Study Title: Specialized Community Disease Management to Reduce Substance Use and Hospital Readmissions

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Data Analysis Plan

Analyses will compare outcomes for the TAU and SCDM groups. We will employ remedial measures such as power transformations when necessary. We will confirm that the groups do not differ at baseline on relevant background variables using t-tests for continuous variables and chi-square tests for discrete or ordinal responses. The randomization process should minimize the need for the inclusion of covariates to reduce bias in the treatment comparisons [1]. However, relevant covariates will be considered for inclusion in the analyses to improve the precision of estimation of the effects [2].

Power Analysis. The power analysis for the primary hypothesis was conducted following the recommendations of Diggle et al. [3] for mixed effects models. Using a two-sided alpha of .05, an estimated intraclass correlation of .7 between the repeated measurements, and a 15% attrition rate by month 6, we will have 85% power to detect a moderate effect of the intervention (d = .4) with a sample size of 111 patients in each group (222 altogether).

Primary hypothesis: Patients assigned to the SCDM condition will report significantly fewer days of substance use than patients assigned to TAU. Using TLFB data, we will create a variable for days of any substance use by combining all drug types and alcohol. Urine samples collected at months 3 and 6 will be used to confirm reports of drug use. Provided that the rate of disagreement between urine results and self-report is acceptable (below 15%), we will analyze days of substance use as a unitary variable. A linear mixed effects model [2] will be used to examine days of self-reported drug use in the past 30 days at each follow-up assessment. Mixed effects models have advantages over conventional repeated measures methods in that they allow for missing observations, accommodate measurements made at different time points, provide greater flexibility in modeling the variance-covariance matrix, and permit the estimation of group and random subject-specific effects. The model will include terms for condition, assessment point, and their interaction along with any necessary covariates including the number of days of use reported at the baseline. The analysis will be conducted using

SAS's PROC MIXED. Should the rate of disagreement between urine and self-report exceed acceptable standards; we will analyze the urine results as the primary outcome. However, the literature indicates that self-report of substance use is generally quite accurate [4,5].

Secondary hypothesis (a): Patients assigned to the SCDM condition will exhibit greater reductions in days of hospitalization and acute emergency care over the six-month period than patients assigned to TAU. A linear mixed effects model [2] will be used to compare participants in the two groups on the days of inpatient and ED utilization in the past 90 days at the 3 and 6-month follow-up assessments. The model will be similar to that outlined for the primary hypothesis.

Secondary hypothesis (b): Patients assigned to the SCDM condition will demonstrate higher rates of engagement in substance abuse treatment than patients assigned to TAU. A linear mixed effects model [2] will be used to compare patients in the two groups on the number of treatment sessions attended in the past 90 days at the 3 and 6-month assessments, similar to that outlined for the primary hypothesis.

Exploratory hypothesis: Patients randomized to SCDM will demonstrate a) reduced HIV transmission risk behaviors, and b) greater incidence of HIV testing over the 6 month follow-up than patients randomized to TAU. Secondary efficacy analyses will be conducted to examine the effects of the intervention on HIV related behaviors. A linear mixed effects model [2] will be used to compare the two groups' RAB scores (i.e., total, sex, drug) at months 3 and 6. The baseline response will be included as a covariate. A logistic regression model will be employed to test differences in incidences of testing.

References:

1. Tabachnik B, & Fidell, L.S. *Using multivariate statistics.* Boston, Massachusetts: Allyn and Bacon; 1994.
2. Hauck WW, Anderson S, Marcus SM. Should we adjust for covariates in nonlinear regression analyses of randomized trials? *Controlled Clinical Trials.* 1998;19(3):249-256.
3. Littell RC, Milliken GA, Stroup WW, Wolfinger RD. *SAS System for Mixed Models.* Cary, North Carolina: SAS Institute Inc.; 1996.

4. Hjorthoj CR, Hjorthoj AR, Nordentoft M. Validity of Timeline Follow-Back for self-reported use of cannabis and other illicit substances--Systematic review and meta-analysis. *Addict Behav.* 2012;37(3):225-233.
5. Sobell LC, Sobell MB, Leo GI, Cancilla A. Reliability of a timeline method: Assessing normal drinkers' reports of recent drinking and a comparative evaluation across several populations. *British Journal of Addiction.* 1988;83(4):393-402.