Statistical Analysis Plan for "Use of Mobile Devices and the Internet to Streamline an Asthma Clinical Trial"

Power and Statistical Analysis

A sample size was determined for Specific Aim 1 (comprehension and retention following PPA between participants enrolled in MICT and LASST), with subsequent assessment of dwetectable differences for Specific Aims 2 and 3 using that sample size. Because our hypothesis is that our novel PPA process will be at least as good as the conventional process, we have elected to use a non-inferiority design. We used the preliminary parent data described above (Section B Innovation), assumed normalcy of the data, and defined the non-inferiority margin as 2.4, which corresponds to 0.5 standard deviation to calculate the power for a range of sample sizes (see Table 3).

Table 3. Sample Size Determination		
Effect Size: 2.4 (0.5 standard deviation)		
Total N	N Per Group	Power*
90	45	0.761
100	50	0.799
110	55	0.832
120	60	0.859
130	65	0.883
140	70	0.903
*Type I error rate (1-sided) of .05		

Based on these calculations and other considerations discussed below, we propose to randomize 120 participants: 60 participants into the MICT project and 60 participants into the LASST study. This will give us greater than 80% power to reject the hypothesis that the novel PPA process is worse than the conventional process at a threshold of 2.4 units on the questionnaire scale, after allowing for approximately 10% loss to follow-up.

For Aim 2, because we are unaware of meaningful measures to establish non-inferiority margins for completeness and quality of data collection, we will use 0.5 SD as a qualitative measure of non-inferiority. We anticipate this sample size will allow us to estimate the proportion of study days with diary data with a 95% confidence interval width of 15%. For example, in a recently completed ALA-ACRC pediatric trial, the proportion of days with a diary card entry was 90%, the corresponding 95% confidence interval would be 82.5% to 97.5%. If the upper bound of the 95% confidence for study days with diary card data for participants assigned to MICT exceeds the lower bound of the participants enrolled in LASST, we will accept the non-inferiority hypothesis. The second objective of Aim 2 is to evaluate the comparability of the quality of spirometry from MICT and LASST. We will employ the spirometry review system currently used in an ALA-ACRC trial, which grades each spirometry session with a letter grade (A to F). For initial spirometry sessions, the current overall Grade Point Average (GPA) is 3.68, with a standard deviation of 0.67. Using these values, with a sample size of 60 in each of LASST and MICT, we expect to be able to estimate spirometry quality using a similar review system with a 95% confidence interval ranging from approximately 3.51 to 3.85, which should be adequate to allow us to compare spirometry quality in the two groups.

For Aim 3, we will have greater than 90% power to detect a clinically meaningful difference of 3 in the ACT score [123,124] between one of the treatment arms in LASST and the corresponding treatment arm in MICT, assuming a mean score of 19 with a standard deviation of 4 (data from ALA-ACRC trial). We plan to perform these analyses using a non-inferiority approach; that is, as long as the MICT result is not worse than the corresponding LASST result, we will conclude that the streamlined approach has not impaired study conduct.

We will compare the Research Participation Assessment scores of those participating in MICT with those participating in LASST (Specific Aim 1) and data completeness and quality GPA (Specific Aim 2) using t-tests without adjustment. We will consider the novel interactive consent process to be non-inferior to the traditional process if the upper bound of the 95% confidence interval for the difference L-M (LASST minus MICT) is less than 2.4, our a priori margin of non-inferiority as determined from pilot data using the assessment. We will use a similar approach for the evaluating non-inferiority of data quality.

For Aim 3, we will compare ACT scores within each treatment group between the LASST and MICT groups, using a multivariate regression model that incorporates both trial and treatment group. We will evaluate the contrast for each treatment group and determine if there is evidence to support an interaction between treatment group and trial. If there is not sufficient evidence to support an interaction, we will perform the test of the trial effect on the change in ACT score without including an interaction term. In all cases, primary analyses will use crude (unadjusted) comparisons, although we will also report analyses that include adjustments for possible differences between the MICT and LASST groups in important demographic characteristics.

Interim Reviews
No interim analyses for MICT are planned.