % (SD)
CFTRm	17	97.2 (4.6)	16	93.1 (6.7)	18	96.6 (4.6)	20	91.7 (9.4)	20	96.5 (4.7)	24	95.5 (3.8)
Inhaled Antibiotics	6	87.0 (19.5)	6	96.0 (7.0)	8	90.7 (12.7)	8	87.0 (20.1)	10	87.0 (19.7)	10	90.4 (10.2)
PULM	15	86.1 (24.7)	17	79.5 (25.8)	17	81.6 (25.3)	17	85.6 (25.2)	17	89.1 (17.8)	19	84.8 (20.9)

TABLE 3: BMI and predicted FEV1 by medication class and adherence

	PDC	Lower Limit (kg/m ²)	Upper Limit (kg/m ²)	Avg of Lowest FEV1 % during study	Avg of Highest FEV1 % during study
CFTRm	HIGH	18.48	21.32	100.43	98.99
	LOW	20.26	26.1	75.26	92.26
PULM	MED	17.15	18.89	101.10	114.30
	LOW	16.76	19.22	85.74	109.00
TIP	HIGH	20.54	39.85	79.53	84.93
	MED	18.35	19.63	55.10	77.40
TIS	HIGH	20.11	21.81	85.77	107.85
	MED	19.73	21.48	57.60	88.80
COLI	HIGH	15.24	26.68	50.65	69.40
	MED	19.73	21.48	57.60	88.80

DISCUSSION

- The average PDC for the CFTRms were >95%, dornase alfa 84.9%, TIP 86.9%, TIS 86.7%, and COLI 92%
- 11 patients had multiple pulmonary exacerbations within the study period, five which led to hospitalizations
 - Only one of these patients had a CFTRm, Trikafta
- The mean baseline FEV1 was 82.3 (SD 35.83%) and mean BMI was 19.71 kg/m² (SD 5.35 kg/m²)
- CFTRm have a consistently higher level of adherence over inhaled therapies
- There were more hospitalizations among patients not on CFTRm
- Qualitatively, if patients were on CFTRm, low adherence to other therapies did not lead to increased PEX
- Limitations: small sample size, not enough patients with varied adherence to assess correlations
- Unable to calculate PDC for medications filled at outside pharmacies
- Future directions can include time studies to find longitudinal associations to clinical outcomes

CONCLUSION

Higher adherence to CFTRm may have a larger impact on clinical outcomes over adherence to other inhaled therapies. This study is not powered enough to show associations between risk factors and level of adherence, however more research is needed with a larger sample size to draw more concrete conclusions.

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