

OHDSI Network Study Execution Framework and Templating

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Background

Real world evidence generated across a network of real world data repositories in OMOP CDM offers a unique opportunity to address a broader range of clinical questions with enhanced external validity compared to the traditional randomized clinical trials.^{1,2} Recognizing the value of real world evidence in regulatory decision-making, the FDA has emphasized the need for increased use of RWE.³ OHDSI network studies are a leading strategy for answering this call.^{1,4,5} To enhance robustness and reliability of OHDSI network studies, it is essential to define/outline key steps involved in design and execution of these studies.

Objectives:

The primary objective of this abstract is to define the key process steps common amongst network studies, in order to improve repeatability and reproducibility and help set expectations for researchers looking to engage in network studies. Secondary objectives are to develop standardized human and computer readable indicators of network study status, progress, and needs. These indicators will provide a snapshot of all currently running network studies and provide the key information that the OHDSI community needs to effectively monitor the studies at a high level and provide appropriate resources at an individual level.

Methods

Consensus from individuals with experience in leading OHDSI network studies demarcated nine fundamental stages that all network studies must progress through towards completion. Based on the identification of these stages and the documentation available for completed network studies, a standard set of human readable and computable data artifacts attributed to each network study are proposed for incorporation into study protocol and GitHub repository documentation.

Results

The nine stages of a network study were identified as, in order: protocol development, data diagnostics, phenotype development, phenotype evaluation, analysis specifications, network execution, study diagnostics, evidence synthesis, results evaluation. These discrete stages are illustrated as successive “camps” along each network study “expedition” in Figure 1, below.



Figure 1. Nine Stages of an OHDSI Network Study Expedition

Stage one is centered around the development and solidification of the study protocol and includes definition of the research question, identification of the study lead, formation of the study team, and recruitment of data partners. Once the protocol is fully developed and the study network and personnel are established, the team can progress to the data diagnostics stage to determine which participant databases have the necessary elements to answer the proposed research question. Stage three focuses on phenotype development where standard vocabularies and ontologies are used to create concept sets that will identify the clinical expressions and events of interest, which are then used to define study cohorts for analysis. Stage four is concentrated on phenotype evaluation and using descriptive statistics to assess general validity of the study cohorts produced in the previous stage. After the cohort diagnostics are performed, analysis design choices are evaluated to determine the best methods for addressing the research question in stage five: analysis specifications. It is essential to have completed a robust evaluation of the databases, phenotypes, cohorts, and analysis methods chosen for each study to ensure that network coordination remains the primary challenge for stage six: network execution. The generation and sharing of results from each participating site mark the end of the network execution and the beginning of stage seven: study diagnostics, where tools for objective diagnostics of statistical power, equipoise, covariate balance, generalizability, and systematic error are employed to evaluate the strength of the evidence generated during the preceding network execution phase. Stages eight and nine are where the final product is made. Stage eight, evidence synthesis, focuses on choosing the most appropriate numerical and graphical representations of the results; choices directly informed by the preceding three stages. Stage nine is where the study team can come together and, if all the preceding

stages have been completed with rigor, discuss the relevant and valuable clinical insight and meaning that can be communicated with the larger scientific community.

The proposed set of data artifacts for study progress monitoring and facilitation are outlined in Table 1, below. A current view of the OHDSI Community Dashboard for viewing status of all network studies is provided in Figure 2.

Table 1. Data Artifacts for Network Study Monitoring

Study Attribute	Values
IRB materials are sufficient for review	[No, Yes]
Cohort definition available	[No, Yes]
Data partner recruitment status	[Not Ready, Open, Closed]
Deadline for adding new data partners	MM/DD/YYYY
Protocol building team recruitment status	[Not Ready, Open, Closed]
Deadline for adding new protocol building team members	MM/DD/YYYY
Manuscript preparation team recruitment status	[Not Ready, Open, Closed]
Deadline for adding new manuscript preparation team members	MM/DD/YYYY

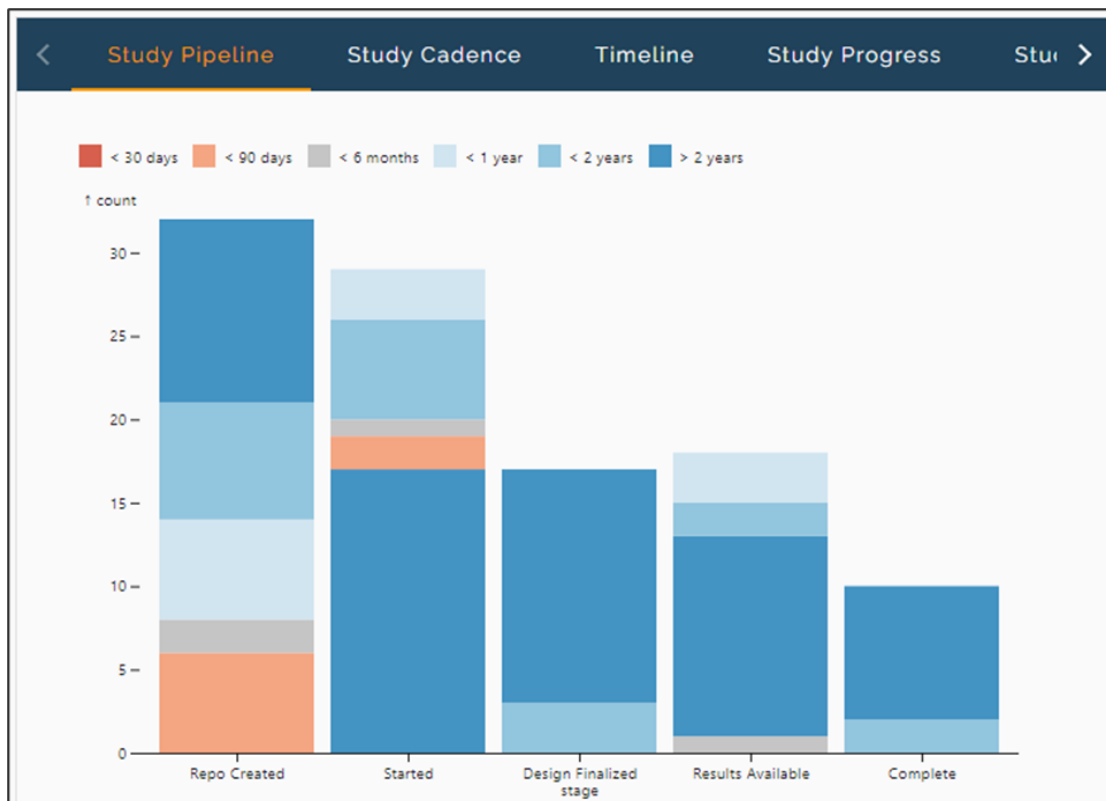


Figure 2. OHDSI Community Dashboard Visualization of Network Study Progress

Conclusion

OHDSI network studies share a great degree of common methodology and challenges. Laying out the key steps with a common framework, providing clarity and direction through each of these common stages, and identifying key information for monitoring progress amongst the community will facilitate progression and use shared experience to overcome repetitive challenges. It is important for the study team to dedicate communal focus to each of these steps, sequentially, so that preceding steps inform and enable the next. It will also be helpful to agree upon computable indicators of stage progression to enable better evaluation of the OHDSI community's ability to complete network studies. Additionally, this added structure will lower the bar for entry into the OHDSI community by novice network study leaders and data partners by refining expectations and estimated time and resources required for participation and completion of a study. The computable data artifacts attributed to each network study through incorporation into GitHub README files and study protocol documentation will allow large-scale monitoring of study progress via the Community Dashboard (Figure 2, below) and help community members allocate appropriate and timely resources to address individual study needs. The framework of network study stages and set of study progress artifacts proposed here needs to be refined and internalized by the OHDSI community at large.

References

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