# Ending transmission of HIV, HCV, and STDs and overdose in rural communities of people who inject drugs (ETHIC) Including the ECHO addendum

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## Statistical Analysis Plan

We will explore the effects on PWUD using longitudinal cohort data from ETHIC participants, where outcomes were guided by the CDC RE-AIM framework. Outcomes of the harm reduction expansion intervention included:

**1.)** Reach Analysis**:** Reach measures intervention engagement. This was defined as the total number of participants newly engaged in harm reduction services (HRS) by accepting a referral to the HRSO organization with no previous history of receiving services from the organization and at least one week after their baseline survey.

a. Descriptive Analysis: Descriptive analyses will be conducted to examine variable distributions and identify outliers, and data will be summarized using frequencies and measures of central tendency. The absolute number and proportion (%) of participants accepting referral to the harm reduction intervention will be calculated at the end of 2 years. Descriptive and graphical approaches will be used to examine harm reduction engagement over the study period.

**2.)** Effectiveness Analysis: Effectiveness measures the impact of the intervention on outcomes of interest, including evaluation of ECHO/Harm reduction Integration, and will be analyzed as follows;

a. Descriptive Analysis: Effectiveness will be reported based on the category of outcomes:

i. Program Data: Cross sectional analysis of client volume, including primary and secondary exchangers, naloxone trainings and kits dispensed, fentanyl strips dispensed, condoms dispensed, HIV/HCV/STI screenings performed, and clients referred to medical care and substance use treatment will be performed.

ii. Injection Behavior: Cross sectional analysis will be performed by calculating the injection behavior outcomes (e.g. syringe/equipment access, sharing practices), i.e. “Effectiveness: Syringes and Equipment outcomes”) in individuals engaged and not engaged in the harm reduction intervention.

iii. Overdose: Cross sectional analysis will be performed by calculating the overdose-related behavior outcomes including access to and possession of naloxone (i.e. “Effectiveness: Naloxone outcomes) in individuals engaged and not engaged in the harm reduction intervention.

iv. Substance use disorder (SUD) treatment: Cross sectional analysis will be performed by calculating referrals to SUD treatment (i.e. “Effectiveness: SUD treatment outcome) in individuals engaged and not engaged in the harm reduction intervention.

v. HIV care and prevention: Cross sectional analysis will be performed by calculating access to HIV care among those who received a reactive HIV test during the study period, and PrEP knowledge (i.e. “Effectiveness: HIV care access and PrEP outcomes) in individuals engaged and not engaged in the harm reduction intervention

vi. HCV care: Cross sectional analysis will be performed by calculating access to HCV care among those who received a reactive HCV test during the study period (i.e. “Effectiveness: HCV care access outcome) in individuals engaged and not engaged in the harm reduction intervention

vii. Sexual Behavior: Cross sectional analysis will be performed by calculating the sexual-related behavior outcomes including engaging in condomless sex (i.e. “Effectiveness: Sexual behavior outcomes) in individuals engaged and not engaged in the harm reduction intervention.

In addition to descriptive analyses of these secondary outcomes, we will explore longitudinal differences from baseline and 6 months among those who were newly engaged in HRS.

**3.)** Adoption Analysis: Adoption of the intervention by the harm reduction agency will be defined by the number of additional participants and additional zip codes served by the end of the study period.

**4.)** Implementation Analysis: The fidelity, acceptability, appropriateness, feasibility, cost, and maintenance / sustainability of the intervention will be analyzed as follows:

a. Fidelity

i. Field staff observation using the WHO 15 essential element needle exchange program checklist at baseline and every 6 months thereafter will be analyzed based on adherence to each element of service provision, with fidelity as a measure of 100% compliance at 6 months, and maintenance of fidelity defined by 100% compliance at all subsequent observations.

ii. Qualitative analysis: The qualitative instruments will be based on CFIR constructs as described above in the Narrative Study Design section. At the conclusion of each interview, the interviewer will develop a broad free-text memo detailing any prevailing observations or interpretations from the interview. These interview memos will then be reviewed and discussed with another member of the research team. Interviews will be transcribed and will be analyzed using a deductive thematic approach using NVivo. This process will be prefaced by the development of a set of *a priori* codes, generated using the CFIR framework as the basis for

the coding scheme. Each transcript will be coded by one coder; for additional fidelity, a second coder will code a subset of transcripts. Discrepancies will be resolved through discussion.

b. Acceptability, Appropriateness, and Feasibility:

i. Qualitative analysis: The qualitative instruments will query on elements ot the Acceptability of Intervention (AIM), Intervention Appropriateness (IAM), and Feasibility of Intervention (FIM) measures. Qualitative exploration (as opposed to surveys) was chosen given the small sample size and richness of data and contexualization offered via the semi-structured interview format. Interviews will be analyzed as per section 4.a.ii. above, with the development of a set of *a priori* codes, generated using the Weiner's measures as the basis for the coding scheme. Each transcript will be coded by one coder; for additional fidelity, a second coder will code a subset of transcripts. Discrepancies will be resolved through discussion

d. Maintenance and Cost Analysis:

i. Qualitative analysis: To explore Maintenance of the intervention, the qualitative instruments will also query on elements of The Program Sustainability Assessment Tool (PSAT), again modified to be elicited as items in the interview guide given the small sample size of stakeholders and the richness of qualitative data. Interviews will be analyzed as per section 4.a.ii. above, with the development of a set of *a priori* codes, generated using the PSAT as the basis for the coding scheme. Each transcript will be coded by one coder; for additional fidelity, a second coder will code a subset of transcripts. Discrepancies will be resolved through discussion.

ii. Cost analysis: The cost analysis will be performed using Cidav's pragmatic approach, which combines granular, procedurally based time-driven activity-based costing of implementation activities (intervention and implementation strategies) as characterized above. Cost per HRSO participant served per year was calculated, as well as the annual budget impact of service expansion based on adoption over the course of the study. Costs were discounted at 3% annually. Costs relate to research, including data collection and research overhead will be excluded.