

Paper GH-08

SAS® Analytics for the Healthcare Cost Reporting Information System

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ABSTRACT

Medicare-certified institutional providers are required to submit annual cost reports to Medicare Administrative Contractors (MACs). The Medicare Cost Report (MCR) contains provider information such as facility characteristics, utilization data, facility and Medicare costs by cost center, inpatient and outpatient charges by cost center, Medicare settlement data, and financial statement data. CMS maintains the cost report data in the Healthcare Cost Reporting Information System (HCRIS). HCRIS includes subsystems for Hospital, Skilled Nursing Facility (SNF), Home Health Agency (HHA), End-Stage Renal Disease (ESRD) Facility and Hospice cost reports. In 2012, subsystems for Community Mental Health Center (CMHC) and Rural Health Clinic (RHC)/Federally Qualified Health Center (FQHC) cost reports will be added to HCRIS. This paper will focus on the Medicare Cost Report for hospitals, the most complex of the cost reports, and will describe the characteristics of the files, explain how to access the data, and provide program code to interpret and analyze the data.

INTRODUCTION

When Medicare was established in 1965, Congress adopted the private health insurance sector's "cost-based reimbursement" system to pay for hospital services. Under this system, Medicare made interim payments to hospitals throughout the hospital's fiscal year. At the end of the fiscal year, the hospital filed a Medicare Cost Report (mandatory per the Social Security Act) and the interim payments were reconciled with "allowable costs" which were defined in regulation and policy.

In 1982, Congress mandated the creation of a prospective payment system (PPS), a method of reimbursement in which Medicare payment is made based on a predetermined, fixed amount. The payment amount for a particular service is derived based on the classification system of that service (for example, diagnosis-related groups for inpatient hospital services). CMS uses separate PPSs for reimbursement to acute inpatient hospitals, home health agencies, hospice, hospital outpatient, inpatient psychiatric facilities, inpatient rehabilitation facilities, long-term care hospitals, and skilled nursing facilities. The Inpatient PPS was the first to be implemented in 1983 and by 2004, the remaining PPSs were initiated.

Prior to the implementation of the Prospective Payment Systems for all provider types, MCRs were used to reimburse providers for Medicare services. MCRs are still used to reimburse providers for the small percentage of services that remain cost-based, such as organ acquisition, nursing anesthetists, and critical access hospitals.

Cost reports have evolved beyond their original purpose of Medicare reimbursement and continue to be a valuable resource. Federal organizations such as the Centers for Medicare and Medicaid Services (CMS), Medicare Payment Advisory Commission (MedPAC), Office of Inspector General (OIG), General Accounting Office (GAO), Office of Management and Budget (OMB), and Congress use HCRIS data to evaluate payment adequacy, analyze market baskets, investigate cost trends, and study elements of reimbursement such as indirect medical education and disproportionate share payments.

The hospital portion of the HCRIS database includes annual cost reports for years 1996-2010. The data is on a fiscal year basis (i.e. the 2010 cost report contains data for facilities with a fiscal year begin date between October 1, 2009 and September 30, 2010). Each annual report contains over 7300 data fields for about 6,200 hospitals.

HOSPITAL COST REPORT

To use the Hospital cost report data, a researcher must first determine the data required by reviewing the cost report forms and the data specifications. The worksheet code, line, and column from the cost report form is required to determine which records to keep.

To obtain hospital cost report forms and the data specifications, visit the website, <http://www.cms.gov/CostReports> and click on the link, "[Hospital Cost Report](#)". Scroll down to the section labeled, **Hospital Cost Report Dataset Supplemental Files**. Download item number 1 to obtain a copy of the **Readme** file, **Worksheet Codes** and other related files.

1. [Readme](#); [Data Dictionary](#); [Worksheet Codes](#); [Data Model](#); and [Cost Center Codes](#)
2. [Hospital Cost Report Data Set File Size](#)
3. [Provider Control Type, Type of Hospital, Urban/Rural Indicators](#)
4. [Facility Numbering, State Codes, Table Descriptions and SQL](#)
5. [HCRIS File Data Elements](#)

The Readme and Worksheet Codes files within item 1 are a good place to start. Once these have been obtained, scroll down to the section labeled, **Worksheet Forms**, and click on the link called, "[Provider Reimbursement Manual](#)". There are 41 separate chapters in this manual. The chapter discussed in this paper is [Chapter 36-\(T25\) -- Hospital and Hospital Health Care Complex Cost Report \(Form CMS 2552-96, Instructions & Specifications\)](#). These specifications contain the cost report instructions and describe the information entered into each worksheet of the hospital cost report. Copies of the forms can be found in the [R25236S.zip](#) and [R25236F.zip](#) files found in the Chapter 36 link.

Flow of the Cost Report

The hospital cost report is comprised of a series of worksheet forms, each of which flows into the next.

The first set of worksheets is the **S series**. Worksheet S, Parts I and II are the certification and settlement summary. Worksheet S-2 contains identification data such as the Medicare provider number, hospital name, and control type. S-2 also includes a series of questions such as "Are you a teaching hospital?" Many of the questions set triggers and skip patterns to identify which other worksheets must be completed. S-3, Part I, includes utilization data such as beds, full time equivalents (FTEs), and Medicare and Medicaid days. S-3, Part II contains wage index data such as salary and contract labor costs.

The next set of worksheets is the **A series**, described as the cost finding worksheets. In Worksheet A, overhead and revenue-generating costs are identified by cost center and split into salary and non-salary components,

In the **B-series** of worksheets, the overhead costs, identified in worksheet A, are allocated to the revenue-generating cost center using various statistics. (e.g. Laundry costs are allocated based on the pounds of laundry used by each cost center and housekeeping costs are allocated using square footage.)

Cost-to-charge ratios by cost center are computed in **Worksheet C**. These ratios are used in the next set of worksheets, the **D series**, in which a share of the total costs is apportioned to the Medicare program. Medicare costs are not directly reported by providers. They are estimated by applying the following formulas to reported data:

- Routine Medicare costs = Total cost per day * Medicare days
- Ancillary Medicare Costs = (Total ancillary costs/total ancillary charges) * Medicare charges

The **E series** of worksheets contains the settlement data, including Medicare payments for DRGs, outliers, indirect medical education (IME), and disproportionate share (DSH).

The **G series** contains the financial statements including the balance sheet and statement of revenue and expenses.

The following supplemental worksheets feed into the main worksheets described above:

- H series – hospital-based HHA payment and cost data
- I series – hospital-based ESRD payment and cost data
- K series – hospital-based hospice payment and cost data
- L series – capital payment worksheets
- M series – RHC/FQHC payment and cost data

WORKSHEET FORMS

Within the section 3 of the Readme file, there exists a description of how to obtain the total number of hospital beds. The text reads, "The number of beds is collected on Worksheet S-3, Part I, Line 12, Column 1 (using) the following condition:"

Worksheet Code = 'S300001'
Line Number = '01200'
Column Number = '0100'

Figure 1 shows a section of Worksheet S-3, Part I. Column 1 indicates the "No. of Beds" and line 12 indicates the "Total". The phrase "see instructions" indicates the hospital needs to look at the instructions for this sheet. Those instructions are located at the bottom of each cost report. In this case the hospital is pointed to:

FORM CMS-2552-96 (01-2010) (INSTRUCTIONS FOR THIS WORKSHEET ARE PUBLISHED IN CMS PUB. 15-II, SECTION **3605.1**)

Section **3605.1** is located in Chapter 36. Figure 2 shows an example of the Table of Contents from [Chapter 36-\(T25\) -- Hospital and Hospital Health Care Complex Cost Report \(Form CMS 2552-96, Instructions & Specifications\)](#). Figure 3 shows the contents of Column 1 Line 12 of Part I, Hospital and Hospital Health Care Complex Statistical Data.

01-10 FORM CMS-2552-96		
HOSPITAL AND HOSPITAL HEALTH CARE COMPLEX STATISTICAL DATA		
Component		No. of Beds
		1
1	Hospital Adults & Peds. (columns 3, 4, 5 and 6, exclude Swing Bed, Observation Bed and Hospice days)	
2	HMO	
3	Hospital Adults & Peds. Swing Bed SNF	
4	Hospital Adults & Peds. Swing Bed NF	
5	Total Adults and Peds. (exclude observation beds) (see instructions)	
6	Intensive Care Unit	
7	Coronary Care Unit	
8	Burn Intensive Care Unit	
9	Surgical Intensive Care Unit	
10	Other Special Care	
11	Nursery	
12	Total (see instructions)	

Figure 1: Worksheet S-3, Part I

	Section
Worksheet S - Hospital and Hospital Health Care Complex Cost Report Certification and Settlement Summary.....	3603
Part I - Certification by Officer or Administrator of Provider(s)	3603.1
Part II - Settlement Summary.....	3603.2
Worksheet S-2 - Hospital and Hospital Health Care Complex Identification Data	3604
Worksheet S-3 - Hospital and Hospital Health Care Complex Statistical Data and Hospital Wage Index Information	3605
Part I - Hospital and Hospital Health Care Complex Statistical Data.....	3605.1
Part II - Hospital Wage Index Information.....	3605.2
Part III - Hospital Wage Index Summary.....	3605.3

Figure 2: Table of Contents

3605.1 Part I - Hospital and Hospital Health Care Complex Statistical Data.--This part collects statistical data regarding beds, days, FTEs, and discharges.
Column 1 --Effective for discharges occurring on or after October 1, 2004, refer to 42 CFR 412.105(b) and Vol. 69 of the Federal Register 154, dated August 11, 2004, page 49093 to determine the facility bed count. Indicate the number of beds available for use by patients at the end of the cost reporting period. A bed means an adult bed, pediatric bed, birthing room, or newborn bed maintained in a patient care area for lodging patients in acute, long term, or domiciliary areas of the hospital...
Line 12 --Enter the sum of lines 5 - 11 for columns 1 - 6, and for columns 12 - 15, enter the amount from line 1. For columns 7 - 11, enter the total for each from your records.

Figure 3: Worksheet S-3, Part I, Column 1, Line 12

WORKSHEET CODES

The **Worksheet Forms** description on the previous page was used to provide researchers with information on where to find the specifications used for the cost reports. The **Worksheet Codes** section will further describe these specifications and will be used to create the SAS code needed to filter the required data.

The **first two digits** always show the Worksheet.

The **third digit** may be used in four different ways:

1. Worksheets for multiple hospital-based components
 - Hospital=0, first sub-provider=1, second sub-provider=2
2. Worksheet D-6
 - Identifies Kidney, Lung, Heart, Liver, or Pancreas Acquisitions
3. Worksheets I-1, I-2, and I-4
 - Identifies a Renal Dialysis Department or a Home Dialysis
4. Worksheets A-8-2, A-8-3 and A-8-4
 - Identifies a worksheet Part 1, Part 2, etc.

The **fourth digit** may be used in four different ways:

1. Represents the type of provider
 - 0 Universal
 - A Hospital
 - B Sub-provider
 - C SNF
 - D Swing Bed SNF
 - E NF
 - F Swing Bed NF
 - G CMHC
 - H CORF
 - I ICF
 - J OPT
 - K OOT
 - L OSP
 - Q FQHC
2. Worksheet A-8-3
 - Identifies a Physical Therapy or a Respiratory Therapy Service
3. Worksheet A-8-4
 - Identifies a Physical, Respiratory, Occupational Therapy, or Speech Pathology
4. Worksheet S-8
 - Identifies a FQHC or RHC

The **fifth** and **sixth digits** identify:

1. Worksheets required by a Federal Program
 - 18 Title XVIII Part-A Hospital Insurance (HI)
 - 19 Title XIX Part-B Supplemental Medical Insurance (SMI)
2. Worksheets required for the Facility
 - 00 Universal

The **seventh digit** represents the worksheet part.

Example:

Worksheet code 'S300001' represents Worksheet S-3 (S3), Hospital Universal (00), and Universal Facility (00), on the Part-1 worksheet (1).

Worksheet Code	
S300001	
S3	Worksheet S-3
0	Hospital
0	Universal
00	Universal
1	Part 1

COST REPORT DOWNLOAD

To obtain cost report data visit the website, <http://www.cms.gov/CostReports> and click on the link, “Cost Reports by Fiscal Year”. The examples shown in this paper will focus on the 2009 Hospital cost report.

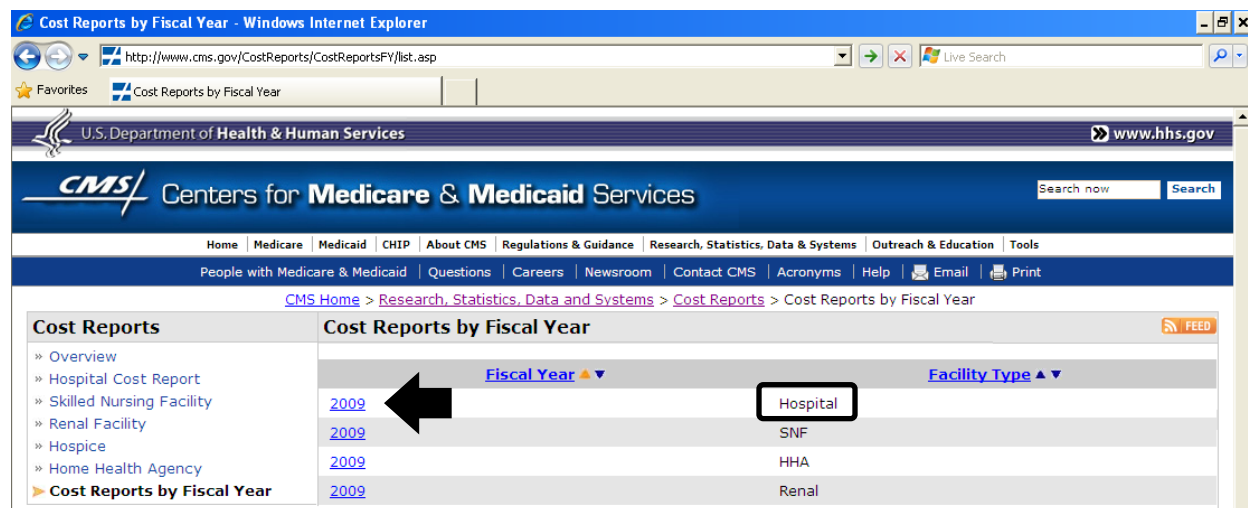


Figure 4: Cost Report Download Screen

By clicking on the year of the cost report, a WinZip® file will be downloaded containing four files:

- Hosp_2009_ALPHA.CSV - Provider name, address, cost center descriptions
- Hosp_2009_NMRC.CSV - Numeric values such as cost, counts, and salaries
- Hosp_2009_ROLLUP.CSV - Aggregations by category such as intensive care units
- Hosp_2009_RPT.CSV - Variables such as provider number and fiscal year begin date

Beginning with the Quarter ending June 30, 2007, the Cost Reports have been separated by individual Fiscal Year. The yearly Hospital Cost Report files include the Rollup files.

There is one dataset file for each fiscal year. There is a file for fiscal year 1995, but there are only two reports in this file. These reports have a fiscal year ending date greater than September 30, 1996; however, the fiscal year begin dates categorize them as 1995 cost reports. These reports were filed on the CMS Form 2552-96 so they are included in this release.

When the Comma Separated Values (CSV) files are imported into SAS data sets, they can be merged together by the Report Record Number (Rpt_Rec_Num) as indicated in the HCRIS Data Model.

The 2009 Hospital Report (Hosp_2009_RPT) table consists of one record per report per hospital. The Alpha, Numeric (NMRC), and Rollup tables contain multiple records per report per hospital per line number (Line_Num) creating a one-to-many relationship.

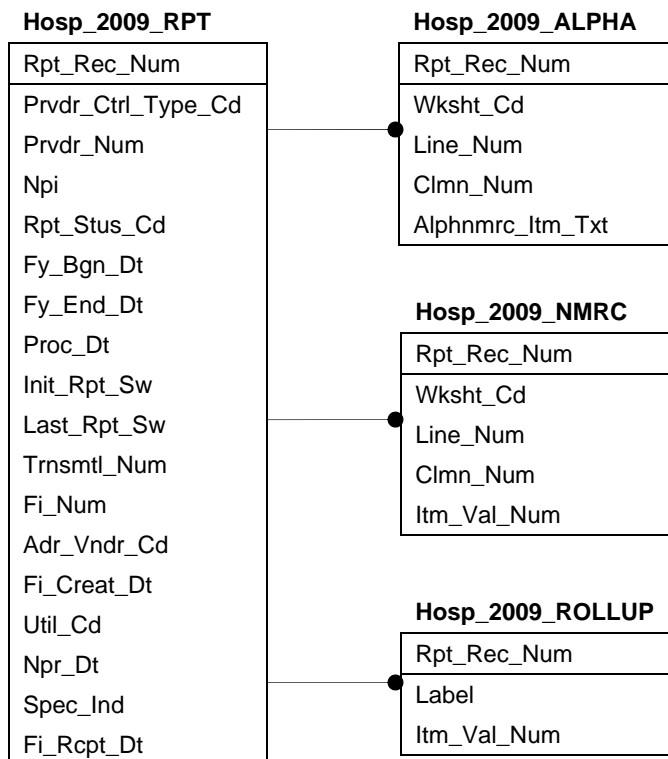


Figure 5: HCRIS Data Model

SAS INPUT STATEMENTS

The following SAS input statements can be used to import the CSV files.

<pre> DATA Hosp_2009_RPT; INFILE 'Hosp_2009_RPT.csv' DLM=',' DSD; INPUT Rpt_Rec_Num Prvdr_Ctrl_Type_Cd : \$2. Prvdr_Num : \$6. Npi : \$10. Rpt_Stus_Cd : \$2. Fy_Bgn_Dt : mmddyy10. Fy_End_Dt : mmddyy10. Proc_Dt : mmddyy10. Init_Rpt_Sw : \$1. Last_Rpt_Sw : \$1. Trnsmtl_Num : \$2. Fi_Num : \$5. Adr_Vndr_Cd : \$1. Fi_Creat_Dt : mmddyy10. Util_Cd : \$1. Npr_Dt : mmddyy10. Spec_Ind : \$1. Fi_Rcpt_Dt : mmddyy10. ; RUN; </pre>	<pre> DATA Hosp_2009_ALPHA; INFILE 'Hosp_2009_ALPHA.csv' DLM=',' DSD; INPUT Rpt_Rec_Num Wksht_Cd : \$7. Line_Num : \$5. Clmn_Num : \$4. Alphnmrc_Itm_Txt : \$40. ; RUN; DATA Hosp_2009_NMRC; INFILE 'Hosp_2009_NMRC.csv' DLM=',' DSD; INPUT Rpt_Rec_Num Wksht_Cd : \$7. Line_Num : \$5. Clmn_Num : \$4. Itm_Val_Num; RUN; DATA Hosp_2009_ROLLUP; INFILE 'Hosp_2009_ROLLUP.csv' DLM=',' DSD; INPUT Rpt_Rec_Num Label : \$20. Itm_Val_Num; RUN; </pre>
--	--

Figure 6: HCRIS SAS Input Statements

The properties of each table are shown below. The RPT table is the smallest, since it only contains data for one cost report per hospital per year. It is possible for one Hospital to submit two or more cost reports for a given year for the same cost report status. This may happen if a hospital changes its Fiscal Intermediary (FI), now known as Medicare Administrative Contractor (MAC), or if there is a Change of Ownership (CHOW) during the year. Cost reports may also be found that were sent in error with an incorrect begin or end date. For the most part, HCRIS tries to eliminate these incorrect submissions by contacting the MAC and deleting a cost report that the MAC identifies as incorrect.

The data files contain the highest level of Medicare cost report status. If HCRIS has both an “as submitted” report and a “final settled” report for a hospital for a particular year, the data files will only contain the final settled report. If HCRIS has an as submitted, final settled and reopened report for a hospital for a particular year, the data files will contain the reopened cost report.

The NMRC table is the largest because most of the line numbers in the cost report are numeric in nature. Examples would be DRG Payments, Salaries, Capital Costs, and Total Inpatient Days. The ALPHA table will contain alpha-numeric values such as the name and address of the hospital or cost center descriptions.

2009 Hospital Cost Report Table Properties				
Attribute	RPT	ALPHA	NMRC	ROLLUP
Observations	6,131	1,040,529	10,249,830	2,035,050
Variables	9	5	5	3
Observation Length	48	64	32	36
File Size (MB)	0.3	46	398	73

NUMBER OF BEDS

This section will show a simple case using the example within section 3 of the Readme file to obtain the total number of hospital beds. As determined by reviewing the specifications, the number of beds is collected on Worksheet S-3, Part I, Line 12, Column 1, therefore a where condition needs to be created using the following:

```
Worksheet Code = 'S300001'
Line Number    = '01200'
Column Number  = '0100'
```

```
DATA Number_of_Beds;
SET Hosp_2009_NMRC;
WHERE Wksht_Cd = 'S300001'
      AND Line_Num = '01200'
      AND Clmn_Num = '0100';
RUN;
```

Figure 7: Number of Beds

Since the value needed (number of beds), is numeric in nature, a query from the NMRC (Numeric) table is required. The SAS code in Figure 7 will extract 6,051 records from the NMRC table. The Item Value Number (Itm_Val_Num) contains the number of beds reported per cost report per hospital because of the worksheet, line, and column number combination.

According to the data model, the NMRC table can be joined with the RPT table by using the Rpt_Rec_Num to obtain the provider number (Prvdr_Num). Keep in mind the Rpt_Rec_Num is unique on the RPT table, which means it contains only one record per cost report per hospital for that particular year.

The following examples will compare use of a SAS merge and a Structured Query Language (SQL) join. This is to prepare for use of the System of Record, which resides in a Relational Database Management System (RDBMS).

Number of Beds				
Rpt Rec Num	Wksht Cd	Line Num	Clmn Num	Itm Val Num
233559	S300001	01200	0100	91
233765	S300001	01200	0100	35
234213	S300001	01200	0100	368
234735	S300001	01200	0100	40

ACUTE DRG PAYMENTS

(1) The example below merges the number of beds data set with the RPT table and limits the results to acute care hospitals by evaluating the provider number. The Itm_Val_Num is also renamed to Number_of_Beds.

(2) The next step is to summarize the Diagnosis Related Group (DRG) payments from the NMRC table. The WHERE clause within the PROC SUMMARY is used to evaluate the worksheet code, column, and line numbers to keep only the records containing the DRG payments. Wksht_Cd 'E00A18A' represents Worksheet E (E0), Hospital Only (0A), and Title XVIII Hospital Insurance (18), on the Part-A worksheet (A). This is not to be confused with Part-A of Medicare - it is Part-A of Worksheet E. The DRG payments are located in column 1 (0100) on lines 1 (00100), 1.01 (00101), and 1.02 (00102). The Itm_Val_Num is then renamed to DRG_Payments.

(3) The final step merges the acute care beds and DRG payments data where the cost report contains both values. Note this can only be done now that the NMRC table has been summarized by the Rpt_Rec_Num.

```
PROC SORT DATA= Number_of_Beds;
  BY Rpt_Rec_Num;
RUN;

PROC SORT DATA= Hosp_2009_RPT;
  BY Rpt_Rec_Num;
RUN;

DATA Acute_Care_Beds;
  MERGE
    Number_of_Beds
    Hosp_2009_RPT;
  BY Rpt_Rec_Num;
  IF SUBSTR(Prvdr_Num,3,4) <= '0879';
  KEEP Rpt_Rec_Num Itm_Val_Num
      Prvdr_Num;
  RENAME
    Itm_Val_Num = Number_of_Beds;
RUN;
```

```
PROC SUMMARY DATA= Hosp_2009_NMRC;
  BY Rpt_Rec_Num;
  VAR Itm_Val_Num;
  WHERE Wksht_Cd EQ 'E00A18A'
        AND Clmn_Num EQ '0100'
        AND Line_Num IN
          ('00100', '00101', '00102');
  OUTPUT OUT= DRG_Pmt_Data
         SUM= DRG_Payments;
RUN;

DATA Acute_Beds_DRG_Pmts;
  MERGE
    Acute_Care_Beds (IN= Acute_Bed)
    DRG_Pmt_Data     (IN= DRG_Pmnts);
  BY Rpt_Rec_Num;
  IF Acute_Bed AND DRG_Pmnts
  THEN OUTPUT;
RUN;
```

Figure 8: Acute Care Beds and DRG Payments

SYSTEM OF RECORD

The System of Record for HCRIS resides in an Oracle database. Figure 9 shows an example of using SAS Access to send an SQL pass-through query to the DBMS. The results of this query are the same as the results in Figure 8. Only CMS employees and their contractors with access to the CMS network can access this database.

The structure of the Oracle database is the same as the SAS input statements used in Figure 6. The naming convention of the tables is different, though similar. The SAS table Hosp_2009_RPT becomes Hosp_RPT_Expy_Tbl. The one difference is the addition of the FY (Fiscal Year) variable. The Oracle table contains data for all years.

(1) The SQL begins with the RPT table in the FROM statement of the outer query and the WHERE clause at the bottom of the query limits the data to Acute Care hospitals. Notice the use of FY to further limit the data to 2009.

(2) The next step is to capture the records that contain the number of beds per cost report per hospital per fiscal year.

(3) The final step is to summarize the DRG payments. Note the SUM function is used in conjunction with the GROUP BY clause to accumulate the dollars by the Rpt_Rec_Num. Otherwise there would be three records joined that would duplicate the number of beds.

The Oracle database is more of a data warehouse than an analytical data mart. Researchers sometimes have trouble using a relational database and will denormalize the data. Data are pre-joined into one table instead multiple related tables.

Output of Figures 8-10

Prvdr Num	Number Of Beds	DRG Payments
260097	91	1,407,488
500050	368	11,502,265
450683	106	524,215
230239	87	1,707,837

This is the case with the SAS Analytical Files (SAFs) used by CMS employees and contractors. The relational data located in the four Oracle tables, RPT, NMRC, ALPHA, and ROLLUP are merged together into one SAS data set.

In the SAS files, the rows of data are transposed into columns of data. Instead of having multiple tables containing millions of rows, there is one table contains thousands of variables.

```
PROC SQL;
CONNECT TO ORACLE ( PATH='HCRISPRD.WORLD'
USER=&SYSUSERID PASSWORD="&PWD" );

CREATE TABLE Acute_Beds_DRG_Pmts AS
SELECT * FROM CONNECTION TO ORACLE
(
SELECT
,T1.Prvdr_Num
,Q1.Number_of_Beds
,Q2.DRG_Payments

FROM Hosp.Hosp_RPT_Expy_Tbl T1

INNER JOIN
( SELECT
T2.Rpt_Rec_Num
,T2.Itm_Val_Num AS Number_of_Beds
FROM Hosp.Hosp_Rpt_NMRC_Expy_Tbl T2
WHERE T2.FY = '2009'
AND T2.Wksht_Cd = 'S300001'
AND T2.Line_Num = '01200'
AND T2.Clmn_Num = '0100'
) Q1
ON Q1.Rpt_Rec_Num = T1.Rpt_Rec_Num

INNER JOIN
( SELECT
T3.Rpt_Rec_Num
,SUM(T3.Itm_Val_Num) AS DRG_Payments
FROM Hosp.Hosp_Rpt_NMRC_Expy_Tbl T3
WHERE T3.FY = '2009'
AND T3.Wksht_Cd = 'E00A18A'
AND T3.Clmn_Num = '0100'
AND T3.Line_Num IN
('00100','00101','00102')
GROUP BY
T3.Rpt_Rec_Num
) Q2
ON Q2.Rpt_Rec_Num = T1.Rpt_Rec_Num

WHERE T1.FY = '2009'
AND SUBSTR(T1.Prvdr_Num,3,4) <= '0879'

ORDER BY
T1.Rpt_Rec_Num
);
QUIT;
```

Figure 9: Oracle Example

SAS ANALYTICAL FILES

The denormalized SAS files contain a variable for each data element instead of a separate record. The number of beds value in the previous examples is shown in the table below. Here the field name becomes S3_1_C1_12 to represent the worksheet, column, and line.

Number of Beds
2552-96 Worksheet S-3, Part I

Field Name	Field Description	Wksht Cd	Column	Line
S3_1_C1_12	Total Hospital	S300001	0100	01200

The DRG amounts are found on three separate lines within the cost report, therefore three separate records in the Oracle tables and CSV downloads. The SAS Analytical Files contain three separate variables instead as shown in the table BELOW.

DRG Amount
2552-96 Worksheet E, Part A

Field Name	Field Description	Wksht Cd	Column	Line
E_A_HOS_C1_1	Payments prior to Oct 1*	E00A18A	0100	00100
E_A_HOS_C1_101	Payments on or after Oct 1 & before Jan 1*	E00A18A	0100	00101
E_A_HOS_C1_102	Payments on or after Jan 1*	E00A18A	0100	00102

* Other than outlier payments.

These files are located on the CMS network at [\\Co-adsasdata\Data\Cms\Oact\Global\HCRIS\HOSP](#) and can only be accessed by CMS employees and contractors. The information given here is to provide an example of the various ways to store the data. Below is an example of the SAS program to create the same results from Figures 8 and 9.

```
LIBNAME hcris '\\co-adsasdata\Data\cms\oact\global\HCRIS\HOSP\2011-06-30';

DATA Prds_hosp_yr2009;
SET hcris.Prds_hosp_yr2009;
WHERE SUBSTR(prvdr_num,3,4) <= '0879';

Number_of_Beds = S3_1_C1_12;
DRG_Payments    = SUM(E_A_HOS_C1_1, E_A_HOS_C1_101, E_A_HOS_C1_102);

KEEP Prvdr_Num Number_of_Beds DRG_Payments;
RUN;
```

Figure 10: SAS Analytical File Example

2009 Table Properties	
Attribute	RPT
Observations	6,131
Variables	7,372
Observation Length	59,048

USING THE SAS ANALYTICAL FILES

The SAS Analytical Files (SAFs) of hospital cost report data are available at CMS for fiscal years 1996-2010, one file per year. The SAFs are provider level files, meaning each record contains all the data fields for a single hospital. Since there are approximately 6200 hospitals and 7000 data fields, each SAF contains about 6200 observations (rows) and 7000 variables (columns). The average provider is required to complete about half of the fields.

Provider Number

The unique identifier for a hospital in the SAF is the six-digit provider number (field name = prvdr_num). Intelligence is embedded within the provider number. The first two digits indicate the state and the last four digits identify the type of hospital. See the link, [Facility Numbering, State Codes, Table Descriptions and SQL](#), identified above, for a list of state codes and type of hospital codes.

The hospital SAF contains data for all types of hospitals (e.g. acute-care inpatient, long-term care, rehabilitation, and psychiatric hospitals,). Each type of hospital has a different cost structure, payment rates, and characteristics. Therefore, MCR data are often subset by hospital type before being analyzed.

```
/* Subsets hospitals by provider type */  
  
DATA Prds_hosp_yr2009;  
  SET hcris.Prds_hosp_yr2009;  
  
  Hospital_Type = SUBSTR(prvdr_num,3,4); extract hospital type from provider number.  
  
/* Execute the one IF statement that matches the hospital type to be analyzed. */  
  
  IF Hospital_Type <= '0879';           * acute-care inpatient hospitals;  
  IF '2000' <= Hospital_Type <= '2299'; * long-term care hospitals (LTCHs);  
  IF '3025' <= Hospital_Type <= '3099'; * inpatient rehab facilities;  
  IF '4000' <= Hospital_Type <= '4499'; * inpatient psychiatric facilities;  
  
RUN;
```

Figure 11: Hospital Type Example

In recent years, many rural hospitals have been designated as Critical Access Hospitals (CAHs) and granted exemption from PPS. Also, they are permitted to complete an abbreviated cost report (similar to no or low Medicare utilization facilities) so many key fields are blank. Therefore, they are often excluded from PPS hospital analyses.

```
/* Excludes Critical Access Hospitals */  
  
DATA Prds_hosp_yr2009;  
  SET hcris.Prds_hosp_yr2009;  
  IF SUBSTR(prvdr_num,3,2) NE '13';      * Removes CAHs;  
  
RUN;
```

Figure 12: Exclude Critical Access Hospitals

When analyzing HCRIS data, keep in mind that the U.S territories, as well as the U.S. states, submit cost reports. Also note that Maryland hospitals have a waiver from PPS, so they are typically excluded from analyses of PPS hospitals.

```
/* Excludes Maryland and the U.S. territories */  
  
DATA Prds_hosp_yr2009;  
  SET hcris.Prds_hosp_yr2009 (KEEP=prvdr_num);  
  State = SUBSTR(prvdr_num,1,2) ;  
  IF State NOT IN ('21','40','48','65','66','80') ;  
  
RUN;
```

Figure 13: Exclude Maryland and U.S. Territories

ANALYTICS WITH HCRIS DATA

Please note that the analytics in this paper are simply illustrations of how to work with the MCR data and are not endorsed by CMS as the best and only method, since there are often multiple ways to calculate many of the measures.

Payment Adequacy

One of the most important uses of the MCR data is assessing the adequacy of Medicare payments. The MCR is vital to this function because it is the only data source that contains both payments and costs in the same data set. These data can be used in several ways as a tool to evaluate whether payments to providers are covering the costs to treat Medicare patients. One measure that can be used to assess payment adequacy is the profit margin. The formula, Profit Margin = (Payments-Costs)/Payments, indicates which percent of payments are profit.

Profit margins can be computed for the total facility, overall Medicare, inpatient Medicare, outpatient Medicare, and hospital-based units. Profit margins can also be calculated on a national level, by state, and by individual hospital.

The following code shows how to compute a total facility margin for individual hospitals directly from variables in the Statement of Revenues and Expenses in Worksheet G-3.

```
DATA Margins;
  SET hcris.Prds_hosp_yr2009 (KEEP=prvdr_num G3_C1_3 G3_C1_25 G3_C1_4 G3_C1_30);
  IF SUBSTR(prvdr_num,3,4) <= '0879';      *subsets acute-care inpatient hospitals;
  Total_Revenues = SUM(G3_C1_3, G3_C1_25);
  Total_Expenses = SUM(G3_C1_4, G3_C1_30);
  Total_Margin = SUM(Total_Revenues, - Total_Expenses) / Total_Revenues;
RUN;
```

Figure 14: Total Facility Margin Example

The next examples show how to compute a total facility margin on a national level. An equally-weighted margin is computed by taking the mean of the individual hospital margins. Hospitals of all sizes contribute equally to this measure. A revenue-weighted margin is calculated by summing the revenue and expenses for all hospitals and re-computing the margin using the sums. Larger hospitals have more of an impact on this margin.

```
/* Equally-weighted total facility margin on national level */

PROC MEANS DATA=Margins; * Margins dataset is created above;
  VAR Total_Margin;
  OUTPUT OUT=Mean_Margin MEAN=;
RUN;

/* Revenue-weighted total facility margin on national level */

PROC SUMMARY DATA=Margins;
  VAR Total_Revenues Total_Expenses;
  OUTPUT OUT=SumRevExp SUM=;
RUN;

DATA RevWgtMargin;
  SET SumRevExp;
  Total_Margin = SUM(Total_Revenues, -Total_Expenses) / Total_Revenues;
RUN;
```

Figure 15: Equally-weighted vs. Revenue-weighted Profit Margin

Computing Medicare margins is more complex than computing total facility margins since, unlike total facility margins, there are not specific variables for Medicare revenues and Medicare expenses. There are multiple Medicare payment variables in the E series of worksheets and many Medicare cost variables throughout the D series of worksheets. Thus, there are numerous ways to measure Medicare margins. To estimate a Medicare margin, an analyst would sum the appropriate Medicare costs from worksheet D and payments from worksheet E, ensuring that the included costs properly correspond to the appropriate payments. Then, they would compute the margin using the formula: **Medicare_Margin = SUM(Medicare_payments, - Medicare_Costs) / Medicare_payments.**

A revenue-weighted Medicare margin is one tool used to measure whether or not there are enough payments in the system. In other words, is the size of the pie large enough? The equally-weighted margin gives insight into whether the payments are distributed appropriately across different categories (e.g. urban/rural) of hospitals.

Utilization Analysis

Hospital Occupancy Rate

Hospital occupancy rate, defined as the percentage of beds that are occupied at a given time, is computed by dividing *hospital days* by *hospital bed days available*, as shown in Figure 16.

Days are broken out by payer (e.g. Medicare and Medicaid) and by cost center (e.g. adults and pediatrics and intensive care unit). Column 3 contains Maternal and Child Health Insurance (Title V) days; column 4 contains Medicare days (Title XVIII); column 5 contains Medicaid days (Title XIX); and column 6 contains total days for all patients. Private Health Insurance days are included in the residual (total facility days minus Public days (Col 6 – (Col 3 + Col 4 + Col 5))). Hospital days are found on line 12 and total facility days are found on line 25.

Bed Days Available are calculated in HCRIS as the *number of beds* times *365 days in a year*. Hospital bed days available are found on line 12 and total facility bed days available are on line 25.

```
DATA Prds_hosp_yr2009;
SET hcris.Prds_hosp_yr2009 (KEEP = prvdr_num S3_1_C2_12 S3_1_C6_12);
IF SUBSTR(prvdr_num,3,4) <= '0879'; *subsets acute-care inpatient hospitals;
Hospital_Days = S3_1_C6_12; * Hospital Days are in wkst S3, col 6, line 12;
Bed_Days_Avail= S3_1_C2_12; * Hosp Bed_Days_Avail are in wkst S3, col 2, line 12;
Occupancy_Rate = Hospital_Days / Bed_Days_Avail;
RUN;
```

Figure 16: Occupancy Rate Example

Hospital Length of Stay

Average hospital length of stay, defined as the average number of days a patient spends in the hospital, is computed by dividing hospital days by hospital discharges, as illustrated in Figure 17.

Like days, discharges (found in Worksheet S-3, columns 12 through 15) are broken out by payer and by cost center. Column 12 contains Title V discharges; column 13 contains Title XVIII discharges; column 14 contains Title XIX discharges; and column 15 contains total discharges. Private Health Insurance discharges are included in the residual of total facility discharges minus Public discharges (Col 15 – (Col 12 + Col 13 + Col 14)). Hospital discharges are found on line 12 and total facility discharges are found on line 25.

```
DATA Prds_hosp_yr2009;
SET hcris.Prds_hosp_yr2009 (KEEP=prvdr_num S3_1_C6_12 S3_1_C15_12);
IF SUBSTR(prvdr_num,3,4) <= '0879'; *subsets acute-care inpatient hospitals;
Hospital_Days = S3_1_C6_12;
Hospital_Discharges = S3_1_C15_12; * Discharges are in wkst S3, col 15, line 12;
IF Hospital_Days > 0 AND Hospital_Discharges > 0 THEN
    Average_LOS = Hospital_Days / Hospital_Discharges;
RUN;
```

Figure 17: Length of Stay Example

Medicare and Medicaid Percent of Total

The days fields in Worksheet S-3 can be used to determine which percentage of the hospital's business is from Medicare, Medicaid, and other sources. Figure 18 shows how to determine Medicare and Medicaid percent of total days.

```
DATA Prds_hosp_yr2009;
SET hcris.Prds_hosp_yr2009 (KEEP=prvdr_num S3_1_C4_12 S3_1_C5_12 S3_1_C6_12);
IF SUBSTR(prvdr_num,3,4) <= '0879'; *subsets acute-care inpatient hospitals;

Medicare_Days = S3_1_C4_12;
Medicaid_Days = S3_1_C5_12;
Hospital_Days = S3_1_C6_12;
Medicare_Pct = Medicare_Days/Hospital_Days;
Medicaid_Pct = Medicaid_Days/Hospital_Days;
RUN;
```

Figure 18: Medicare and Medicaid Percents of Total

Cost Analysis

Detailed hospital cost information is found throughout the cost report. Worksheet A contains overhead costs (referred to as general service cost centers) and revenue-generating costs (categorized as inpatient routine, ancillary, outpatient, other reimbursable, special purpose, and non-reimbursable cost centers), broken out by their salary and non-salary components. In Worksheet B, the overhead costs are stepped down to the revenue-generating cost centers using the appropriate statistics. Total costs are apportioned to the Medicare program in Worksheet D.

When analyzing MCR costs (or payments), it is common to compute a cost per bed/day/discharge in lieu of a cost (payment) level. This allows analysts to compare costs (or payments) across hospitals, regardless of differences in the levels of utilization.

Overhead Costs

The first twenty-four lines on Worksheet A represent the overhead cost centers. The following example demonstrates how to generate overhead per bed.

```
/* Computes total overhead per bed. */  
  
DATA Prds_hosp_yr2009;  
  SET hcris.Prds_hosp_yr2009 (KEEP =prvdr_num  
                              A_C1_5-A_C1_24 A_C2_1-A_C2_24 S3_1_C1_25);  
  
  OH_Salary = SUM(OF A_C1_5-A_C1_24);           * salary component of overhead;  
  OH_NonSalary = SUM(OF A_C2_1-A_C2_24);        * non-salary component of overhead;  
  Total_Beds= S3_1_C1_25;  
  Overhead_per_Bed = SUM(OH_Salary,OH_NonSalary)/Total_Beds;  
RUN;
```

Figure 19: Overhead per Bed Example

Compensation (Wage Index Data)

Worksheet S-3, Parts II and III contain hospital wage index information, including salaries, contract labor and other wage-related costs such as employee benefits. Figure 20 shows how to compute compensation costs as a percent of total costs.

The hospital salary costs in Worksheet S-3, part II, column 1, line 1, match the salary costs computed by summing the costs in Worksheet A, column 1. In Worksheet S-3, column 3, the salary costs are adjusted for reclassifications identified in Worksheet A-6.

The compensation costs in Worksheet S-3 are separated into categories like non-physician anesthetists, physician, and teaching costs, allowing analysts to categorize costs into PPS-included and PPS-excluded components.

```
DATA Prds_hosp_yr2009;  
  SET hcris.Prds_hosp_yr2009;  
  Salary = S3_2_C3_1;  
  Contract_Labor = S3_2_C3_9;  
  Benefits = SUM(OF S3_2_C3_13-S3_2_C3_20,  
                S3_2_C3_1801, S3_2_C3_1901);  
  Total_Compensation =  
    SUM (Salary, Contract_Labor, Benefits);  
  Total_Costs = SUM(A_C1_101,A_C2_101);  
  Comp_Pct = Total_Compensation/Total_Costs;  
RUN;
```

Figure 20: Compensation Example

Payment Analysis

Payment information can be found in Worksheet E which has five parts:

- Part A - Inpatient Hospital Services Under PPS
- Part B - Medical and Other Health Services
- Part C - Outpatient Ambulatory Surgical Center
- Part D - Outpatient Radiology Services
- Part E - Other Outpatient Diagnostic Procedures

Part A contains inpatient payments, such as DRG payments for inpatient services to Medicare patients, Managed Care (MC) payments, IME (Indirect Medical Education) payments to teaching hospitals, DSH (Disproportionate Share) payments to hospitals that treat a disproportionate share of indigent patients, and extra payments to hospitals that treat a high percentage of ESRD beneficiaries. Parts B through E contain payments for outpatient services.

The following example depicts how to compute the mean and median DRG, MC, IME, DSH, and extra ESRD payments.

```
/* Computes payment means and medians. */  
  
DATA Prds_hosp_yr2009;  
  SET hcris.Prds_hosp_yr2009 (KEEP= prvdr_num  E_A_HOS_C1_1  E_A_HOS_C1_101  
                                E_A_HOS_C1_102  E_A_HOS_C1_103-E_A_HOS_C1_108  
                                E_A_HOS_C1_324  E_A_HOS_C1_404 E_A_HOS_C1_506);  
  
  Hospital_Type = SUBSTR(prvdr_num,3,4);  
  IF Hospital_Type <= '0879';    * subsets acute-care inpatient hospitals;  
  
  DRG_Pay=SUM(E_A_HOS_C1_1, E_A_HOS_C1_101, E_A_HOS_C1_102);  
  Managed_Care_Pay=SUM(OF E_A_HOS_C1_103-E_A_HOS_C1_108)  
  IME_Pay= E_A_HOS_C1_324;  
  DSH_Pay= E_A_HOS_C1_404;  
  ESRD_Add_Pay= E_A_HOS_C1_506;  
  
KEEP prvdr_num DRG_Pay Managed_Care_Pay IME_Pay DSH_Pay ESRD_Add_Pay;  
RUN;  
  
PROC UNIVARIATE DATA=Prds_hosp_yr2009;  
  VAR DRG_Pay Managed_Care_Pay IME_Pay DSH_Pay ESRD_Add_Pay;  
  OUTPUT OUT=Payment_ds MEAN= MEDIAN= ;  
RUN;  
  
* The dataset Payments_ds will contain one record with the mean and median of each of  
the five payment types;
```

Figure 21: Payments Example

Uncompensated Care

Uncompensated Care, defined as charity care and bad debt, can be found in worksheet S-10. Charity care includes services for which hospital policies determine the patient is unable to pay. Bad debt is the unpaid dollar amount for services rendered from a patient or third party payer for which the provider expected payment. Worksheet S-10 is applicable to acute-care inpatient hospitals only.

Categorical Data Analysis

Worksheet S-2 contains information about hospital characteristics that can be used to analyze cost, payment, and utilization measures for different categories of hospitals. Commonly used characteristics include urban/rural, control type, teaching status, and bed size. Adding a CLASS or BY statement to the SUMMARY, MEANS, or UNIVARIATE procedures above would produce the statistical measure by the specified categorical data variable. The examples below demonstrate how to compute *average IME payments by teaching status and the weighted and unweighted salary costs per FTE by control type*.

```
DATA Prds_hosp_yr2009;
  SET hcris.Prds_hosp_yr2009 (KEEP=prvdr_num S3_1_C7_25 S3_1_C1_25 E_A_HOS_C1_324);
  IF SUBSTR(prvdr_num,3,4) <= '0879';      *subsets acute-care inpatient hospitals;

/* To determine teaching status, first compute interns and residents per bed ratio */

  IF S3_1_C1_25 > 0 THEN IRsPerBed = S3_1_C7_25/S3_1_C1_25;
  IF IRsPerBed GE 0.25 THEN Teach = 'Major Teaching';
  IF IRsPerBed GT 0 AND IRsPerBed LT 0.25 THEN Teach = 'Minor Teaching';
  IF IRsPerBed = . THEN Teach = 'Non-Teaching';
IME_Pay= E_A_HOS_C1_324;
RUN;

PROC MEANS DATA= Prds_hosp_yr2009;
  VAR IME_Pay;
  CLASS Teach;
  OUTPUT OUT=IME_by_Teach MEAN=;
RUN;
```

IME_by_Teach will contain four records for mean IME payments. The top line indicates the national average and the last three lines show the mean IME payments for major, minor and non-teaching.

```
DATA Prds_hosp_yr2009;
  SET hcris.Prds_hosp_yr2009 (KEEP= prvdr_num S2_C1_18 S3_2_C3_1 S3_1_C10_25);
  IF SUBSTR(prvdr_num,3,4) <= '0879';      *subsets acute-care inpatient hospitals;

/* Control type */
  IF S2_C1_18 in (1,2) THEN CtrlStat = 'Non-Profit';
  IF S2_C1_18 in (3,4,5,6) THEN CtrlStat = 'Profit';
  IF S2_C1_18 in (7,8,9,10,11,12,13) THEN CtrlStat = 'Government';

Salary=S3_2_C3_1;
Facility_FTEs=S3_1_C10_25;
Salary_per_FTE = Salary/Facility_FTEs;
RUN;

PROC MEANS DATA=Prds_hosp_yr2009;
  VAR Salary_per_FTE;
  CLASS CtrlStat;
  OUTPUT OUT= SalarybyControl_UnWgt SUM=;
RUN;
```

SalarybyControl_UnWgt will contain UNWEIGHTED salary per FTE by control

```
PROC SUMMARY DATA=Prds_hosp_yr2009;
  VAR Salary Facility_FTEs;
  CLASS CtrlStat;
  OUTPUT OUT=SumSalaryFTE SUM=;
RUN;
```

```
DATA SalarybyControl_Wgt;
  SET SumSalaryFTE;
  Salary_per_FTE = Salary/Facility_FTEs;
RUN;
```

SalarybyControl_Wgt will contain WEIGHTED salary per FTE by control

Figure 22: Categorical Data Example

Audits/Edits

The MCR variable Report Status Code, Rpt_Stus_Cd, indicates whether or not a cost report has been audited.

Notice that around 8 percent of cost reports are audited. And typically only a few fields of the audited reports are reviewed. There are also numerous edits to check that the provider number, date, and categorical fields have valid values and to verify that detail data adds to the totals. However, there are no canned edits to check for reasonable values reported in cost, payment, and utilization fields. Therefore, it is a good practice to apply edits specific to the data needed for each project. Possible edits include trimming high and low outliers based on selected criteria or setting threshold ranges for variables of interest.

Report Status Code Values	Percent
1 – As Submitted	19
2 – Settled without Audit	42
3 – Settled with Audit	8
4 - Reopened	29
5 - Amended	2

Here are two examples of applying outlier trims based on the hospital payment to cost ratio.

<pre> /* Trim based on algorithm. */ DATA temp; SET home.all2009; IF totrev GT 0 AND totexp GT 0; tottrim=LOG(totrev/totexp); ALIKE = 1; RUN; PROC UNIVARIATE DATA=temp; VAR tottrim; OUTPUT OUT=trim_limits P10=totlow P90=tothigh; RUN; DATA trim_limits; SET trim_limits; alike=1; RUN; PROC SORT DATA=temp; BY alike; RUN; PROC SORT DATA=trim_limits; BY alike; RUN; DATA trimmed_file; MERGE temp(IN=in1) trim_limits; BY alike; IF in1; tlow=totlow-(1.5*(tothigh-totlow)); thigh=tothigh+(1.5*(tothigh-totlow)); IF tottrim > tlow AND tottrim < thigh; totmarg=SUM(totrev,-totexp)/totrev; RUN; </pre>	<pre> /* Simple trim of top and bottom 5 pct */ DATA temp; SET home.all2009; IF totrev GT 0 AND totexp GT 0; tottrim=LOG(totrev/totexp); ALIKE = 1; RUN; PROC UNIVARIATE DATA=temp; VAR tottrim; OUTPUT OUT=trim_limits_2 P5=totlow P95=tothigh; RUN; DATA trim_limits_2; SET trim_limits_2; alike=1; RUN; PROC SORT DATA=temp; BY alike; RUN; PROC SORT DATA=trim_limits_2; BY alike; RUN; DATA trimmed_file_2; MERGE temp(IN=in1) trim_limits_2; BY alike; IF in1; IF tottrim > totlow AND tottrim < tothigh; totmarg=SUM(totrev,-totexp)/totrev; RUN; </pre>
---	---

Figure 23: Outlier Trim Example

Applying outlier trims does not always eliminate all unreasonable data. Therefore, analyzing individual hospitals or small groups of hospitals, such as a state with a few hospitals, sometimes yields unreliable results. Cost report data analysts find that computing averages on a national level or across larger groups of data is a more effective way to analyze the data. Because the data set is fairly robust, averaging the data tends to cancel out the noise, yielding reasonable results.

Handling Multiple Reports for a Provider

A provider can submit multiple cost reports in a given year to update their data or make corrections. When this happens, it is common to use the most recently submitted (and likely most up-to-date) report and drop the old report to avoid double counting.

Providers can also submit data in partial year increments in separate reports in the same year. An analyst could keep both reports and add the cost, payment, and some of the utilization fields to obtain a full year of data. In this case, be cautious not to add certain numeric fields such as beds and FTEs since they are not meant to be accumulated. Because very few providers submit partial years, an analyst could simplify the process, only keeping the most recently submitted "full year" cost report for a given provider.

```
/* Keeps the most recent report */

PROC SORT DATA=hosp2009; /* Sorts by provider number and report record number.
  BY prvdr_num DESCENDING rpt_rec_num;
RUN;

PROC SORT DATA=hosp2009 NODUPKEY;
  BY prvdr_num; /* Keeps the record with the highest report record number. */
RUN;

/* Checks for a "full year" of data (self-defined as 10-14 months of data)
   using the fiscal year begin date and end date variables. */

DATA Prds_hosp_yr2009;
  SET hcris.Prds_hosp_yr2009;
  Report_Days = SUM(FY_End_Dt, -FY_Bgn_Dt);
  IF 300 < Report_Days < 420;
RUN;
```

Figure 24: Multiple Reports Example

Note: This paper is based on the CMS-2552-96 version of the cost report. In 2012, an updated version (CMS Form 2552-2010) will be implemented. The same data will be available, but the line and column for some data elements will change. A crosswalk describing the old and new field locations will be available at the website, <http://www.cms.gov/CostReports>.

CONCLUSION

Medicare cost reports contain a wealth of information that can be used by policymakers, healthcare analysts, and researchers. One of the key aspects of HCRIS is the fact that it is the only data source that includes provider expenses, revenues, characteristics, and utilization data. These data make it possible to compute a myriad of health care measures on a national level; by hospital categories such as urban/rural, control type, teaching status, and bed size; and for individual hospitals. Many of these measures can be used as a tool for assessing Medicare payment adequacy and analyzing elements of a hospital's cost structure.

REFERENCES

Blue Cross Blue Shield, "Medicare Cost Reporting Forms: Commentary and Case Study," https://www.cahabagba.com/part_a/forms/form_cms2552.pdf

CMS, "Cost Reports", http://www.cms.gov/CostReports/01_Overview.asp, updated 2011.

Gottlob, P., "Medicare Hospital Prospective Payment System: How DRG Rates Are Calculated and Updated", OEI-09-00-00200 (2001), <http://oig.hhs.gov/oei/reports/oei-09-00-00200.pdf>.

Highmark, 2010, <https://www.highmarkmedicareservices.com/parta/arcenter/audit-ref/cost-rpt-instrc.html>

ResDAC, "Cost Reports Data Available", http://www.resdac.org/CostReports/data_available.asp, updated 2010.

ResDAC, "Using Medicare Hospital Cost Reports Cost-to-Charge Ratios in Research," http://www.resdac.org/tools/TBs/TN-008_UsingCCRsInResearch_508.pdf

SAS Institute Inc. 2008, "SAS OnlineDoc 9.1.3", <http://support.sas.com/onlinedoc/913/docMainpage.jsp>

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APPENDIX A

Cost Report Data Dictionary		
Column Code	Table	Title
Adr_Vndr_Cd	RPT	Automated Desk Review Vendor Code
Alphnmrc_Itm_Txt	ALPHA	Alphanumeric Item Text
Clmn_Num	ALPHA,NMRC	Column Number
Fi_Creat_Dt	RPT	Fiscal Intermediary Create Date
Fi_Num	RPT	Fiscal Intermediary Number
Fi_Rcpt_Dt	RPT	Fiscal Intermediary Receipt Date
Fy_Bgn_Dt	RPT	Fiscal Year Begin Date
Fy_End_Dt	RPT	Fiscal Year End Date
Initl_Rpt_Sw	RPT	Initial Report Switch
Itm_Val_Num	NMRC	Item Value Number
Last_Rpt_Sw	RPT	Last Report Switch
Line_Num	ALPHA,NMRC	Line Number
Npr_Dt	RPT	Notice of Program Reimbursement Date
Npi	RPT	National Provider Identifier
Proc_Dt	RPT	Process Date
Prvdr_Ctrl_Type_Cd	RPT	Provider Control Type Code
Prvdr_Num	RPT	Provider Number
Rpt_Rec_Num	ALL TABLES	Report Record Number
Rpt_Stus_Cd	RPT	Report Status Code
Spec_Ind	RPT	Special Indicator
Trnsmtl_Num	RPT	Current transmittal or version number
Util_Cd	RPT	Utilization Code
Label	ROLLUP	Rollup label
Item	ROLLUP	Rollup value
Wksht_Cd	ALPHA,NMRC	Worksheet Identifier