Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

decrease in respiratory cultures growing *P. aeruginosa* likely reflects these phenomena. A confounding factor is the SARS-CoV-2 pandemic and widespread use of HEMT. Clinic closures and implementation of telemedicine limited in-person patient visits during 2020 and 2021. Despite limited in-person visits, the average number of respiratory cultures per individual at CMKC in 2020 was 3.5, which is consistent with previous years. We were able to obtain frequent surveillance cultures through implementation of a drive-through respiratory specimen collection process. Hence, the decrease in number of iTOB courses cannot be attributed to a decrease in frequency of respiratory cultures, although we cannot assess the impact of school closures and a decrease in social gatherings on new *P. aeruginosa* acquisition or chronic infection. Looking at all these variables, the widespread use of HEMT likely played a significant role in reducing new *P. aeruginosa* acquisition and chronic *P. aeruginosa* infection.

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Dosing and therapeutic drug monitoring of intravenous vancomycin in cystic fibrosis: A practice survey

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Background: If a cystic fibrosis (CF) exacerbation warrants intravenous antibiotics, vancomycin is first line for methicillin-resistant *Staphylococcus aureus* infection. Trough-based therapeutic drug monitoring (TDM) of vancomycin has been used historically, but revised consensus guidelines recommend area under the curve to minimum inhibitory concentration ratio (AUC/MIC)-based TDM [1]. The primary objective of this study was to assess pharmacists' vancomycin dosing and TDM practices in people with CF (PwCF). A secondary objective was to evaluate AUC/MIC-based TDM implementation strategies.

Methods: An electronic survey was emailed via the Cystic Fibrosis Foundation Pharmacist listserv to pharmacists affiliated with CF centers on May 4, 2021; the survey closed June 17, 2021.

Results: Of 28 pharmacists who completed the survey, 71% cared for children with CF, and 36% cared for adults with CF (Table 1); 71% used a specific resource, guideline, or nomogram for vancomycin dosing. Sixty-one percent never used a loading dose (LD), 29% used a LD sometimes, and 11% used a LD always. LD ranged from 20 mg/kg to 30 mg/kg in adults and 15 mg/kg to 25 mg/kg in children. Twenty-eight percent used a maximum total daily dose (TDD); 4000 mg was most common. Trough level was used in 75% for inpatients and 79% for outpatients. For adults, 56% targeted 15 mg/L to 20 mg/L and 22% targeted 10 mg/L to 15 mg/L. For children, 33% targeted 15 mg/L to 20 mg/L, and 39% targeted 10 mg/L to 15 mg/L. For three respondents using peak levels, 35 mg/L to 40 mg/L was targeted. AUC/MIC was used in 39% for inpatients and 21% for outpatients. Of the 11 respondents who reported using an AUC/MIC-based TDM strategy, 91% targeted an AUC of 400 mg per h/L to 600 mg per h/L. Pharmacist-led education sessions and protocol implementation facilitated the change to AUC/MIC-based TDM; challenges faced were appropriate level timing and AUC/MIC calculation and staff education. Advantages of AUC/MIC-based TDM included lower vancomycin TDD, less toxicity, and fewer repeat levels needed; no decrease in effectiveness was observed. Common considerations for TDM included local standard of practice (93%), evidence-based recommendations (61%), personal or health care team preference (46%), number of vancomycin levels required (43%), and availability of specific software (32%). Of 17 respondents using trough levels, 41% were planning or considering a change to AUC/MIC-based TDM.

Conclusions: Vancomycin dosing and TDM varies between pharmacists caring for PwCF. Since the practice survey was conducted in 2015 [2], the proportion of respondents using trough-based vancomycin TDM has decreased, and the proportion using AUC/MIC-based TDM has increased. The proportion of respondents targeting troughs of 15 mg/L to 20 mg/L has decreased and the proportion targeting trough of 10 mg/L to 15 mg/L has increased. Advantages of AUC/MIC-based TDM have been observed; adequate staff education and strategies to overcome barriers are necessary to implement this practice.

Table 1.
Respondent and cystic fibrosis center characteristics (N = 28 respondents)

Characteristic	n (%)
Country of practice	
– Canada	12 (43)
– United States	16 (57)
Years providing care for pwCF	
– <3 years	5 (18)
– 3-5 years	6 (21)
– 6-10 years	7 (25)
– >10 years	10 (36)
Age group(s) of pwCF provide cared for	
– Only adults	8 (29)
– Only pediatrics	18 (64)
– Both adults and pediatrics	2 (7)
Number of adult patients with CF cared for[a]	
– 0-50	4 (40)
– 51-100	3 (30)
– >100	3 (30)
Number of pediatric patients with CF cared for[b]	
– 0-50	1 (5)
– 51-100	4 (20)
– 101-200	9 (45)
– 201-300	2 (10)
– >300	4 (20)

pwCF, people with CF
[a]Based on n=10 respondents caring for adult patients
[b]Based on n=20 respondents caring for pediatric patients

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Evaluation of the Medication Electronic Monitoring Systems n adherence measurement in a real-world setting

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Background: RECOVER is an ongoing multisite (n = 8) postmarketing study of clinical outcomes in people with cystic fibrosis (CF) prescribed elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA) in Ireland and the United

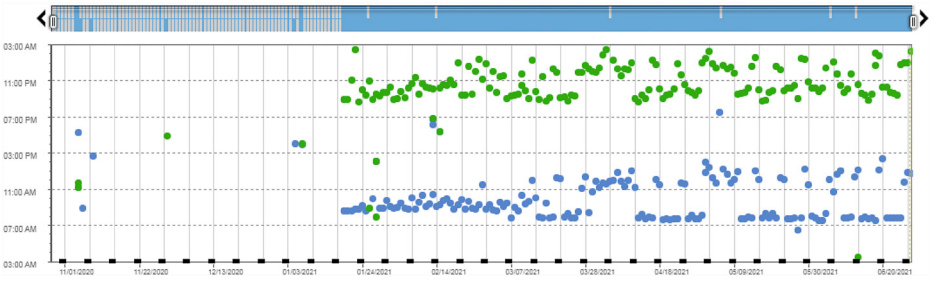

Figure 1 (abstract 251): Medication Electronic Monitoring System (MEMS) of a participant prescribed elexacaftor/tezacaftor/ivacaftor (blue) and ivacaftor (green). Each dot denotes an opening of the MEMS bottle, which is equated to drug administration by the participant.

Kingdom. Previous studies of CF treatments have shown suboptimal adherence. Effectiveness of ELX/TEZ/IVA in real-world settings may not match that seen under controlled trial conditions. The Medication Electronic Monitoring System (MEMS, Aardex, Sion, Switzerland) provides an objective measure of adherence that uses a computer chip embedded in the medication bottle cap to record every occurrence of cap removal. MEMS is being used as one of three methods to measure real-world adherence as part of the RECOVER study. Although recognized as the gold standard adherence software for clinical trials and academic research, participant withdrawal from the RECOVER MEMS sub-study has been noted.

Methods: Adherence to ELX/TEZ/IVA is being prospectively investigated using MEMS in a subset of RECOVER study participants aged 12 and older over a 12-month period. Participants are invited to participate on enrollment. They collect their dedicated MEMS medication bottles from their community pharmacist monthly [one for ELX/TEZ/IVA and one for IVA (pm)]. Data are extracted from the MEMS caps at routine clinic visits. When participants withdrew from the MEMS study, they were invited to complete a feedback form capturing reasons for discontinuation and perceived limitations associated with MEMS caps.

Results: Initially, 80% of target MEMS recruitment (n = 32) was achieved. Only 15 participants (47%) remained at the end of the 12-month study period. Interim MEMS data (n = 9) extracted and collated at this point indicated adherence rates of 81.6% for ELX/TEZ/IVA and 79.8% for IVA (overall adherence 80.7%; Figure 1). Data collection is ongoing for this cohort, with additional 12-month data extraction and analysis due to be collected in the second quarter of 2022. Fourteen of the 17 study dropouts completed feedback forms. Seven of the 14 (50%) found it harder to track their medication use, six (43%) found it harder to remember to take their medication, five (36%) felt more likely to skip their medication, five (36%) reported finding it harder to remember when to request a new prescription and two (14%) reported the packaging more difficult to use.

Conclusions: Although MEMS is considered the gold standard for measuring adherence, this study highlights the barriers to continued participation in this cohort of people taking ELX/TEZ/IVA. This insight led to development of an updated information leaflet for the next phase of the RECOVER study (aged 6–11). MEMS recruitment for this cohort is in the early phases. Additional data will be available for presentation at the conference.

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Real-world efficacy of elexacaftor/tezacaftor/ivacaftor in decreasing cystic fibrosis pulmonary exacerbations in health-system based specialty pharmacy patients

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Background: Elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA) is the newest cystic fibrosis (CF) transmembrane conductance regulator (CFTR) modulator approved for people with CF (PwCF). It is a highly effective modulator therapy indicated for the treatment of CF in people with a single copy of F508del [1]. In randomized controlled trials, ELX/TEZ/IVA improved lung function, decreased respiratory symptoms, and reduced pulmonary exacerbations and weight gain [2,3]. Long-term clinical benefit of ELX/TEZ/IVA in real-world settings is still under investigation.

Methods: This retrospective within-group study examined PwCF receiving care from a single academic health system specialty pharmacy. Subjects who initiated ELX/TEZ/IVA and continued therapy for longer than 1 year were included. Retrospective data from the index year before ELX/TEZ/IVA initiation and the year after was collected by medical records review. The primary end point was difference in number of severe CF exacerbations, defined as requiring hospitalization or intravenous antibiotics) between the index year and the year after ELX/TEZ/IVA initiation. Secondary endpoints included change in percentage predicted forced expiratory volume in 1 second (FEV_1pp) and body mass index (BMI) from baseline.

Results: Seventy-six patients were included in the final analysis (median age 25). In the post-ELX/TEZ/IVA year, subjects had a significant mean decrease in severe exacerbations (–0.72; $p < 0.001$). Decreases in severe exacerbations remained significant in subgroups of patients with prior CFTR modulator exposure (–0.56; $p = 0.006$; $n = 46$) and those with moderate to severe lung disease (–0.98; $p < 0.001$; $n = 41$). After 1 year of ELX/TEZ/IVA therapy, subjects experienced a significant mean absolute increase in FEV_1pp of 6.1% ($p = 0.01$) and increase in BMI of 1.46 kg/m^2 ($p < 0.001$).

Conclusions: In this single-center, retrospective study, 1 year of ELX/TEZ/IVA therapy was associated with improvement in clinical status of PwCF. Consistent with clinical trials, patients in this study experienced fewer exacerbations, better lung function, and higher BMI.

Acknowledgements:

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Change in liver biomarkers after introduction of elexacaftor/tezacaftor/ivacaftor: Results from a 12-month follow-up study in the national cystic fibrosis cohort in Denmark

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Background: Elexacaftor/tezacaftor/ivacaftor (ELX/TEZ/IVA) improves lung function and nutrition status in people with cystic fibrosis (PwCF), but its