

Receiving and Distributing Data Nationally:  
A SAS® Solution to HEDIS Reporting  
Sue Freimuth, Independent Consultant, Haddam, CT  
Chris Yindra, C.Y. Training Associates, Canton Center, CT

**Abstract**

HEDIS (Healthplan Employer Data and Information Set) is a reporting standard designed to evaluate an HMO's performance using uniform measures. When a large healthcare insurer tackled the assignment of developing a reporting system to comply with the new HEDIS standard, the SAS system was chosen as the development tool for its ability to read many data types on a variety of media, efficiently encode measurement algorithms according to HEDIS specifications, and transport data across PC and mainframe platforms and applications. This paper will describe how this process was developed, beginning with batch programs running on the mainframe against sequential files, and evolving into a flexible adhoc reporting system running under a PC-based GUI interface, accessing data from local and host data stores, and distributing it via e-mail. In addition to base SAS software the following products were used: SAS/FSP®, SAS/AF® (including its FRAME component), SAS/CONNECT®, and SAS/ACCESS® for DB2®.

**The Reporting Process**

(A graphical representation of the reporting process is included in the Appendix to this paper) .

*1. Extract data from central and remote locations, stored in flat files on tape and on DASD, in DB2 data bases, spreadsheets and ASCII files.*

The first challenge faced by the HEDIS project was to gather the data required for all of the different report types from a wide variety of locations throughout the country. This meant working with data originating on different hardware and software platforms, ranging from large mainframe sequential files and DB2 tables to PC-based ASCII files and spreadsheets. A significant early source of data was a managed care reporting file that held three years of claim history on over 30 tape cartridges. This was supplemented with data extracted from DB2 tables, and data submitted directly to the project by outside vendors and remote company locations in whatever format and medium was available at the point of origin.

*2. Encode measurement algorithms according to HEDIS specifications. Store the results in a central data repository accessible throughout the company.*

The purpose of the HEDIS project, initiated by NCQA (National Clinical Quality Association) in partnership with several large employers and a group of healthplans of varying sizes, was to provide employers a standard means of evaluating healthplan performance. Prior to HEDIS, there was no universally-accepted measurement of healthcare quality, financial results, provider characteristics, or other criteria that could be used to evaluate the effectiveness of a healthplan's managed care policies. HEDIS defines measurements of quality of care, utilization of services, membership growth and demographics, provider qualifications and availability to members, and financial performance and stability. These are performance measures that employers evaluate

when choosing healthcare coverage for their employees. Prior to HEDIS, when an employer wanted to evaluate, for example, the quality of healthcare delivered by a healthplan, the employer had to either persuade the healthplan to develop measurements according to the employer's specifications, or accept whatever measurements the healthplan had made on its own. Now that HEDIS has been instituted, the old question "What is the mammography rate for your healthplan?" has been replaced by the very specific question: "What is the percentage of women age 50 - 64 who have been continuously-enrolled in your healthplan for the past two calendar years and who have had a mammogram during that period?" By defining exact criteria for each measurement, HEDIS imposes a uniform reporting standard on healthplans throughout the country. The algorithms that were encoded to meet HEDIS measurement criteria were audited by NCQA to assure compliance with HEDIS specifications. This meant that it was important to have a standard set of code that could be applied to data from any source to yield HEDIS-compliant measurements.

The results of the HEDIS measurements needed to be accessible to the various areas of the company that required them for customer reporting, financial reporting, quality improvement activities at each healthplan, and other purposes. The result data were stored in DB2 tables in the mainframe environment. This complied with company standards for data architecture, and made the data available to the widest possible end-user base.

*3. Transport data from the mainframe to the PC platform. Translate results into spreadsheet databases. Distribute via e-mail.*

This aspect of the project presented its own set of challenges. Because insurance claim data is not a complete record of actual medical events,

HEDIS permits healthplans to supplement measurement results taken from claim data with audits of medical records performed in the field. To support this effort in the healthplans, HEDIS measurement results had to be extracted from the DB2 repository and redistributed to each healthplan in a format that was universally supported. The corporate standard data environment supported common spreadsheet software at each healthplan, and this was chosen as the delivery vehicle. The company's e-mail system was used to distribute the spreadsheet databases to each of the healthplans.

*4. Receive updated results back from remote locations, incorporate changes into original datasets, upload to the mainframe, and store in DB2 tables for company-wide access.*

After the medical record audits had been completed, the results had to be returned to the originating site and incorporated with the claim-based results. This was a reversal of the distribution process described above. The data returned from the healthplans had to be extracted from the spreadsheets, edited for validity, uploaded to the mainframe, and added to the DB2 data store of HEDIS measurement results. After this procedure was complete, the HEDIS measures were ready to be reported.

#### **Using SAS to get it done**

Early in the development of HEDIS reporting for this corporation, the project's challenges from a data and systems perspective were identified as these:

- The scope would be evolutionary, beginning with a pilot that developed a limited set of HEDIS measures for a single healthplan, and expanding to include the full set of HEDIS measures for the more than 60 healthplans the company operates nationwide.

- The data environment was diverse and widely distributed, and would continually change over the life of the project. HEDIS requires huge volumes of data to produce its measures: 5 years of healthcare claim data and membership history, detailed information on all healthcare providers contracted by the healthplans (physicians, hospitals, laboratories, and other vendors), and financial information. Although much of this data was held on data repositories at the company's central office, a large percentage was held at vendor sites, in PC databases throughout the company, and at some of the healthplan locations themselves. All of this source data had to be collected, interpreted into a common format, fed into a warehouse of HEDIS measurements, and redistributed to healthplans and employers throughout the country on demand.
- The workflow would constantly evolve. At the outset of the project, the systems area had responsibility for developing the programs to produce the measures, and for all of the healthplan contact as well. As the project grew, it became necessary to offload nondevelopment tasks to a team of business partners. At that point, tools to allow easy access to the HEDIS data repository to produce standard and adhoc reporting were needed.
- Consistency was required throughout the HEDIS system. All reports had to use the same algorithms for each measure, whether they were adhoc reports developed on a PC, or standard reports developed on the mainframe. Portability of code became a major factor.

SAS was chosen for its ability to handle data on virtually any platform and medium, for the portability of its code, and for the availability of an object-oriented GUI development environment as an integral part of its toolset.

### Creating the Pilot

The HEDIS project began as a pilot developed to support one healthplan and a subset of the full HEDIS measures. The goal was to develop a process that could survive an NCQA audit and then to expand this process to incorporate all of the HEDIS measures for over 60 healthplans nationally.

Data sources for the pilot were a managed care reporting system (on 30+ cartridges) for claim data, and DB2 tables for membership and provider data. SAS software available at that point was limited to version 6.08 of Base software running under MVS® on a mainframe. As a result, all DB2 access was made through batch QMF® programs that extracted DB2 data to flat files which were then read into SAS datasets. Access against the large tape file required careful subsetting to avoid repeated reads of the full file. Throughout, data quality checks were imposed to ensure that the data collected from all of the sources were accurate and complete. SAS enabled the project to streamline these efforts and to quickly develop a rigorous set of data quality assurance tools using SAS procedures.

The second phase of the pilot, distributing raw results to the healthplan for medical record audit and reincorporating the audit results into the original, presented its own challenges. By the time the project reached this point, version 6.08 of SAS for Windows® had been purchased for the team. We were still working without the CONNECT product, however, so the data had to be downloaded to the PC in ASCII format, through terminal emulation software. Once on the PC, it was read into SAS datasets and then fed into spreadsheets using DDE.

By the time the spreadsheets had been returned from the healthplan, SAS/CONNECT had been installed. This enabled us to extract the

healthplan data from the spreadsheets and edit it on the PC, upload it to the mainframe, merge it with the original results stored in mainframe SAS datasets, and recalculate the HEDIS measures, all in one operation originating from a SAS session in Windows. (We felt as though we had been truly blessed at that point!)

At this stage of the pilot, NCQA's audit of the process took place. A team of auditors from NCQA met with members of the HEDIS project team and staff members at the healthplan to review the complete data collection and measure calculation process, beginning with a demonstration of the company's claim processing system. All code was reviewed for compliance with HEDIS specifications. The result was favorable, and the HEDIS team was ready to move on to the next step of the project.

### **HEDIS for the Book of Business**

After the audit was complete, the pilot process was expanded to support over 60 healthplans operated nationwide by the company. The challenge at this juncture was to maintain the integrity of the algorithms that had passed the NCQA audit, while completely changing the data access methods developed for the pilot. The original source of claim data (the 30+ tapes) was replaced by a mammoth DB2 database storing 30 months of claim history, the provider system was replaced by a rewrite, and data from healthplans that maintained their own data environments had to be incorporated into the standard HEDIS process that had been developed. SAS/ACCESS for DB2 was installed to permit direct access to DB2 data from within SAS programs for the first time.

SAS code, and modular program design, allowed the project team to uncouple the HEDIS measurement algorithms from the data access portion of the system quite easily. The

transition to the new data sources was accomplished without touching any of the code that identified HEDIS events in the data and calculated the HEDIS measures. The code developed for the pilot was usable in the expanded version of the system with very little modification. This speeded up development while retaining the accuracy of the original results.

Distributing data to all of the healthplans to support medical record reviews, receiving the results of healthplan reviews back at the central office, and reincorporating healthplan results into the HEDIS measures became a much larger undertaking at the book-of-business level. To ease the workload, which was still supported within the systems area, automated processes using SAS/CONNECT were built that would extract sample data from the HEDIS results datasets, download it to the PC, and store it in Lotus® spreadsheets. The spreadsheets were sent to the healthplans via e-mail, and were returned to the central office in the same manner. Another process written in SAS for Windows extracted the updated data from the spreadsheets, edited it for validity, and uploaded it to the mainframe, where it was combined with the original HEDIS results datasets. These two SAS processes eased the workload for the systems team, and ensured that the data returned by the healthplans was accurate and consistent.

### **Developing an end-user toolset**

Demand for HEDIS results increased throughout the company after the release of the first set of measurements for the book of business. It was necessary to develop a facility to allow the business community to access HEDIS data in a consistent fashion, and to simplify the data collection and distribution functions that were based on the PC platform.

The PC became a communications hub in the HEDIS process. It was used to:

- Collect source data from PC databases and upload it to the mainframe.
- Distribute HEDIS data extracts to the healthplans.
- Collect updated HEDIS data from the healthplans and upload it to the mainframe.
- Support standard and adhoc reporting requirements.
- Provide data maintenance capabilities against DB2 tables.

In short, a client/server environment was needed, with the mainframe and a PC as the servers. SAS for Windows became the centerpiece of the solution to all of the PC platform issues.

Early efforts relied on SAS programs fronted with macro windows to collect parameters that allowed generic file conversion programs to handle many different types of input. The Windows DDE feature was used to read data directly from spreadsheets and ASCII files into SAS datasets, where it was edited and prepared for incorporation into the HEDIS reporting tables on the mainframe. Prior to the installation of SAS/CONNECT, these PC SAS files had to be reconverted to ASCII, uploaded, and read back into SAS.

The download process was similar, but worked in reverse. Flat files were extracted from SAS datasets on the mainframe, downloaded via the terminal emulator, reconverted to SAS on the PC, edited, and loaded into spreadsheets via DDE. Again, SAS/CONNECT streamlined this process to the point where all of these procedures could be performed by entering parameters into a macro window and initiating a process on the PC.

Although the development of macro-driven processes using SAS/CONNECT greatly improved the efficiency of data transport between the mainframe and PC, these processes still required a programmer to perform some code manipulation and to submit the appropriate programs. In addition, while standardized data formats were requested for these files, they frequently did not match the defined format (particularly date formats) and it was necessary to verify the input data prior to any processing.

In order to free the programming staff from these standard data verification and upload functions, FRAME entries were created to replace the macro-based application.

This conversion to FRAME entries was simplified by the fact that the existing macro code could be easily embedded into and driven by SCL entries, eliminating the need to recreate existing functionality. A data verification utility and logon script were also added, enabling the end user to handle all aspects of reading, editing and transporting data for the necessary measures.

Concurrently, programming staff were frequently being diverted from system development to fill requests for non-standard HEDIS reports. Because these requests used the same code structure as the standard HEDIS algorithms with modified selection criteria, the existing SAS code for the HEDIS algorithms could easily be parameterized and run as a separate process. A PC FRAME application was developed as a client server tool which allowed the gathering of user selected parameters on the PC. These parameters were then passed as a SAS data set to the mainframe where all data selection and processing took place. The resulting SAS data set was passed back to the PC application where the user could

then create Lotus worksheets, ASCII files or a variety of hardcopy reports.

All of the above processes, as well as easy end user access into the DB2 HEDIS results tables, were combined into a single application which can be easily distributed throughout the company. As is apparent, the original macro-based data transfer utility evolved into a custom user interface and data presentation application which not only streamlined the HEDIS reporting process but put many data analysis capabilities into the hands of the business units.

### **The Future**

HEDIS has become established as a nationally-recognized standard for healthplan evaluation, and as such is becoming an important aspect of reporting and analysis for managed healthcare. Particularly in the arena of quality management, HEDIS is being used not only to measure, but also to improve healthplan performance. Now that a standard yardstick is available, healthplans can use HEDIS results to track the effectiveness of their quality improvement efforts over time. Healthplan quality managers have begun to request projections of HEDIS measurements. Detail on services received, or not received, by individual healthplan members allow quality managers to intervene with members and providers, encouraging members to receive needed services in a timely manner. Support for this type of reporting will be an area of intensive development. Constant increase in the flexibility of adhoc reporting, and expansion to additional data sources, are also areas where there is considerable interest.

### **Conclusion**

Information is a key resource for success in the managed healthcare industry. It is also one of the most difficult resources to manage. Data intended for a variety of administrative

purposes, and maintained at divergent locations by diverse owners, is often the very data that is needed to evaluate managed care performance. Providing accurate and complete information in a timely manner is an assignment that requires a powerful and flexible toolset. The SAS System met the challenges of HEDIS reporting on many different fronts. It has proven to be a solid foundation on which to build HEDIS reporting processes that are reliable in the present, and will be effective in the future.

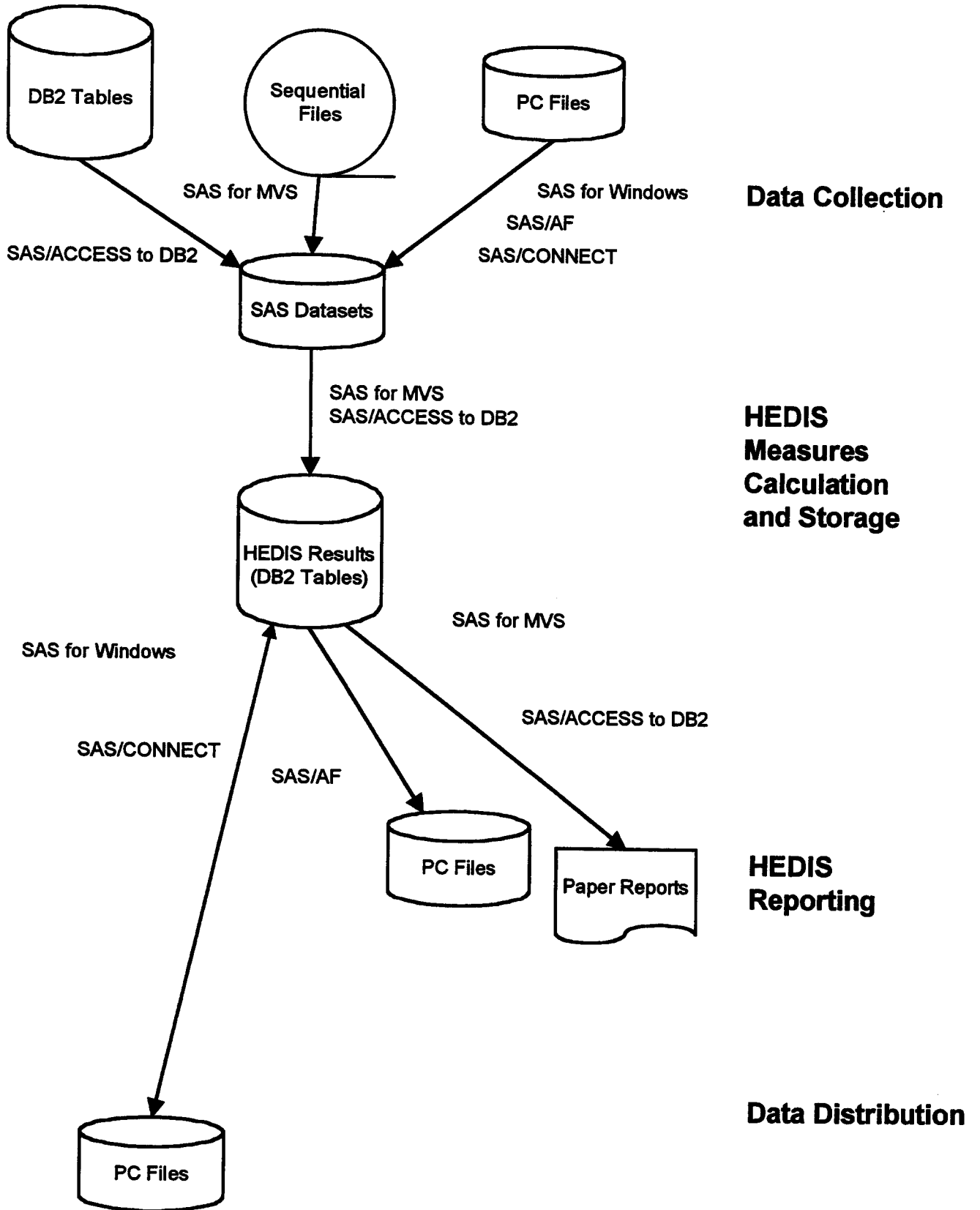
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Your comments, questions and suggestions will be welcomed by the authors:

Sue Freimuth  
1233 Saybrook Road  
Haddam, CT 06438  
(860) 345-3694  
74653,1203@compuserv.com

Chris Yindra, C.Y. Training Associates  
80 West Mountain Road  
Canton Center, CT 06020  
(860) 693-4297  
yindra@ix.netcom.com



Appendix - The HEDIS Reporting Environment