From Fragmentation to Federation: A Multi-Partner OMOP Implementation in Uganda Enabling Global Real-World Evidence Generation

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Background

Incorporating geographically diverse populations into real-world evidence (RWE) studies is essential for generating insights that are globally applicable and can effectively inform public health strategies and regulatory decisions. The Joint Clinical Research Centre (JCRC) in Uganda is a leading institution in HIV care and research with a long-standing track record of participation in both clinical trials and observational studies. While JCRC's electronic medical record (EMR) system has supported numerous research efforts, its integration into global federated RWE infrastructures has been limited by data format and interoperability constraints. To further leverage the value of JCRC's clinical data within international RWE networks, a collaboration was formed between JCRC, IQVIA, and Gilead Sciences. The objective of this project was to enable transformation of patient-level EMR data into the Observational Medical Outcomes Partnership OMOP (OMOP) Common Data Model (CDM), thus aligning with the Observational Health Data Sciences and Informatics (OHDSI) framework. This effort aimed not only to enable federated analytics using OHDSI tools, but also to build local capacity for ongoing data standardization and research collaboration.
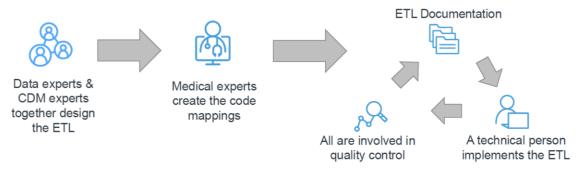
Methods

This project was executed in three collaborative phases by teams across JCRC, IQVIA, and Gilead Sciences. Each institution brought complementary capabilities: JCRC contributed clinical and research expertise, local IT administration, and data science leadership; IQVIA led the OMOP conversion and analytics workflow; and Gilead coordinated study design and scientific oversight. This conversion project was approved by the JCRC Research Ethics Committee (REC) and Uganda National Council for Science and Technology (UNCST).

Phase 1: Data Assessment and Architecture Design

JCRC's Integrated Clinical Enterprise Application (ICEA) was assessed to determine suitability for OMOP CDM conversion. IQVIA's Extraction, Transformation, and Load Process (ETL) specialists worked closely with JCRC's data and clinical teams to document table relationships, field semantics, and domain alignments. A Minimum Viable Product (MVP) OMOP design was proposed and tailored to support the research use case while balancing conversion complexity.

Phase 2: ETL Execution and Custom Mapping

ETL development involved collaborative engagement with JCRC to construct custom codebooks mapping local terms to OMOP-standard vocabularies. IQVIA facilitated mapping logic and transformation implementation. Documentation was delivered to JCRC to support ongoing OMOP maintenance.

ETL Documentation

Data experts & CDM experts together design the ETL

Medical experts create the code mappings

All are involved in quality control

A technical person implements the ETL

Phase 3: RWE Study Design and Characterization

Following conversion, the team developed a descriptive protocol to characterize four cohorts: all patients, Patients living with HIV (PLWH), patients with Hepatitis B infection (HBV), and Hepatitis C infection (HCV) infection. Gilead led protocol development; IQVIA conducted data analysis using OHDSI tools.

Results

Transformation

- **168 tables | 1,894 fields | 0 standard codes**

✗ No medical coding systems

✗ 100% custom terminology
✗ Unclear table relationships

✗ Single-user remote access only

Data Mapped

- **48,748 patients → 7 OMOP domains → 48,748 patients**

✓ **100+ hours of mapping and standardization completed**

✓ **95% data capture for core domains**

Cohort Characterization Results:

- All patients (n=48,748), PLWH (n=18,560) and HBV-positive patients (n=3,417).

Key Insights:

- Local terminology variation (e.g., tuberculosis algorithms, HIV staging, death recording) required continuous expert validation
- Embedded co-development with JCRC clinicians and analysts was critical to ensure fidelity
- The project demonstrated feasibility of real-time tri-partner OMOP implementation
- Documentation and handoff materials positioned JCRC for sustained analytic reuse and participation in future federated OHDSI studies

Conclusion

This collaboration between JCRC, IQVIA, and Gilead demonstrates that full OMOP CDM implementation and characterization are feasible in highly customized data environments when built on a foundation of collaborative design. The project illustrates how local expertise, jointly applied with global technical and scientific support, can rapidly convert unstructured health data into standardized, reusable datasets. This work has enabled JCRC to engage with OHDSI's federated ecosystem and serves as a replicable model for other settings aiming to generate representative RWE at scale.