Using SAS® to Support the Implementation of a Patient-Centered Outcomes Research Institute Grant Funded by the Affordable Care Act

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ABSTRACT

The Patient-Centered Outcomes Research Institute (PCORI) was created as part of the Affordable Care Act. PCORI is authorized by Congress to conduct research to provide information about the best available evidence to help patients and their health care providers make more informed decisions. Community Care Behavioral Health Organization in Pittsburgh, Pennsylvania was awarded a PCORI research grant to investigate health care system improvements for adults with serious mental illness. The grant, titled “Optimizing Behavioral Health Homes by Focusing on Outcomes that Matter Most for Adults with Serious Mental Illness,” began in January of 2013 and is ongoing. Information Technology staff at Community Care have leveraged SAS® solutions in providing real-time data extraction and reports to support the development and implementation of this research project. SAS tools have been used to merge data from multiple platforms and database sources, including web data sources. SAS has also enabled the formatting and traffic lighting of multiple Microsoft Excel data sets and files, in addition to the creation of many operational reports and data files needed for study implementation, administration, and maintenance. The challenges faced and the SAS solutions employed are the subject of this paper.

INTRODUCTION

The Patient-Centered Outcomes Research Institute was created as part of the 2010 Patient Protection and Affordable Care Act (Public Law 111-148). The section of the law that creates PCORI amends Title XI of the Social Security Act. The law authorizes the establishment of a nonprofit corporation that is not part of the federal government that is charged with examining the health outcomes, clinical effectiveness, and appropriateness of different medical treatments by evaluating existing studies and conducting its own. The purpose of the Institute is to assist patients, clinicians, purchasers, and policy-makers in making informed health decisions by advancing the quality and relevance of research evidence on how health conditions can be prevented, diagnosed, treated and managed. It is also charged with establishing ways to disseminate these research findings into the general population.

Simply stated, the mission of PCORI is to “help people make informed healthcare decisions, and improve healthcare delivery and outcomes, by producing and promoting high integrity, evidence-based information that comes from research guided by patients, caregivers and the broader healthcare community.” Improved health care models are imperative because the United States spends more on health care than any other country, yet our life expectancy is lower than other developed countries.

Community Care Behavioral Health Organization (Community Care) is a member of the Insurance Services Division of the University of Pittsburgh Medical Center (UPMC). Community Care is the only Pennsylvania-based, not-for profit, licensed behavioral health managed care organization (BH-MCO). Community Care was created to serve HealthChoices programs throughout Pennsylvania. Community Care holds both risk-bearing and Administrative Services Only (ASO) contracts. The organization has eight offices across the Commonwealth of Pennsylvania and currently has contractual arrangements with 39 of the 67 Pennsylvania counties. With nearly 500 employees and by utilizing a network of approximately 2,000 behavioral health providers, Community Care manages behavioral healthcare for over 700,000 Medicaid managed care enrollees. Community Care was designed primarily to serve the needs of public sector consumers, their families, and their communities. The mission of Community Care is to improve the health and well-being of the community through the delivery of clinically effective, cost-efficient, and accessible behavioral health services. In December of 2012, Community Care was awarded a PCORI grant based upon their application entitled “Optimizing Behavioral Health Homes by Focusing on Outcomes that Matter Most for Adults with Serious Mental Illness”.

Persons suffering from serious mental illness, a diagnosable mental health disorder defined by duration and functional impairment, are some of the most medically vulnerable populations in America. It is estimated that 6 percent (or 1 in 17) adults live with a serious mental illness. These people not only struggle with their behavioral health condition; they often have high physical health need and difficulty accessing physical health care. Difficulty accessing care is often higher in rural areas. Physical health problems in this cohort cover a broad spectrum, including cardiovascular disease, diabetes, hypertension, obesity, and hyperlipidemia. As a result, adults with serious mental illness have high rates of premature death, dying as much as 15 to 25 years younger than the general
The grant, “Optimizing Behavioral Health Homes by Focusing on Outcomes that Matter Most for Adults with Serious Mental Illness”, provides a unique opportunity to study the effectiveness of wellness interventions across 11 Community Mental Health Centers in the north central and eastern regions of Pennsylvania. The research tests the comparison between two promising practices for promoting health, wellness, and recovery of adults with serious mental illness: patient self-directed care and provider-supported integrated care. Patient self-directed care is practiced at 6 of the provider locations participating in the research study. This arm of treatment focuses on activating patients to be more informed and effective managers of their own health and health care. It uses a specialized web portal to deliver health information to patients as well as tools for tracking their progress on their personal wellness goals. Additionally, a specially-trained peer with similar life issues and experiences is provided to the patient to assist them in taking a more active role in their health and health care. Provider-supported integrated care is practiced at 5 of the provider locations participating in the research study. This arm of treatment utilizes a registered nurse on staff at the locations who works with patients to provide patient wellness support and education, as well as to assist with coordination of care and to monitor the patients’ medical progress. Both arms of treatment focus on health and wellness education, the setting of wellness goals, creating action plans to meet those goals, and monitoring progress using health trackers. The specific areas of wellness focused on are: healthy weight, smoking cessation, physical activity, taking medications effectively, physical and behavioral health care, sleep hygiene, and stress reduction.

The implementation of this grant provided many technical challenges to Community Care. Data with disparate formats from multiple sources and platforms had to be combined to meet the many data collection, extraction and reporting needs of the project. Member data was comprised of data obtained from paid Medicaid behavioral service claims, paid Medicaid pharmacy claims, Medicaid service authorization data, member reported data and web portal data from participating providers. Data was pulled to identify and stratify members for the project; data was then sent to and used by the providers to begin study recruitment. A web portal was developed to collect member consent and to provide a data entry tool for member and provider measurement, survey, and other study related data. Web-based health trackers were also made available to study participants. Multiple complex reports were needed for study implementation and administration. Due to the disparity in data sources and formats as well as the demanding requirements of the PCORI project, SAS® was determined to be the most efficient tool for data manipulation.

PROJECT IMPLEMENTATION

All member information was extracted from a behavioral health claims database using SAS®. Study eligible members were identified using the following criteria: a) 18 years of age or older; b) member of Medicaid Health Choices in the North Central area of Pennsylvania; and c) a diagnosis of schizophrenia, major mood disorder, psychotic disorder, or borderline personality disorder. Additionally, members were identified by number of claims for specific types of behavioral health service utilization within a 6 month look back period. Members qualified for study enrollment if 2 or more claims were found documenting use of case management, certified peer specialist contacts, Assertive Community Treatment (ACT) team contacts, psychiatric rehabilitation services or outpatient services within the 6 month period. Next, the provider sites at which the members received services were listed to provide a nested data structure. If a member received differing types of services at different provider sites, the site providing case management services became the primary site.

Once the list of members who qualified for enrollment into PCORI at the various provider sites was compiled, they were stratified into a high and low risk tier. The purpose of these tiers is to help focus efforts towards the members who had the highest health risk factors in both treatment arms of this study in case of staffing or administrative shortfalls.

The high risk tier comprised of members who had chronic physical health conditions like diabetes or asthma or Chronic Obstructive Pulmonary Disease (COPD) (identified by pharmacy insurance claims for medications filled for any of these conditions) or had received high intensity behavioral health services in the prior year such as multiple inpatient hospitalizations, admission into an extended acute care unit, multiple services with Assertive Community Treatment (ACT) Teams, multiple services with Community Treatment Teams (CTT), or had concomitant fills for multiple behavioral health medications such as antipsychotics, antidepressants, mood stabilizers, opiates, anxiolytics, stimulants, sedatives, etc. Approximately 30% of the members who qualified for recruitment into PCORI were in the high risk tier.

After stratification, member lists were generated for each provider using the ODS HTML utility in SAS in combination with PROC REPORT (Display 1 and Display 2). The generated excel files were then password protected per HIPAA
regulations since the files contained protected health information and were distributed to the participating providers via company secure email.

Using a SAS macro and a DO LOOP, separate datasets are created with all the relevant information for each of the 11 participating providers.

```
%macro prov_output(indata) ;
  ODS LISTING CLOSE;
  proc sort data = &idata out=outdata1 ;
    by provider_name ;
  run;
  data outdata2 ;
    set outdata1 ;
    by provider_name ;
    retain prov_index 0 ;
    if first.provider_name then prov_index=1 ;
  run;
  proc sql noprint ;
    select max(prov_index) into: maxind
    from outdata2
    where prov_index > 0 ;
  quit ;
  %do i = 1 %to &maxind :
    proc sql noprint ;
      select distinct strip(compress(provider_name, "_")) into :provname
      from outdata2
      where prov_index=&i ;
    quit ;
    data prov_&i_data ;
      set outdata2 ;
      where prov_index=&i ;
    run ;
    proc sql noprint ;
      select distinct provider_name into :prov
      from prov_&i_data ;
    quit ;
  %end ;
%end ;
```

Display 1: Macro and the DO Loop
CONSENT PROCESS

Once the provider sites received their file, they used it to guide and inform their PCORI recruitment. The providers were also allowed to recruit members for the PCORI study who were not on the identified list sent to them as long as the member met all the identification criteria. At each provider site, interested members logged on to a web portal built specifically for this project and submitted their consent for this study.

In addition to the consent, members use the web portal to complete a set of seven survey instruments which include the Physical Health Information (PH Part 1) and the Interpersonal Support Evaluation List (ISEL) which help assess the member’s quality of life in personal and professional settings while living with serious chronic behavioral and physical health conditions (shown in Display 3).

Answered in a pre-determined sequence, the member’s responses to these surveys are collected at least four times during the study. The member screen and the order in which the surveys appear are shown in Display 3. The first time they complete the survey is recorded as a baseline response. Subsequent surveys are re-measurements at different time points in the study. These responses will be used to measure outcomes and assess the effectiveness of the different treatment arms at the end of the project.
The consent data and survey response data feeds into a Cognos framework developed for this purpose on a daily basis and is then extracted into an excel file using the Cognos Report Query created for this project.

Each tab in the excel file contained the responses from one form on the web, i.e. the data from the consent form was in the first tab, data from the SF12 was in the second tab and similarly each of the others surveys shown in Display 3 were in a separate tab as well. A screen shot of the excel file is shown in Display 4.

AccessNumber is the Member’s Medicaid ID which is protected health information and hence has been redacted.
Excel data in the format shown in Display 4 enabled the use of the code shown in Display 5. The result of using this is shown in Display 6.

The libname statement creates a libname directly to the excel file and each of the sheets is now a dataset with a $ sign appended to the sheet name that is present in excel. The first row in each tab is now the variable name. The result is shown in Display 6.

The consent table is shown in Display 7 as an example.

Display 5: SAS Code Importing Excel Data Directly into SAS

Display 6: Result of the Libname to the Excel File

Display 7: Consent Table as Sample
Each of the tabs in the excel file were therefore converted to permanent SAS datasets with minimal manual intervention.

**PROVIDER PERFORMANCE TRACKING**

There were three rates that needed tracked for the initial recruitment phase of the project – the consent rate, primary measure completion rate and survey completion rate.

The consent rate corresponded to the rate of members who qualified for the PCORI study that consented to be part of the study. The primary measure completion rate was the rate of members who consented for the PCORI study and also completed the first three surveys of the study shown in Display 3. This rate was important because these three surveys are part of the primary outcomes to be studied at the end of this PCORI grant. The last tracking rate was the survey completion rate which was the rate of members who consented for the PCORI study and completed all seven of the surveys.

All rates were presented as an overall rate, a rate by treatment arm and a rate by provider. A combination of PROC SQL, the DATA STEP MERGE and PROC REPORT was used to create the final output.

Member consents and member responses to the PH Part 1 survey (third survey in Display 3) and ISEL survey (seventh survey in Display 3), all of which were converted to permanent SAS datasets as shown in Display 7 were grouped individually to create summary datasets for PCORI study consent, the PH Part 1 survey and the ISEL survey - by provider, by treatment arm and overall for the entire project.

These summary datasets were then merged to the summary dataset created from the original member identification file sent to all providers which showed the distribution of members who qualified for the PCORI study – by provider, treatment arm and overall. The next few figures explain the building of the final output table and the final report.

```sas
174: data all2;
176  merge prov_freq2 (in=a) prov_consent_freq2 (in=b) prov_isel16_freq2 (in=c)
177  by provider_name provider_id;
178  if a;
179  format pct_yes percent13.2 pct_complete percent13.2 pct_primary percent13.2;
180  if consentTF = 1 then pct_yes = consent_ID/all_ID;
181  if isel16TF = 1 and consentTF = 1 then pct_complete = isel16_ID / consent_ID;
182  if phiTF = 1 and consentTF = 1 then pct_primary = phi_ID / consent_ID;
183  run;
```

Display 8: Merging Summary Datasets

The dataset created from the above merge is shown in Display 9.

Display 9: Merged Dataset
An overall summary record with totals and percentages is created from the table shown in Display 9.

Once stacked to the provider summary dataset, a new grouping variable is created categorizing each provider by the treatment arm.

Summary totals and percentages by treatment arm are created.

This completes the report dataset.
The final report was produced using PROC REPORT in combination with ODS PDF. The code is shown in Display 14 and Display 15.

ODS PDF was used to format the look and feel of the report including adding custom titles and footnotes.

SAS System options used to orient the report and date stamp and time stamp the output.

PROC REPORT was used to customize the look and feel of the table with columns being defined in specific format and suppressing some columns as needed.
Display 15: PROC REPORT for Final Output Creation (part 2)

The final report output sent to all providers and project stakeholders is shown in Output 1.
CONCLUSION

A variety of SAS® functions and procedures have proven to be quite useful in addressing the multiple requirements of the PCORI project. As the project moves forward, we will continue to look to SAS solutions to solve our technical challenges.

REFERENCES


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