

SPECIFIC AIMS

The overall aim of the **Consortium to improve Outcomes in HIV/AIDS, Alcohol, Aging, & multi-Substance use (COMpAAAS)** is to build and disseminate the evidence needed to optimize care for HIV+ experiencing medical harm from alcohol and related substance use, through coordinated, integrated, and externally validated observational, operations research modeling, and intervention studies. Combining and integrating the complimentary expertise of informatics, biostatistics and epidemiology, we propose a U24 **Resource for Informatics and Biostatistics (RIB)** fully integrated with and supportive of all other COMpAAAS components:

COMpAAAS U24: **Coordinating Center**

COMpAAAS U01: **Observation** (Optimizing Treatment in HIV and HCV: ART, Alcohol and Polypharmacy)

COMpAAAS U01: **Intervention** (The FIRST Trial)

COMpAAAS U01: **Operations Research (OR) Modeling** (Simulation to inform intervention design for alcohol-using HIV+ persons)

COMpAAAS U24: **CHAMP** (Consortium on HIV/Alcohol research in Minority Populations)

This resource will address the complex challenges required to maximize power and minimize bias in analyses addressing consortium-wide questions. Advanced informatics methods supported include natural language processing (NLP), ontologies, database and clinical decision support, and application of vital data management tools for secure data collection, storage, annotation, retrieval, and integration. Advanced epidemiological and statistical methods include time-updated exposure techniques, multiple imputation, propensity score techniques, regression correction, and competing risks regression. Routine, but essential, statistical methods include Cox proportional hazards, logistic and linear regression, goodness of fit diagnostics, and agreement/accuracy metrics (kappa, sensitivity, specificity, etc.). The RIB will further leverage the observational and interventional studies, simulation models, and well-coordinated network of cores and workgroups of COMpAAAS with advanced informatics and biostatistical techniques tailored to the particular challenges of large scale, longitudinal data from multiple sources including electronic health records (EHR), clinical interventions, patient self-report, and tissue repositories. For example, the Observational study will build on previous work developed by the Biostatistics Core such as improved alcohol measures and techniques to adjust for confounding; plus data collection and data management tools including Snap and REDCap applied and/or supported by the Informatics Core.

Drawing on our network of investigators, collaborators, trainees, policy makers and patients, we propose to continue to support, and inform the U01 and other U24 projects with information, technologies and expertise to multiply their impact. Because of the prior experience, resources, and momentum of COMpAAAS, the RIB is uniquely positioned to accomplish its mission through the following aims:

Aim 1. Provide statistical expertise for COMpAAAS to maximize scientific impact.

- 1a.** Support appropriate design and execution of data analyses in VACS and cross cohort collaborations.
- 1b.** Provide advanced statistical methods including time-updated exposure techniques, multiple imputation, propensity score techniques, measurement error correction and competing risks regression.
- 1c.** Enhance design, recruitment, and follow-up of intervention studies (COMpAAAS U01: Intervention) with VACS data.
- 1d.** Provide estimates of alcohol patterns for COMpAAAS U01: OR Modeling and identify sexual/gender minority populations (COMpAAAS U24: CHAMP) from VACS survey data.

Aim 2. Provide informatics expertise for COMpAAAS to maximize scientific impact.

- 2a.** Continue to improve and maintain the Consortium Web-Based Laboratory (WBL Portal) to support ongoing research design, data collection and management, development and testing of interventions and facilitate external validation and dissemination of our findings.
- 2b.** Provide advanced informatics research to the Consortium including clinical decision support and eHealth tool design.
- 2c.** Provide advanced informatics research to the Consortium including development and validation of information extraction tools for textual data. Use cases include NLP for falls, pneumonia, delirium (COMpAAAS U01: Observation); patterns of alcohol use (COMpAAAS U01: OR Modeling), and documentation of sexual and gender minority populations (COMpAAAS U24: CHAMP).