in 76 (20%), and interventional radiology in 209 (56%). Despite a low frequency of blood stream infections (0%) and venous thrombosis (1.6%), less-serious adverse events were noted in 147 cases (39%). In 24 cases (6.4%) line placement was problematic, usually due to difficult guidewire advancement (22/24). We found no significant predictors of difficult line placement. Local soft tissue reactions were noted in 94 (25%), with proportions similar in adults and children, although reactions leading to line removal tended to be more frequent in adults (5.5% vs 1.4%, $p = 0.05$). Predictors of local reactions included larger catheter size (OR 3.85, 95% CI, 1.53–10.44, $p = 0.006$ for 4 Fr vs 3 Fr; OR 4.53, 95% CI, 1.44–14.72, $p = 0.01$ for 4.5 Fr vs 3 Fr) in children and multilumen catheter use (OR 3.11, 95% CI, 1.32–7.24, $p = 0.008$) in adults. Catheter malfunction was observed in 59 cases (16%) and resulted in line removal in 10 cases (2.7%), both in similar proportions of adults and children. Predictors of catheter malfunction in adults included history of difficult wire passage (OR 6.09, 95% CI, 2.33–15.7, $p \leq 0.001$) and venous stenosis or anatomy preventing access on one side (OR 6.91, 95% CI, 2.02–23.8, $p = 0.002$). Adverse events other than venous thrombosis led to early line removal in 11 cases (2.9%).

Conclusions: Despite practice variation across sites, instances of venous thrombosis were rare, although we identified several factors predictive of catheter malfunction and soft tissue reactions.

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Cystic fibrosis in West Virginia: Is higher body mass index target desirable?

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Background: Malnutrition in people with cystic fibrosis (PwCF) is associated with worse pulmonary function and greater morbidity and mortality. Nutritional intervention and introduction of modulator therapy has led to increase in overweight (body mass index (BMI) = 25–29.9 kg/m^2) and obesity (BMI >30 kg/m^2) in PwCF, although the advantage and impact of higher BMI is understudied. We aim to study the effect of higher BMI in PwCF on clinical outcomes.

Methods: We conducted a retrospective cross-sectional study of PwCF aged 18 and older followed at the Mountain State CF Center. Information on demographic variables, BMI, lung function (percentage predicted forced expiratory volume in 1 second (FEV_1pp)), and number of exacerbations from January 1, 2020, to December 31, 2020, was collected from the CF Registry, as well as number of reported exacerbations from January 1, 2015 to December 31, 2019. Outcomes of underweight/normal (BMI ≤24.9 kg/m^2) and overweight/obese (BMI>24.9 kg/m^2) individuals were compared.

Results: Of 86 patients included in the study, 36 (41.8%) were overweight or obese. Mean age of the total cohort was 33.3 ± 13.3, and mean BMI was 25.1 ± 6.5 kg/m^2. FEV_1pp was higher in the overweight/obese group (78.5 ± 26.7%) than in the underweight/normal group (67.4 ± 25.8)). Sixty (69.8%) patients were on modulator therapy, with half of these on triple modulator therapy; 25 patients (69.4%) in the overweight/obese group and 35 (70%) in the underweight/normal group were on modulator therapy. Pulmonary complications (asthma, allergic bronchopulmonary aspergillosis, bronchiectasis) were similar in both groups (8 (16.0%) vs 8 (22.2%); $p = 0.5$). Hyperlipidemia was more common in the overweight/obese group than in underweight/normal group ($p = 0.04$). Rates of all other comorbidities, including hypertension, diabetes, and cardiovascular events, were similar ($p > 0.05$). CF exacerbations in 2020 were similar in the two groups ($p > 0.05$), whereas there were fewer exacerbations between 2015 and 2019 in the overweight/obese group, although this was not statistically significant.

Conclusions: Higher BMI may be associated with fewer CF exacerbations, although it may increase risk of cardiovascular comorbidities. Therefore, the risks and benefits of higher BMI in PwCF should be studied in further detail.

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Factors contributing to successful retention of people with cystic fibrosis in a 3-month daily symptom-tracking study

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Background: Retention of research participants is critical for studies to provide useful results. Failure to meet retention goals can compromise a study's statistical power and the conclusions that can be drawn. Recommendations for optimizing retention include engaging stakeholders, mitigating potential barriers, and minimizing burdens while returning value for participants [1]. We applied these strategies to a study investigating the relationship between cystic fibrosis (CF) symptoms and the menstrual cycle using a smartphone app to record daily symptoms and online monthly surveys.

Methods: We developed study aims based on research priorities that people with CF identified as part of the Cystic Fibrosis Reproductive and Sexual Health Collaborative (CFReSHC) [2] and included a patient-partner on our research team. Study participation involved daily tracking of CF and menstrual symptoms and four monthly surveys. To standardize tracking, we customized a period-tracking smartphone app to list all symptoms of interest. Participants had access to their own app data throughout the study. We built our online database to fully automate the sending of email reminders and monthly survey links. We recruited 74 women aged 18 to 45 with CF and regular menstrual cycles from June 1 to October 30, 2021. Participants were able to enroll and start tracking on any day of their menstrual cycle. Before tracking, participants attended a one-on-one, 45-minute video conference orientation. Research staff walked participants through downloading the app, recording symptoms, setting phone reminders for daily tracking, and next steps. Participants received an electronic gift card after each online survey.

Results: Of the 74 participants who completed a virtual orientation, 99% (n = 73) completed the baseline survey, which was the next step in study participation. Completion rates for the four monthly surveys were 97% (n = 72), 95% (n = 70), 89% (n = 66), and 89% (n = 66), respectively. One participant was withdrawn while completing the month 4 survey, so the overall study completion rate was 88% (n = 65). Of the nine participants who did not complete the study, six were withdrawn because they failed to complete the online surveys. Three participants were withdrawn because of other study criteria.

Conclusions: Several factors contributed to successful retention of research participants in this study. We designed the study based on research priorities that the patient community of interest identified. We minimized barriers to participation by allowing participants to enroll during any phase of their cycle and by selecting mobile technology that required minimal time and effort for tracking. Showing participants how to track in the app mitigated potential technology challenges. Participants could see their symptom data in the app and were compensated every few weeks. Daily reminders and automated survey invitation emails streamlined study efforts for participants and research staff.

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