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SAS® Solutions Make HEDIS® Measures Programming Easier

Qingfeng Liang, UPMC Health Plan Inc., Pittsburgh, PA

ABSTRACT

The Healthcare Effectiveness Data and Information Set (HEDIS®), a product of the National Committee for Quality Assurance (NCQA®), is one of the most widely used set of health care performance measures which are related to many significant public health issues such as cancer, cardiovascular conditions, breast cancer, diabetes, depression, etc. For managed care organizations (MCOs), HEDIS presents interesting information systems and programming challenges to MCOs due to complication of health insurance data and the complexity of the measures. The advantages of SAS programming power and its solutions make these challenges much easier to overcome. This paper will explain the major challenges we faced when we are trying to tackle these measures and, more importantly, we established powerful SAS solutions to overcome these pitfalls.

INTRODUCTION

HEDIS®

The Healthcare Effectiveness Data and Information Set (HEDIS®) is a product developed by the National Committee for Quality Assurance (NCQA®), and is used by more than 90 percent of America's health plans to measure performance on important dimensions of care and service. HEDIS is the most important quantitative performance measures for managed care organizations as it provides a useful and meaningful basis of comparison of historical performance of health plan. There are 76 key indicators of medical delivery across 5 domains listed below for Year 2012:

- Effectiveness of Care
- Access/Availability to Care
- Utilization and Relative Resource Use
- Experience of Care
- Health Plan Descriptive Information

NCQA publishes the HEDIS annual technical specifications for health plans which define indicators to be measured, the measurement period, member inclusion criteria and exclusion criteria, the data collection and rate calculation procedures. For example, with the "Glaucoma Screening in Older Adults (GSO)" measure, the denominator criteria includes members 65 years and older who continuously enrolled during the measurement year and the year prior to the measurement year with one gap up to 45 days during each year of continuous enrollment. The numerators include one or more eye exams for glaucoma by an eye care professional during the measurement year and the year prior to the measurement year (NCQA 2011, p.92).

Because so many health plans collect HEDIS data, and because the measures are so specifically defined, HEDIS makes it possible to compare the performance of health plan to other plans and to national or regional benchmarks. Although not originally intended for trending, HEDIS results are increasingly used to track year-to-year performance. Health plans also use HEDIS results themselves to see where they need to focus their improvement efforts. HEDIS measures address a broad range of important health issues like the following:

- Medication Management for People With Asthma
- Persistence of Beta-Blocker Treatment after a Heart Attack
- Controlling High Blood Pressure
- Comprehensive Diabetes Care
- Breast Cancer Screening
- Antidepressant Medication Management
- Childhood and Adolescent Immunization Status
- Annual Monitoring for Patients on Persistent Medications

Many health plans report HEDIS data to consumers or use their results to make improvements in their quality of care and service. Consumers use HEDIS data, along with accreditation information, to help them select the best health plan for their needs. To ensure the validity of HEDIS results, all data are rigorously audited by certified auditors using a process designed by NCQA.

Consumers also benefit from HEDIS data through the State of Health Care Quality report, a comprehensive look at the performance of the nation's health care system. HEDIS data also are the centerpiece of most health plan "report cards" that appear in national magazines and local newspapers under titles like “Best Health Plan,” such as those found in Newsweek, U.S. News & World Report and Managed Healthcare.

HEDIS data are collected through surveys, medical charts and health insurance claims for hospitalizations, medical office visits, procedures and pharmacy. Survey measures must be conducted by an NCQA-approved external survey organization. Clinical measures use the administrative or hybrid data collection methodology, as specified by NCQA. Administrative data are electronic records of services, including insurance claims and registration systems from hospitals, clinics, medical offices, pharmacies and labs.

UPMC HEALTH PLAN

UPMC Health Plan is owned by the University of Pittsburgh Medical Center (UPMC), one of the nation's top-ranked health systems. As part of an integrated health care delivery system, UPMC Health Plan partners with UPMC and community network providers to improve clinical outcomes as well as the health of the greater community.

The integrated partner companies of the UPMC Insurance Services Division — which includes UPMC Health Plan, UPMC WorkPartners, LifeSolutions (EAP), UPMC for You (Medical Assistance), and Community Care Behavioral Health — offer a full range of group health insurance, Medicare, Special Needs, CHIP, Medical Assistance, behavioral health, employee assistance, and workers' compensation products and services to nearly 1.6 million members. UPMC Health Plan adopts HEDIS measures as quality indicators and maintains an "Excellent" rating (the highest available from NCQA) for its commercial HMO/POS, Medicaid HMO and Medicare HMO products. Our members have access to the world-class academic, advanced-care, and specialty hospitals of UPMC, as well as renowned community hospitals, cancer centers, physician practices, and long-term care facilities.

PROGRAMMING CHALLENGES FOR HEDIS MEASURES

Programming HEDIS measures is a very challenge project; therefore some health plans decide to contract with NCQA certified software vendors to produce the data. With careful planning and with the right tools, this project still can be accomplished within the organization with limited resources. This paper will mainly focus on administrative method which utilizes claims, enrollment records and member registration information to generate the rates for HEDIS measures. We identify the following major challenges when we try to tackle these measures.

THE NATURE OF HEALTH INSURANCE DATA

In general health insurance data includes 3 major sources, claims, member registration information, and provider network information. The following Table 1 to Table 3 shows you the simple prototypes of 3 major data sources.

Claim Type	Claim ID	Member ID	Services	Date	Provider	Amount
Medical claim						
Pharmacy claims						
Dental claims						
Vision claims						

Table 1: Claims

Member ID	Name	Address	Enrollment
1000001	X	123 ABC Road	01/01/2011 – 12/31/2011

Table 2: Members

Provider ID	Name	Address	Contract
100001	Y	234 XYZ Drive	01/01/2010 – 12/31/2012

Table 3: Providers

As we know that health insurance claims are very complicated. They are affected by numerous factors, like how providers bill the claims, and how health plans or claim vendors process claims, etc. Since there are different coding system for medical procedures and diseases diagnosis, claims usually contains CPT codes, HCPCS codes, ICD-9-Procedures codes, ICD-9-Diagnosis codes, UB codes, Revenue codes, etc. Some health plans allow providers to bill with some custom CPT codes. Raw claims need to be cleaned before they can be used to construct the measures. Some claims did not have discharge date for inpatient stay. Some claims were rejected, resubmitted, reversed, etc. MCOs sometimes have difficulty to identify inpatient claims, claims for acute care, etc.

ACCESS AND EXTRACT DATA

MCOs have the data stored in different databases, like ORACLE database, SQL database, SAS, DB2, etc. We may experience limitations and difficulties when we use different applications to extract data, for example, excessive processing time, incompatible formats, etc. We may also have the difficulty to transfer or communicate the data among different databases.

THE COMPLEXITY OF CONTINUOUS ENROLLMENT CHECK

Most of HEDIS measures are required to do continuous enrollment check and the requirements are different on measure by measure basis. Some measures require members with continuous enrollment for measurement period, some may require two year enrollment with one gap of up to 45 days in each year. Some enrollment checks are anchored on service dates of index events, and some are based on measurement period. For example, with the "Cervical Cancer Screening (CCS)" measure, for commercial members, it requires members continuously enrolled for the measurement year and two years prior the measurement year with no more than one gap in enrollment up to 45 days during each year of continuous enrollment (NCQA 2011, p.81). These requirements increase the difficulty and complexity of programming. Plus, as we know that enrollment records are not as clean as we expect. There are a lot of overlaps on coverage periods among different records, same member could have different member ids when she/he switches products, and some members have more than one product in coverage. The challenges are how to remove unnecessary records, to aggregate multiple records into a single coverage with number days of gap and number of gaps calculated.

INCLUSION OR EXCLUSION CRITERIA

Significant amount of measures use different types of service codes, primary diagnosis codes, secondary diagnosis codes as inclusion or exclusion criteria to identify denominators. For example, with "Follow-Up After Hospitalization for Mental Illness (FUH)" measure, denominator criteria excludes "discharges followed by readmission or direct transfer to non-acute facility for a mental health principal diagnosis (Tables MPT-A, MPT-B) within 30-day follow-up period". It also excludes "discharges in which the patient was transferred or readmitted within 30 days after discharge to an acute or non-acute facility for non-mental health principal diagnosis. This includes an ICD-9-CM diagnosis code

or DRG code other than those in Table MPT-A and MPT-B" (NCQA 2011, p.186). There are a lot of twists within those criteria. It is not an easy task to write the program which can implement those criteria efficiently.

CHECK NEGATIVE HISTORY, READMISSION OR TRANSFER

Some measures specify that negative events, readmissions or transfers need to be identify based on potential index events. From programming stand point, it requires that index events are anchored as pointers to go forward or backward to find out potential hits.

THE SAS SOLUTIONS

SAS DATA INTEGRATION AND HEALTH INSURANCE DATA

SAS Data Integration Solution provides a complete and nice way to integrate data from different source systems, and it also provides data quality solution which will clean and standardize data before loading into storage. This serves as an essential and solid foundation to produce accurate and reliable results. Figure 1 showed a data component model which utilizes SAS data integration solution to build data warehouse and data marts.

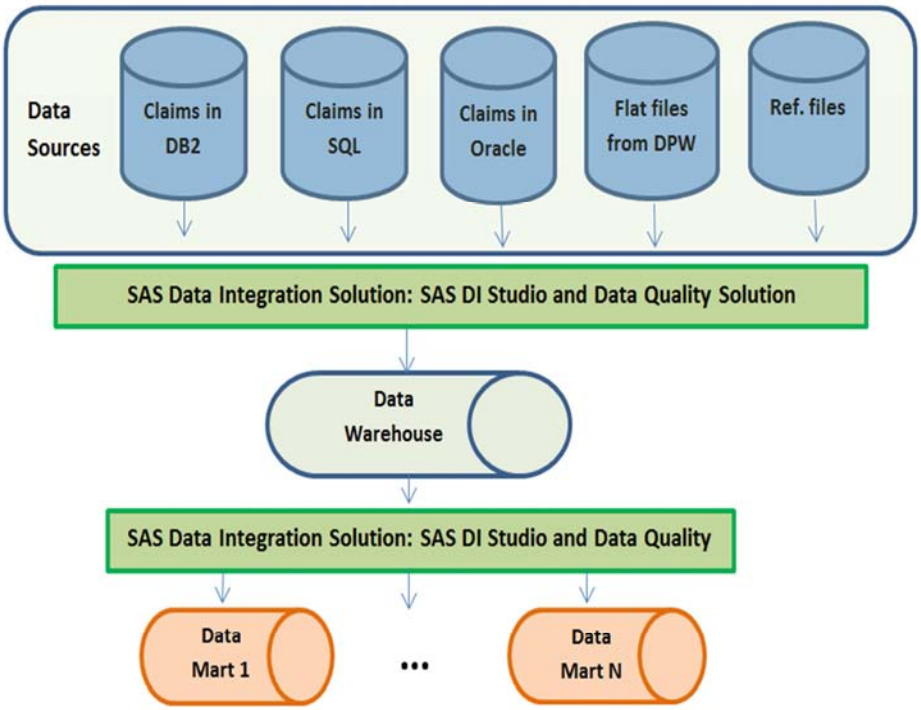

Figure 1: Model of Data Integration

ACCESS AND EXTRACT DATA FROM DATABASES

If MCOs do not have enough resources to integrate data sources into data warehouse, SAS/ACCESS provides an excellent bridge for accessing different databases from SAS. There are two options to access external databases within base SAS. One is to use LIBNAME and the other is to apply SQL Pass Through within PROC SQL. Here are the samples of syntax for these two options to access Oracle database.

LIBNAME

```
LIBNAME data ODBC DSN=Oracle_DB USER=&USERID PASSWORD="&PASSWD";
```

SQL PASS-THROUGH

```
PROC SQL;
CONNECT TO ORACLE USER=&USERID PASSWORD="&PASSWD" PATH=Oracle_schema);
Create table dummy as
Select * from connection to oracle(select * from oracledb.table);
Quit;
```

Each method has its own advantages. LIBNAME engine is a valuable way to extract data, and it is particularly useful for SAS programmers who do not have a lot of experience with SQL. The effectiveness and efficiency depends in part in knowing what parameters to use. With SQL Pass-Through, we can take advantages of some powerful features in external databases, like using existing ORACLE indexes may save significant resources when extracting data, joining tables, and sorting data, etc. The syntax may look a lot different from traditional SAS codes. In my experience, SQL Pass-Through tends to be more efficient than LIBNAME in term of extracting data from Oracle or SQL database. Performances could be varied under different settings or configurations.

DESIGN SAS MACRO TO SLOVE CONTINUOUS ENROLLMENT CHECK

The critical point of checking continuous enrollment is to understand that checking continuous enrollment is based on periods. For example, if we need to check members with continuous enrollment for the measurement year and two years prior the measurement year with no more than one gap in enrollment up to 45 days during each year of continuous enrollment. We are going to divide the enrollment check into three periods, the measurement year period, the one year prior the measurement year period and the two-year prior the measurement year period. For each period, continuous enrollment status will not affect the result of other periods. Therefore, I design a SAS macro to check the continuous enrollment by period, and then the results of all periods will be combined to generate overall results for continuous enrollment for three years period.

GET RIDS OF UNNECESSARY RECORDS

First, we can get rids of unnecessary enrollment records and this will improve the processing time and reduce potential errors. For example in Figure 2, a member have five different enrollment records, and only three of them, A, B and C have overlap with the check period, we can simply delete two unnecessary records A and E.

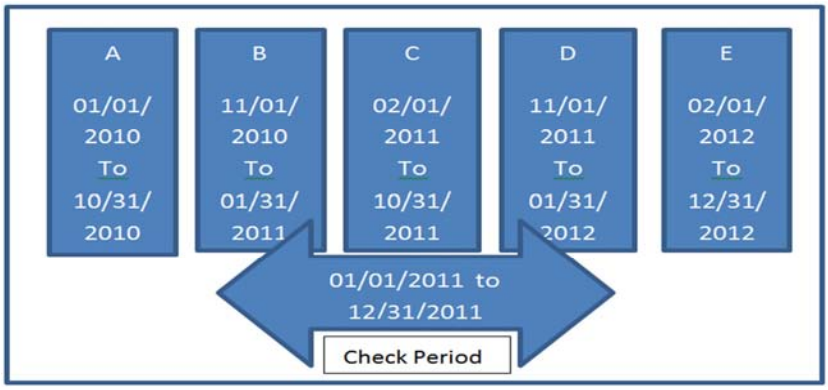

Figure 2: Relationship between Enrollment Records and Check Period

AGGREGATE MEMBERS' ENROLLMENT RECORDS

Second, we can separate the records into two groups, one group is for members with single enrollment record, and the other is for members with multiple records. For members with multiple records, we will roll up their records if possible. For example showed in Figure 3, member X has records A and B show that this member continuously enrollment from record A to record B, from 01/01/2010 to 01/02/2011. Therefore A and B can be aggregated into one new record. We do the same thing for records C and D.

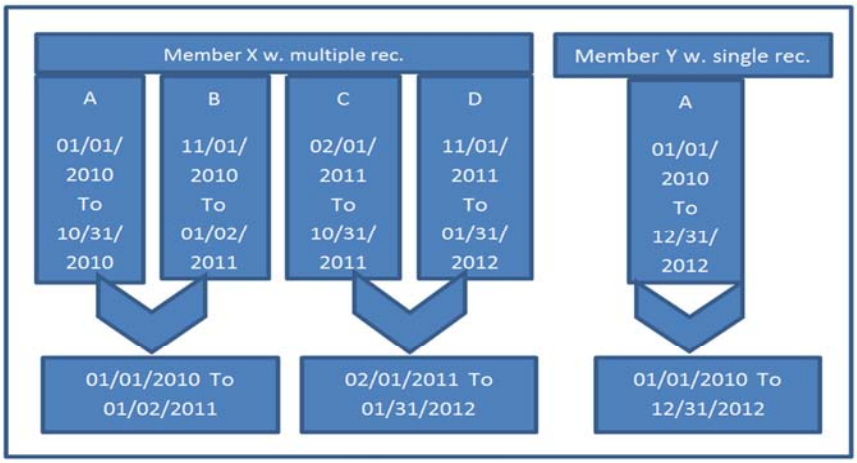

Figure 3: Illustration of Aggregating Records

CALCULATE THE NUMBER OF GAPS AND THE NUMBER OF GAP DAYS

We can utilize retain statement from base SAS to accomplish the task. First we need to sort the members with multiple enrollment records by member_id and start date, and then for first record of each member (first.member_id) retain the value of end date and set values of gap_number and gap_days to zero. Second, for subsequence record of each member, we check start date against end date from previous record, if the difference is greater than one, which means there is a gap between two enrollment records, we will increase gap_number by one and sum up gap_days. Otherwise, the member is continuously enrolled through these two records, and we keep the values of gap_number and gap_days from the previous record. Third, we will go through the same process for next record until the last record of each member. We output the last record of each member to the final output. The details of the whole process are showed in the Figure 4.

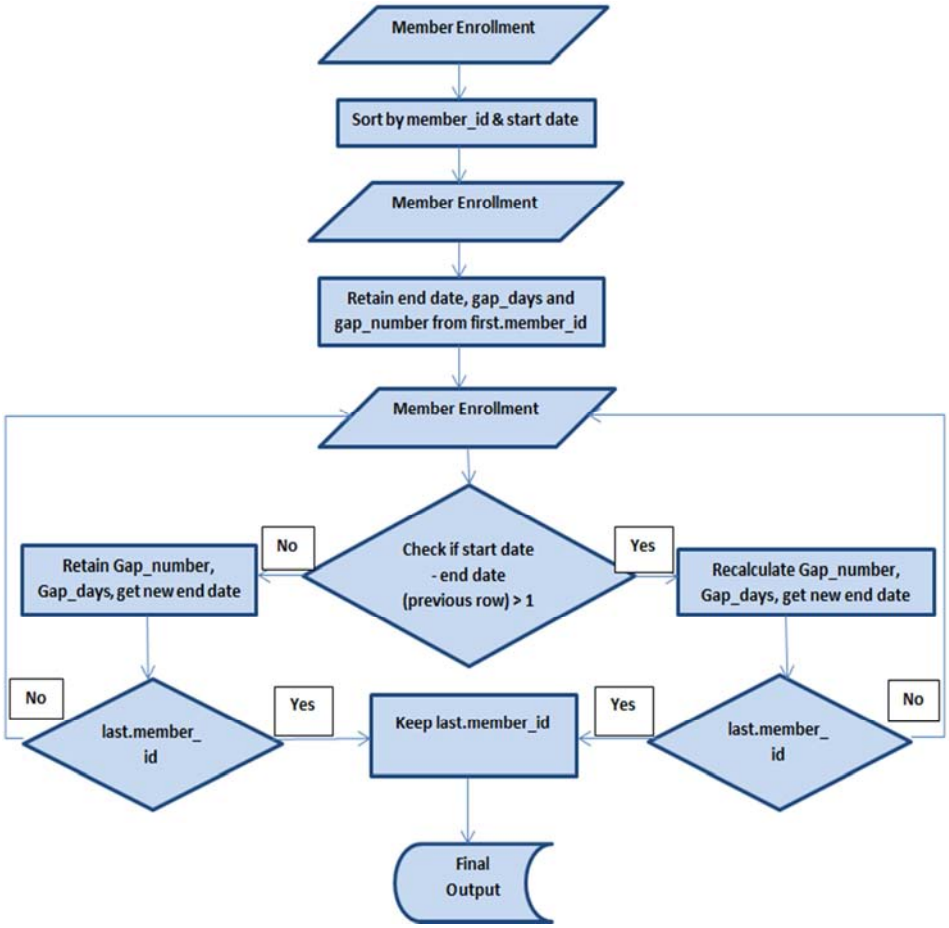

Figure 4: Flowchart of Calculating Numbers of Gaps and the Number of Gap Days

COMBINE THE CALCULATED ENROLLMENT RESULTS PER MEMBER

The last step was to combine the results from members with multiple records with members with single record, and then we also need to combine the results from different check periods if necessary. Finally we check gap_number and gap_days to see if the member satisfies the requirement of continuous enrollment check.

INCLUSION OR EXCLUSION CRITERIA

One of challenges is to extract data more efficiently when inclusion or exclusion criteria are applied. For example, let us look at the following two examples, one is to use function like IN(), NOT IN(), etc. The other utilizes JOIN from PROC SQL.

USE IN(), NOT IN(), EXIST()

```
create table claims_hit as
       select *
       from claims
       where claim_id in(
           select distinct claim_id from  claims_icd
              where icd_code in(select distinct icd_code from icd_CCS) )
         and service_date <= &endd ;
quit;
```

USE JOIN PROPERTY IN PROC SQL

```
create table claims_hit as
select a.*
from claims a,      claims_icd b,     icd_CCS c
where a.service_date <= &end_date  and
     a.claim_id=b.claim_id and
    b.icd_code=c.icd_code;
quit;
```

Use JOIN property from PROC SQL is more efficient than the other method.

CHECK NEGATIVE HISTORY, READMISSION OR TRANSFER

In order to check negative history, readmission or transfer, we need to set index anchor date as pointer which is allowed program to go forward or backward to identify potential hits. Base SAS offers several functions and statement which make those tasks much easier, like .FIRST, .LAST, RETAIN, LAG and DIFF etc. For our experience, using RETAIN with .FIRST and .LAST is pretty straightforward and helpful. The following SAS codes show you how to identify readmission within 30 days.

```
 /* Identify inpatient readmission within 30 days from claims */
data readmition;
set inpatient;
  by member_id start_date end_date;
retain ind_end;

if first.member_id then do;
   ind_end= end_date;
   readmit=0;
end;
else do;
    if (0 <= start_date - ind_end <= 30) then readmit=1;
    ind_end= end_date;
end;
run;
```

CONCLUSION

Since over 90% of health plans choose HEDIS measures to monitor the quality of the services, it is increasing demand for MCOs to have their own capabilities to generate HEDIS measures within organization. Using SAS solutions, programming HEDIS measures become much easier and feasible project if you can overcome these major challenges described in the paper.

REFERENCES

Reprinted from the National Committee for Quality Assurance; HEDIS 2012, Volume 2, Technical Specifications for Health Plans, 2011 by NCQA.

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Qingfeng Liang, Manager,
Quality Data Analysis
HEDIS Improvement
UPMC Health Plan, Inc.
Pittsburgh, PA 15219
Phone: 412-454-8424
Fax: 412-454-6240
E-mail: liangQ@UPMC.EDU
Web: www.UPMCHealthplan.com