14 Rwandan hospitals - comprising more than 3.5 million patients - transformed EHR and Covid-19 data to OMOP CDM as part of a federated data network

Title: The LAISDAR project – hospital EHR harmonization in Rwanda through mapping to OMOP CDM; outcome, challenges and lessons learned

Background: In response to the COVID-19 pandemic, a federated data network (FDN) of 15 hospitals was established in Rwanda; "Leveraging Artificial Intelligence and Data Science Techniques in Harmonizing, Sharing, Accessing and Analysing SARS-COV-2/COVID-19 Data in Rwanda (LAISDAR)" [1, 2]. The project objective was to leverage the federated hospital data sets, extended with data from centralized COVID-19 test results and survey data, to support Rwandan government needs in monitoring and predicting the COVID-19 burden. The impact of various public health measures on the pandemic evolution, social-economic situation, and mental health were also key study objectives. Although the project was originally focused on COVID-19 research, the possible research topics have since widened to other disease areas.

Results: As of April 2023, the ETL to transform the hospital EHR data to OMOP CDM has been run at 14 of the hospitals. Some of the data quality issues encountered were related to inconsistencies with birth dates and gender-specific clinical events. Other challenges were related to different configurations of the same EHR system at different sites, necessitating additional logic in the ETL, and concept mappings that need further work and completion. All these issues are being followed up.

Initially, the deployment and setup of the hospital nodes and central server were supported remotely, which was not always an optimal approach. Onsite visits by edenceHealth and Ghent University personnel helped finalize the node setups and solve remaining technical challenges, such as optimizing the build and deployment approach for updates on the Mac Mini nodes. Arachne node and server instances were built and deployed as Docker containers but have not yet been activated due to some remaining challenges with the execution engine configuration. The deployment of Ares [5] was instead prioritized at this stage, and the Arachne deployment will be continued at a later stage.

Finally, a proof-of-concept for a reporting solution was developed, through which the mandatory monthly reports from the hospitals to the Ministry of Health can be partially automated based on OMOP CDM.

Conclusion: The LAISDAR project has accomplished much; 14 hospital nodes with EHR data transformed to OMOP CDM, with a total of about 3.5 million patients represented. The national COVID-19 test results have been converted to OMOP CDM, as has the results of a COVID-19 related survey from 2022 that included 10,000 participants. A sustainable infrastructure for regular updates of the hospitals' OMOP CDM database instances have been established, with centralized quality assurance and data coverage overviews based on Ares.