Appendix D. Remote CPAP Adherence Monitoring Setup Process and Data Integrity Check

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Continuous positive airway pressure (CPAP) therapy data was an important component of the O2VERLAP study. It was used both for interventional and data analytic purposes. The data was provided via the study platform to both study participants and intervention coaches to help carry out the study intervention. CPAP adherence was considered the primary study outcome, and therefore was also used for data analytic purposes. This appendix provides details about how this data was obtained and used.

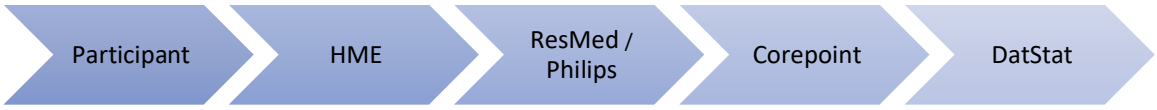
Participants were asked to provide the study team with the following CPAP information: serial number, brand, model, and HME provider. This information was necessary to coordinate access to the participant's remote adherence monitoring data collected wirelessly via their CPAP device modem. All study participants were required to have a ResMed or Philips Respironics brand CPAP device, with wireless modem, for this reason. Both ResMed and Philips Respironics have online systems for their CPAP device users (AirView and EncoreAnywhere, respectively). Home medical equipment (HME) companies and healthcare providers use these systems to log into as necessary for remote data collection, analysis and review. These two companies offer separate patient-specific apps, but they differ in a number of important ways so were not used for the current study. Instead, the study team created a patient-facing website specific for our participants.

The study team then coordinated with the participant's HME company to ensure that their online data profile was appropriately shared. This process included submitting a fax packet comprised of: (a) cover letter; (b) participant's study consent and HIPAA forms; and (c) detailed instructions on sharing either on AirView (ResMed) or EncoreAnywhere (Philips Respironics) data platform. The instructions document included a step-by-step guide to the HME for correctly adding the O_2VERLAP Study as an integration partner and the study's physician in the Physicians tab on 'Patient Details' of the participants profile. As such, both ResMed and Philips Respironics agreed to participate in the development of this study process and provided the following data variables via an 'Application Programming Interface' (API) workflow.

Data flowed from the ResMed AirView or Philips Respironics Encore Anywhere online systems to the necessary API's, and were managed by Corepoint Health Inc (Frisco, TX). Corepoint is an intermediary software company contracted to provide data integration services and provide middleware between the CPAP manufacturer servers and the O_2VERLAP Study portal. Corepoint Health then sent a password-protected excel spreadsheet with a download of the CPAP data linked to each participant's serial

number for importing in the O_2VERLAP Study portal (DatStat, Inc. Seattle, WA). The specified variables were represented graphically, on a bi-weekly basis, in the study portal charts for each participant in their record. Figure 1 shows a diagram of the data flow.

Figure 1: Diagram of CPAP data flow in the O_2VERLAP Study.



Data workflow integration was established such that data calls were made two times each week (Monday and Wednesday) to populate the O_2VERLAP Study portal. The CPAP data was included in the study to be used by both participants and interventionists to monitor progress and intervene as necessary.

Bi-weekly Updates on Critical Adherence Monitoring Data Variables:

1) Total Time Connected (*i.e.*, total time in minutes CPAP was used each 24-hour day)
2) Air Leakage (*i.e.*, number of minutes the Sleep Apnea Mask is leaking air beyond a given threshold)
3) Apnea Hypopnea Index (*i.e.*, a record of the number of apneas and hypopneas that occur while wearing CPAP).

These three variables are critical, quantitative indications of the use and efficacy of CPAP therapy. Monitoring these CPAP therapy variables helped both the research participants and authorized research staff to tailor a participant's goal setting on a weekly basis, acknowledge progress, and troubleshoot any problems or difficulties. The participants randomized to the proactive care arm reviewed and discuss their data on a weekly basis with a peer coach to address these topics. Proactive care participants were also encouraged to call their peer coaches during regular business hours via the C.O.P.D. Information Line and were also encouraged to chat synchronously or asynchronously with peer coaches using the study portal.

CPAP Data Integrity Check. In order to ensure an accurate CPAP adherence dataset, our research team engaged in a doublecheck of each CPAP data value. Data at the source (the manufacturer online platforms) was compared to the data on our study platform. Early on we found that some data on our study platform was set to missing when in fact it should have been CPAP adherence = 0 hours per night. This is what originally prompted the data check. Over time, we ensured that our final data set reflected

true 0 adherence values and true missing values. In addition, because the implementation of middleware, we found that some nights had valid non-0 data but because of timing issues was not being obtained. Some duplicate nights were also found. Neither the duplicate nights nor the number of nights that were not coming through were enough to impact the intervention (*i.e.*, only affected 1-2 nights per week for some participants; trend data was still relatively easy to see). To summarize, all valid data (missing, 0, and non-0) from the source that was not consistent with the data on our study platform corrected. We had three staff members working on this data integrity check, including a check of each other. In doing this, we ensured that we ended up with a complete and accurate final dataset. Given the novel findings of the very high CPAP use levels found in this study, we are confident in our conclusions because of these extensive CPAP data quality assurance efforts.