Answering Questions in the National Patient-Centered Clinical Research Network (PCORnet): The Case for Standardized Querying Infrastructure and Reusable Tools

Kshema M. Nagavedu, MPH[1], Lindsey E. Petro[1], Jessica L. Sturtevant, MS[1], Casie E. Horgan, MPH[1], Darcy M. Louzao, PhD[2], Stephanie Poley, PhD[2], Lesley H. Curtis, PhD[2], Jeffrey S. Brown, PhD[1]
[1]Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, MA; [2]Duke Clinical Research Institute, Durham, NC

Project Aims

- The National Patient-Centered Clinical Research Network (PCORnet) developed a Common Data Model (CDM) to enable distributed querying amongst 78 data contributing Network Partners (NPs)
- PCORnet uses SAS-based tools and SQL-based menu-driven querying to answer questions within the network
- The Coordinating Center (CC) Analytics team develops and maintains reusable SAS-based tools and, as needed, develops ad hoc analytic code to support research
- Efficient, reusable SAS-based tools can generate answers in weeks instead of months

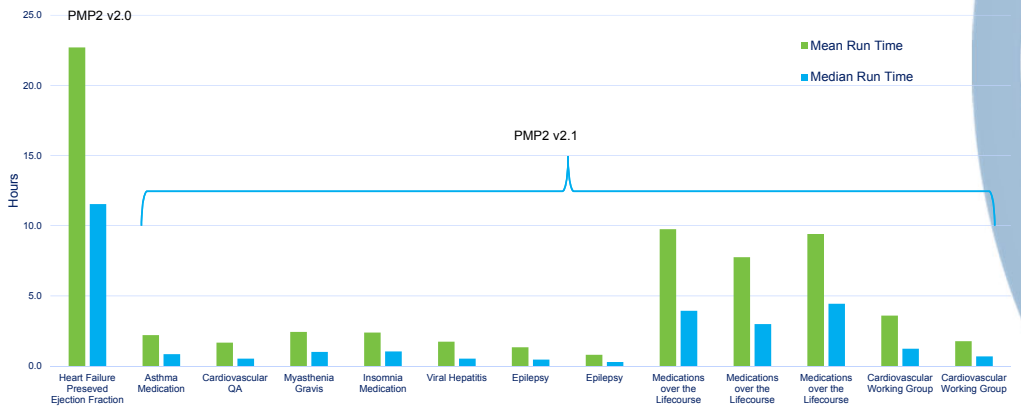
Methods

- The PCORnet reusable SAS-based tools, leveraged from the FDA Sentinel project, are architected to optimize flexibility
- SAS-based tools are standardized to simplify program execution and output review
- SAS-based tools are heavily tested before being approved for use to ensure efficient, reliable operation
- With each subsequent release, SAS-based tools are enhanced to enable new functionality and improve efficiency (See Table 1)

Table 1: PCORnet Toolbox

Functionality	PMP1	PMP2	PMP3
Cohort Defined by:	Procedure, Diagnosis	Procedure, Diagnosis, Prescribing, Dispensing	Procedure, Diagnosis, Prescribing, Dispensing, **Lab record**
Inclusion/Exclusion Events defined by:	Procedure, Diagnosis	Procedure, Diagnosis, Prescribing, Dispensing	Procedure, Diagnosis, Prescribing, Dispensing, **Lab record**
Inclusion/Exclusion period:	Relative to index health event	1) Relative to index health event 2) Within specified date range	1) Relative to index health event 2) Within specified date range
# of Inclusion/Exclusion Criteria:	1 inclusion AND/OR 1 exclusion criteria	1-2 inclusion AND/OR 1-2 exclusion criteria	1-2 inclusion AND/OR 1-2 exclusion criteria
Incident Events defined by:	Procedure, Diagnosis	Procedure, Diagnosis, Prescribing, Dispensing	Procedure, Diagnosis, Prescribing, Dispensing, Lab record
Unexposed Population	Not Available	Procedure, Diagnosis, Prescribing, Dispensing	Procedure, Diagnosis, Prescribing, Dispensing, Lab record
Denominator Population	Enrollment–based	Encounter–based	Encounter-based
Optional Modules	Not available	Cohort Quality Assessment v1.0	Cohort Quality Assessment v1.1

Figure 1: Mean and Median Run Times (Hrs)



Results

- As of September 11, 2018, 34 query packages using SAS-based tools have been distributed into the network since June 2016, representing a total of 172 query counts
- 80% of the query packages distributed in 2017 were operationalized from question to final report in less than 6 weeks
- Tool enhancement achieved a 56% reduction in average run for one query type (See Figure 1)

Lessons Learned

- Reusable tools allow common questions to be answered rapidly and with less effort than ad hoc SAS programming
- CC knowledge of NPs various computing ecosystems (e.g. operating system, SAS version) and database size are critical in architecting and developing reusable SAS tools and ad hoc SAS code
- Extensive testing of query packages ensures, to the extent possible, efficient and accurate execution
- Reusable tools produce standard output enabling NPs to become familiar thereby simplifying their review

CONTACT INFORMATION
Kshema Nagavedu, MPH
Harvard Medical School, Harvard Pilgrim Health Care Institute;
kshema_nagavedu@harvardpilgrim.org

DISCLOSURES

None.

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