Choosing the Best Method for Provider Performance Issue Tracking: SAS® or IBM Cognos

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ABSTRACT

Community Care Behavioral Health Organization (CCBH) in Pittsburgh, Pennsylvania is a behavioral health managed care organization with a large provider network that works with people to obtain clinical assistance and connects them to mental health and substance use treatment options. Studying the performance of different providers in this large network is of utmost importance because of the significant role these providers play in ensuring that our patients get the best possible treatment. Community Care's Quality Department designed specifications around different levels of care delivered by these providers and the Decision Support team at CCBH developed a report using IBM Cognos Business Intelligence. However, programming, executing, and delivering the reports via IBM Cognos proved to be challenging, and the paper addresses the various ways in which these challenges were minimized or overcome by using SAS®. SAS proved to be more efficient, more transparent, and more adaptable to possible future changes or additions to the specifications.

INTRODUCTION

Community Care Behavioral Health Organization (CCBH) is a not for profit licensed behavioral health (BH) managed care organization located in south western PA that falls under the umbrella of the UPMC Insurance Services Division. Established 20 years ago, CCBH was created to serve the needs of people who were enrolled in clinical assistance or Medicaid in PA. Clinical Assistance in PA is called HealthChoices. The organization contracts with 40 of the 67 counties in PA. It has 8 offices across the state and holds both risk-bearing contracts and administrative services only contracts. CCBH has a commitment to provide good quality and cost-effective behavioral health care to all its consumers. With the help of a vast provider network of more than 2500 providers, CCBH manages the BH needs of a little more than 1,000,000 million Medicaid enrollees.

Creating strong business relationships/partnerships with our providers is a vital part of our business model. This involves having a comprehensive credentialing process, assessing the needs of individual communities and ensuring that providers can meet the specific needs of the communities they are in or are close to. Our Quality team helps maintain this process by continuously re-assessing the providers and the impact they have within the community. This is achieved by looking at specific quality indicators such as utilization of services at the provider by high need populations, effectiveness of the care delivered, compliance with regulations, use of preventative services, and health outcomes.

PROVIDER PERFORMANCE ISSUE TRACKING UTILIZING COGNOS

In early 2013, the Quality Department at CCBH initiated a request to automate the provider performance issue tracking process (PPI) using a monthly report. The initial request was for the development of a monthly report that could track member discharges from care, accountable providers, levels of care and the status of aftercare appointments occurring after discharge from specific levels of care.

Prior to this request, the PPI process relied on the clinical care manager to complete a PPI template for providers that met criteria (late discharges, late aftercare appointments, no aftercare appointment). Although required, the process could at times be inconsistent because it relied on the individual care manager's interpretation of what constituted a PPI.

The quality team would then compile a monthly report and manually track all the PPIs by provider and level of care, then trend any providers with 3 or more consecutive months of PPIs that reached an established threshold. The process was time consuming and cumbersome. The request for this report was to make the PPI process a data driven decision rather than left to the individual care manager.

Cognos was selected as the tool for this project due to the ability to automate the monthly scheduling process as well as the ability for the users to run ad-hoc versions of the report. Cognos has customarily been utilized as the tool of choice for reports utilizing data from PsychConsult clinical templates. Typically, these reports use tables that are easily joined through the established Cognos framework. The PPI request proved to be more complex because it relied on a nonexistent link between the template module and the authorization module.

THE DATA

Clinical data is collected via our inhouse application, PsychConsult. PsychConsult is a platform that includes an authorization module and a clinical template module, each comprised of numerous tables. For this report, the data collected was partially coming from the clinical template module tables, and partially from the authorization module tables. The data needed for the report from the clinical template tables was dependent on the status and content of a corresponding authorization saved in the authorization tables. Unfortunately, the clinical template tables and authorization tables do not share a primary or foreign key.

In addition, it was discovered that many of the fields used in the clinical templates were text fields, and not all templates contained the data fields necessary for the report. A request was submitted for modifications to the templates replacing the text fields into reportable fields. This process was critical to develop the necessary date calculations that determined if a provider was given a PPI.

DEVELOPMENT IN COGNOS

Once the necessary modifications were made to the templates in PsychConsult, we were able to create queries in Cognos that pulled the necessary data, most importantly, discharge dates, aftercare appointment dates, provider id, member id and other member demographics. From the authorization module we pulled authorizing provider information and authorized level of care.

Because the tracking of PPIs was conditional on the level of care, and because that level of care did not exist in the clinical template, it was necessary to join to the authorization

module to obtain this crucial data. As previously mentioned, the template module and the authorization module do not share a primary or foreign key. To match a clinical template to the corresponding authorization, it was necessary to create a case statement where the discharge date entered on the clinical template fell within the to and from date on the authorization. In addition, the provider ID on the clinical template needed to match the provider ID on the authorization.

Although this case statement worked with a very small error margin, input errors in the data created scenarios where clinical templates were excluded from analysis because they could not be matched to an authorization. Most commonly the discharge date did not fall in range of any existing authorization with a matching provider ID. This problem is inherent to the data and was carried forward when the report was developed using SAS®.

A set of queries were created for each clinical template where it was matched up with the authorization portion.

Figure 1 illustrates the set of queries and joins needed to capture one type of template from the PsychConsult application. The initial query returns all documents from the rtf_dc table. The second query pulls all documents from the rtf_dc and in addition, authorizations from the authorization tables.
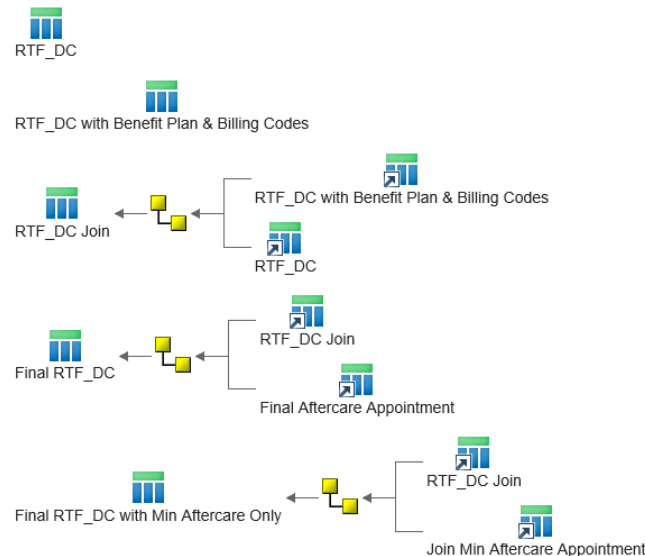

Figure 1: RTF Discharge -Initial Queries

As previously mentioned, there is no common key between the authorization tables and the clinical template tables. To achieve a match between these two, several expressions are utilized to create the best match possible. This is shown in Figures 2, 3 and 4.

Figure 2 shows the expressions that only returns authorizations where the billing codes match those stated. Each clinical template can be utilized for different levels of care. The Quality Department only tracks and trends specific levels of care. Those levels of care are determined by the billing codes utilized in the authorization for service. While creating the initial queries for each clinical template, it was important that only those templates that were utilized with the correct corresponding levels of care were included in the denominator for analysis.

Expression Definition:

[CCBH_Clinical Presentation Layer].[Provider Proc Auth Detail].[Billing Code] in ('154','240','241','242','243','249')

or

[CCBH_Clinical Presentation Layer].[Provider Proc Auth Detail].[Billing Code] like 'H0019%'

or [CCBH_Clinical Presentation Layer].[Provider Proc Auth Detail].[Billing Code] like 'T2038%'

Figure 2: Expression to limit authorizations for RTF Discharge to listed billing codes

Figure 3 shows the expression that returns authorizations where the discharge date on the clinical template falls in range of the from_date and to_date of the authorization. It is with this expression that we can establish that the authorization is connected to the clinical template. With this step, we ensure that the authorization is for services that occurred during the length of service up to the discharge date listed on the discharge template.

Expression Definition:

[CCBH_Clinical Presentation Layer].[Doc_DW_RTF_DC].[date_discharge] > [CCBH_Clinical Presentation Layer].[Provider Proc Auth Detail].[from_date] and [CCBH_Clinical Presentation Layer].[Doc_DW_RTF_DC].[date_discharge] <=[To Date]

Figure 3: Expression stating that discharge date must fall in range of authorization from_date and to_date

Figure 4 shows the expression that creates a 1 to 1 join where the member_id, doc_session_no and provider_id from the clinical template and the authorizations provider_id is equal.

Expression Definition:

[RTF_DC with Benefit Plan & Billing Codes].[Member ID] = [RTF_DC].[Member ID] and
[RTF_DC with Benefit Plan & Billing Codes].[doc_session_no] = [RTF_DC].[doc_session_no] and
[RTF_DC with Benefit Plan & Billing Codes].[Provider ID From Auth] = [RTF_DC].[Discharing Provider ID]

Figure 4: Expression to match clinical template Member ID and Provider ID to Member ID and Provider ID on the authorization

It is at this point that completed clinical templates could potentially be left out of the denominator. This is typically due to the discharge date on the clinical template not falling in the range of the authorization dates. Less often, the dates will fall in range, but the Provider ID will not match.

Once the authorization matches are made for the clinical template, a left join is made to the aftercare appointment query, which shares doc_session_no as the primary key with the clinical templates. The final_rtf_dc join is utilized for the member detail portion of the report. To calculate the status of the aftercare appointment, another query is created that establishes the earliest set aftercare appointment.

Using a union, final queries for each template are brought together into several datasets which can then be utilized according to the measure, as seen in Figure 5, Figure 6, Figure 7, Figure 8 and Figure 9.
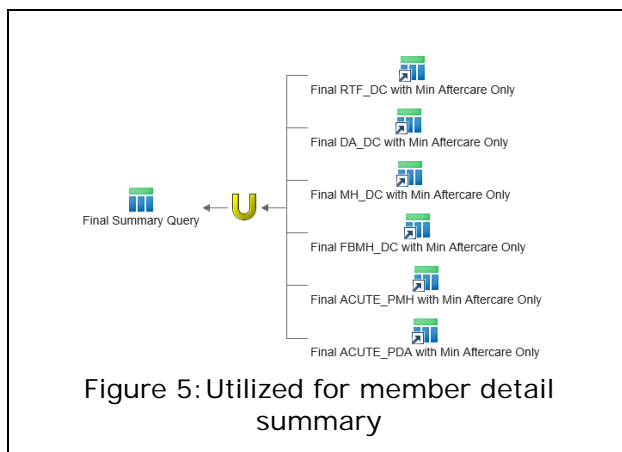

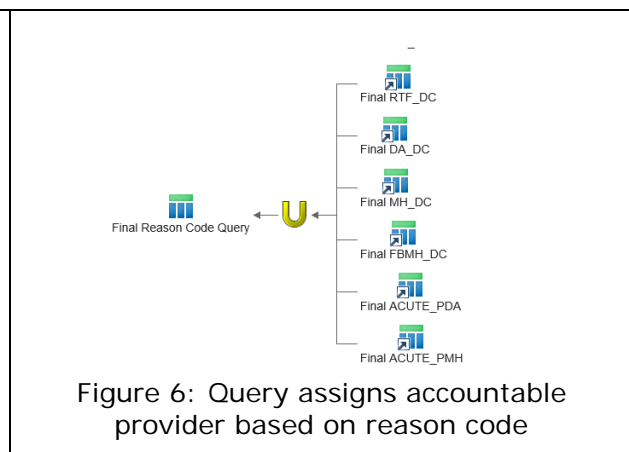Figure 5: Utilized for member detail summary

Figure 6: Query assigns accountable provider based on reason code
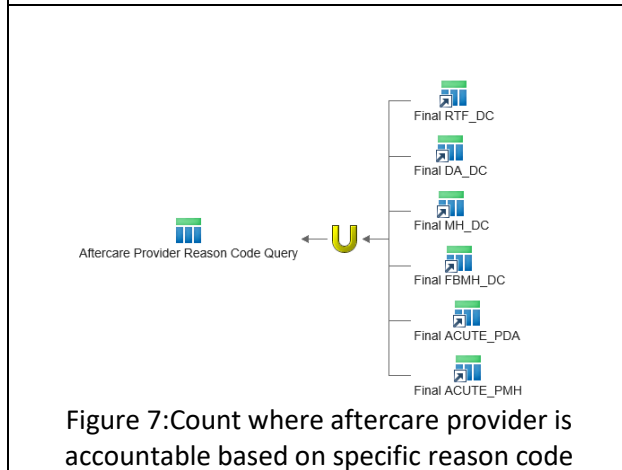

Figure 7: Count where aftercare provider is accountable based on specific reason code
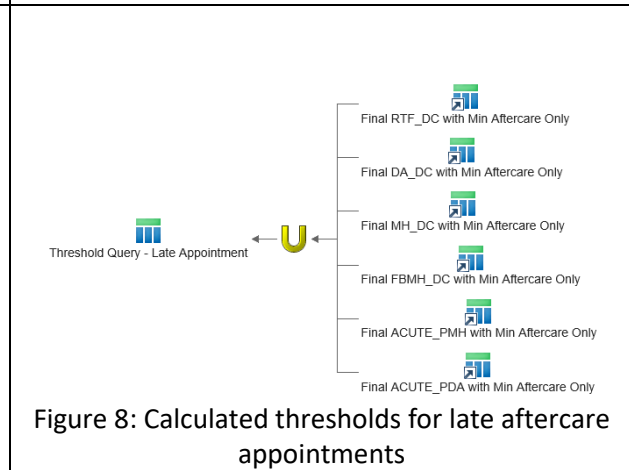

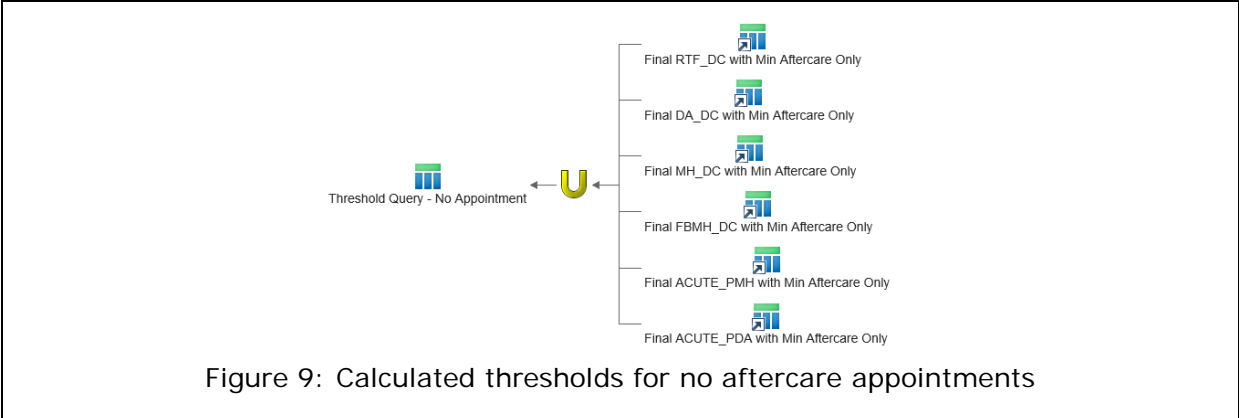Figure 8: Calculated thresholds for late aftercare appointments

Figure 9: Calculated thresholds for no aftercare appointments

Cognos is easily able to handle the data if run for individual clinical templates. Once placed into a crosstab and summarized, due to the structure of the report, the run time of the report increases exponentially. This is likely due to the necessity to place data prompts in final level queries which creates a resource and time intensive process.

Another request from Quality that was difficult to accomplish in Cognos was to merge the measures into one table. Achieving this in Cognos was restrictive because the data was coming from three separate data sets. This is something SAS handles easily by modifying data item names and creating a final data set. Figure 10 and Figure 11 show the crosstab for the output.

Threshold Summary - Late Aftercare Appointment

Discharging Provider Name	Discharging Provider ID	Level of Care	Total Late Appointment	Total Discharges for Level of Care	% of Late or No Aftercare Appointment
< Discharging Facility Name>	< Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>
	<Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>
<Discharging Facility Name>	<Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>
	<Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>

Threshold Summary - No Aftercare Appointment

Discharging Provider Name	Discharging Provider ID	Level of Care	Total No Appointment	Total Discharges for Level of Care	% of Late or No Aftercare Appointment
< Discharging Facility Name>	< Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>
	<Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>
<Discharging Facility Name>	<Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>
	<Discharging Provider ID>	<Billing Code Description>	<Aftercare Appointment Date(count)>	<Total Discharges>	<Percentage>

Figure 10: Threshold No Aftercare and Late Aftercare Summaries

AFTERCARE PROVIDER UNABLE TO OFFER APPOINTMENT

Aftercare Provider Name	Aftercare Provider ID	Aftercare Provider Unable to Offer Apt. Within 7 Days	Total Aftercare Appointments	Percentage
< Aftercare Provider Name>	<Aftercare Provider ID>	<Reason Code Flag(count)>	<Aftercare Provider ID (count)>	<Percentage>
<Aftercare Provider Name>	<Aftercare Provider ID>	<Reason Code Flag(count)>	<Aftercare Provider ID (count)>	<Percentage>

Figure 11: Aftercare Provider Summary

COGNOS LIMITATIONS

Individually, clinical template queries that were joined to the authorization tables would run in a matter of minutes, but once combined and calculations applied in summary, those tables were now taking close to an hour to run for a month's worth of data.

The long running time of the report made it extremely difficult to implement new changes on the development side, and for the report end user, it became a very time intensive process. More importantly, running this report became a very resource heavy task that at times, created significant slowdowns for other Cognos end users.

In addition, the quality department often requires runs of the report that encompass a three plus year range for individual providers. The data from these runs is utilized when the quality department meets with individual providers to initiate a corrective action plan. The data is typically needed within a 48-hour window. These runs could occur as much as five times weekly and each often takes multiple hours to run in Cognos. The necessity for these provider focused reports were one of the main reasons the decision was made to transition to SAS, which could undoubtedly handle the nature and size of these ad-hoc requests.

A MOVE TO SAS

In 2018, a new Quality department head requested significant modifications to the existing report. Knowing the drawbacks of the existing report, and how having Cognos admin outside of CCBH adds to process delays while making modifications of such a complex report, it was determined that this would be a good time to transition the report from Cognos to a SAS program.

Development in SAS required queries and data steps as numerous as those in Cognos, the significant difference in the amount of time that it takes to run the same report in SAS as compared to Cognos, made the time and effort in developing the programs in SAS well worth the return on overall efficiency for the quality department.

Although, we could have transitioned the ad-hoc requests to SAS to improve the efficiency of these larger requests, it was determined that the potential for inconsistencies between the two tools were significant enough that it was decided that all PPI related reports would be transitioned to SAS programs, assuring that there were no inconsistencies. Additionally, when changes are needed and implemented it will only require changes to the SAS program.

More importantly, the 45-minute to hour run time for the monthly Cognos report was now reduced to a 12-minute process. The necessity for cartesian product joins, which were difficult to construct and resulted in the time intensive runs in Cognos, were easily achievable in SAS without any issues. SAS simply processes the data and calculations more efficiently.

IMPLEMENTATION IN SAS

The structure of the SAS program emulated what was developed in Cognos. Each clinical template was handled individually in a sequence of steps to achieve the denominator for each level of care. As in Cognos, a date range calculation had to be utilized to obtain the correct corresponding authorization. A step was also added to determine the number of discharge templates that could not be matched to an authorization:

```
***left join to determine who is not matching, then spot check why reasons
could be billing codes not being tracked and discharge dates not falling in
range of to and from authorization dates***;

proc sql;
      create table da_auths_checknomatch as
            select distinct a.*, b.*
            from da_dc a left join da_auths5 b
      on   a.entity_root_id=b.member_id
      and a.discharge_date >b.from_date
      and a.discharge_date <=b.auth_to_date
      and a.provider_id=b.auth_provider_id;
quit;
***2808***;

***do a spot check of this table to determine how many and why documents
aren't matching look in PsychConsult to see authorizations and detail of
discharge document***;

proc sql;
      create table no_match as
            select * from da_auths_checknomatch
            where billing_code is NULL
      order by entity_root_id;
quit;
***231***;
```

This portion of code allows us to provide our clinical group with an error report on these clinical documents that do not have corresponding authorizations. This was not always achievable in Cognos.

The main measure for this analysis involves calculating Late scheduled aftercare appointments and Null aftercare appointments in contrast to total discharges, as well as determining the accountable provider. To determine if an appointment is late, we first needed to define a timely appointment:

```
**add 7 days to discharge date to determine late appointments***;
data add_7;
      set min_da_aftercare;
      format dc_date_7 mmddyy10.;
      dc_date_7 =intnx('day',discharge_date,7);
run;

***create table with timely appts***;
proc sql;
      create table da_timely_appt as
            select *
            from add_7
      where apt_date<=dc_date_7;
quit;

**determine LATE DA aftercare appointments - appt is considered late if it
occurs 7+ days after discharge***;
proc sql;
      create table da_late_appt as
```

```
              select *
              from add_7
       where apt_date >dc_date_7;
quit;
```

These steps are repeated for each type of clinical template ensuring that the count at each level of care is correct, and if not, it is easy to troubleshoot. Once the denominator is determined, and the measures are defined for each clinical template the next portion of the program focuses on the calculations needed for the summaries. This is where SAS shines. We were easily able to create multiple summary tables from the final data sets below:

```
data discharge_freq;
       format discharge_template $50.;
       set da_dc_freq fbmh_dc_freq mh_dc_freq pda_freqpmh_freq;
run;

data late_freq;
       format discharge_template $50.;
       set da_dc_late_freq2 fbmh_dc_late_freq2 mh_dc_late_freq2
       pda_late_freq2 pmh_late_freq2;
run;

data null_freq;
       format discharge_template $50.;
       set da_dc_null_freq2 fbmh_dc_null_freq2 mh_dc_null_freq2
       pda_null_freq2 pmh_null_freq2;
run;

proc sql;
       create table final_late as
              select a.discharge_template, a.provider_name, a.provider_id,
              a.level_of_care 'Level of Care', b.billing_code, b.contract,
              b.total_late_appts as total_late_null 'Total Late or Null
              Appointments',
              a.total_discharges as total_dc_or_aftercare 'Total
              Discharges/Aftercare'
       from discharge_freq a, late_freq b
       where a.provider_id=b.provider_id
       and a.level_of_care=b.level_of_care;
quit;

proc sql;
       create table final_null as
              select a.discharge_template, a.provider_name, a.provider_id,
              a.level_of_care 'Level of Care', b.total_null_appts as
              total_late_null 'Total Late or Null Appointments',
              b.billing_code,b.contract,
              a.total_discharges as total_dc_or_aftercare 'Total
              Discharges/Aftercare'
       from discharge_freq a, null_freq b
       where a.provider_id=b.provider_id
       and a.level_of_care=b.level_of_care;
quit;
```

SAS PROS AND CONS

One of the primary reasons for moving the PPI program from Cognos to SAS was because Cognos was not able to efficiently handle the data and calculations necessary to create required summaries. SAS is a tool that provides efficiency in how quickly the data is run, but also allows for easier trouble shooting as well as future modifications and additions.

Coding in SAS is very transparent and allows the analyst more control over the joins. The fields can be manipulated with more ease in SAS, and for a request this complex that is subject to many modifications, this kind of control proved to be invaluable. Detailed comments within the code ensures that other analysts could easily take over this task as and when needed by the Quality team.

The main caveat for this switch is that the report is no longer automated and thus needs to be manually run each month. In addition, any ad-hoc request will also need to be run manually by an analyst. But the significant gain in run time and less stress on operating resources makes this switch a sensible one. Even the 3-year run that typically caused the Cognos system to strain significantly, posed no issue in SAS.

With the proper processes in place for run requests, using SAS as a tool for this report is far more reliable and efficient than the existing Cognos report.

CONCLUSION

In conclusion, we would like to state that for a complex project such as the one described in this paper, any tool we used to obtain a solution would have been tough to program.

The main advantage of Cognos was that the reports could be scheduled, and they wouldn't need to be manually monitored. But our in-house data structure limitations, the possibility of having to scale up when the client requested modifications, and simultaneously maintain data accuracy and operational efficiency meant the Cognos solution had limitations.

Re-building the entire report in SAS took quite a bit of time and effort, but the degree to which all the data elements could be manipulated and the speed with which the queries executed, meant it was easy to test different scenarios and the final report could be quickly produced. All changes could be clearly documented in SAS, making the program more transferable. The downside of using SAS is that an analyst will always be required to run the report.

However, we are exploring future solutions where this program could be converted to an automated job in SAS DI Studio (used by the CCBH in house EDW Team) and could therefore be scheduled to run every month.

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