Unique uses of SAS software for Determining Medi-Cal (Medicaid) Hospital Inpatient Reimbursement
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Abstract

The Hospital Reimbursement Section (HRS) of the California Department of Health Services (DHSS) has been using SAS to help hold down the high and rising cost of inpatient hospital care in California since 1980. SAS is used to calculate reimbursement rates for the 549 hospitals which provide services to Medi-Cal (Medicaid) patients in California. Three regulations, each with its own set of formulas, are used by HRS to limit hospital inpatient reimbursement. SAS is used for all of the programming needs of HRS. Many unique and useful tools have been developed over the years to deal with these regulations. The SAS system used by HRS is now a complete package that is used to determine approximately $1.5 billion in Medi-Cal reimbursement each year.

Background

On June 30, 1980 the state of California implemented regulation Section 51536, title 22 of the California Administrative Code. This was California's first successful effort to contain the high and rising cost of Medi-Cal inpatient hospital care. Medi-Cal is the official name for the Medicaid program in California. Section 51536 limits the rate of increase in hospital inpatient reimbursement. This limit defines a reasonable maximum cost for efficiently operated hospitals. Costs above this limit will not be allowable. The system calculates each hospital's actual average reimbursable cost per Medi-Cal patient (discharge) as of July 1, 1980 (the effective date of the regulation) using applicable Medicare reimbursement principles. This average reimbursable cost per discharge is used as the base rate per discharge. The base rate per discharge is allowed to increase each year by a "reasonable" percentage. This percentage increase is calculated by including allowances for hospital inflation (in 7 specific areas), increased service intensity, changes in volume, increases in cost items which are "pass-throughs" and changes in case-mix. Two of the 7 allowances for inflation are calculated using hospital specific data, and the other five use nationwide input price indices from Data Resources Inc. (DRI). Each hospital's own percentage of costs in each area are used to calculate its overall allowable increase. Each hospital is impacted differently, based on its own unique cost and patient experience.

A large volume of data and numerous calculations are necessary to determine each hospital's annual allowable rate per discharge. Each year's rate per discharge becomes the base rate for the next year's rate per discharge. The allowable rate per discharge is calculated twice a year for each hospital. The first calculation is for tentative settlement, which is after the data have been audited.

In 1981 and again in 1982 the state implemented additional regulations designed to further reduce Medi-Cal reimbursement to inefficient hospitals. These new regulations resulted in additional data requirements and calculations.

The first of these new regulations, Section 51537, reduces reimbursement to hospitals which have an occupancy rate below 55%. The next regulation, Section 51539, reduces reimbursement to any hospital with an average reimbursement per discharge above the 60th percentile of its peer group. A peer group is a group of hospitals with similar characteristics, which theoretically would have similar costs if all hospitals were run efficiently. The peer groups themselves were formed using the SAS FASTCLUS procedure.

System Overview

The hospital reimbursement system uses data from three sources. The first source is the Medi-Cal cost report. The second source of data is the California Health Facilities Commission annual disclosure report. The final source of data is the paid claims summary. The paid claim summaries are developed from actual claims submitted to and paid by CSC, the State's fiscal intermediary.

Once the data are input into the computer, the three data sources are merged for each hospital. Since each hospital's rate is built upon the previous year's rate, the data are merged with the previous year's data. The data are then run through the master program, which does all the calculations, updates the master file and produces the output reports.

Data Entry

The data from each of the sources are entered into the computer using SAS FSP. The commands needed to access the proper file are contained in a CLIST (see figure 1). This allows clerical staff to easily get into the proper file under FSEDIT with a single command. The CLIST command will allocate the temporary file, invoke SAS, put the user into FSEDIT, call in the proper screen format and position the user into menu option 1 so the user can start entering data. The file is sorted in license number order and transferred from the temporary file to an intermediate file when the user exits FSEDIT.

The FSEDIT entry screens were designed to resemble the actual input documents. This avoids confusion when the data are entered. The hospital name and license number are highlighted to make them easier to locate.

Data Base

After the data have been entered, a batch...
program is run which merges the intermediate data sets, does some preliminary calculations, sets variable lengths, defines labels and updates the main input file. Several pages of output are produced so the analyst can check the data for errors and inconsistencies. The main program, which is run next, does the following:

1) Merges in the price indices
2) The reimbursement calculations
3) Updates the master file
4) Prints 2 copies of the 17 page report
5) Prints a letter to the hospital
6) Prints the name and address labels

The analyst inputs the hospital license number and fiscal year end date, in order to properly identify the hospital and the appropriate fiscal year. This information is input on a SAS input line which also contains several other input variables which are:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>REIMB</td>
<td>Y means that the reimbursement calculations are to be run for this hospital</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>Y means that the 17 page output report is to be printed</td>
</tr>
<tr>
<td>MIX36</td>
<td>Y means that the hospital is to have a case-mix adjustment calculated under Section 51536</td>
</tr>
<tr>
<td>SETTLEMENT</td>
<td>T means this is a tentative settlement. F means this is a final settlement.</td>
</tr>
<tr>
<td>LETTER</td>
<td>Y means that a letter to the hospital and a label will be printed.</td>
</tr>
<tr>
<td>ANALYSTS</td>
<td>The 2 initials of the analyst are put in here. A permanent SAS format library will translate these into the analysts full name.</td>
</tr>
<tr>
<td>REVISED</td>
<td>R means that this is a revised settlement.</td>
</tr>
<tr>
<td>MIX39</td>
<td>Y means that this hospital is to have a case-mix adjustment under Section 51539.</td>
</tr>
<tr>
<td>MIX39ADJ</td>
<td>This is the value for the 51539 case-mix adjustment factor</td>
</tr>
<tr>
<td>OUTSIZE</td>
<td>S will place the output report on small white paper (11 X 8 1/2). L will place the output report on normal 8.5 X 11 computer paper. See figure 2 for the SAS code which accomplishes this.</td>
</tr>
</tbody>
</table>

The data are stored in a SAS data set that uses names based on the hospital's fiscal year end. The names of the variables reflect a number indicating what year of the reimbursement program the data are in. The program started July 1, 1980, so all fiscal years ending between July 1, 1980 and June 30, 1981 are year 1 for the DHS variables. However, some data are obtained from reports filed with the California Health Facilities Commission (CHFC). The data from CHFC are named after the year in which the CHFC program is in effect. The CHFC program started with fiscal years ending June 30, 1975. Year 1 CHFC data is for all fiscal years ending between June 30, 1975 and June 29, 1976.

The predominant DHS year currently being used represents fiscal years ending between July 1, 1982 and June 30, 1983, which is DHS year 3. The corresponding CHFC years are 8 and 9, which contain fiscal years ending from June 30, 1982 to June 29, 1984. The time periods for the two data sources overlap. Sometimes year 3 DHS data needs year 8 CHFC data and sometimes it needs year 9 CHFC data. The system also needs the previous year's data for each data source in order to do all of the calculations.

If a hospital files two reports in a year, then an "A" is added to the end of the variable names to indicate that this is the second set of data for this hospital. There is a year 3A for DHS data for hospitals that file more than one report with a fiscal year ending between July 1, 1982 and June 30, 1983. A year 3A will need year 3 data to use as the data for the prior year. The possible combinations of DHS and CHFC data for just the year 3 and 3A DHS data are:

<table>
<thead>
<tr>
<th>DHS YEAR</th>
<th>CHFC YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Prior</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>3A</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>8A</td>
</tr>
<tr>
<td>3A</td>
<td>8A</td>
</tr>
<tr>
<td>3</td>
<td>9A</td>
</tr>
<tr>
<td>3A</td>
<td>9A</td>
</tr>
</tbody>
</table>

Each of the nine combinations requires different variables with different names. In the past a different program was written for each variable combination. The programs were rewritten and combined into one program which can handle all nine combinations. The program uses a Macro, which contains nine arrays. The program tests to see which combination to use, and the Macro is then invoked. The Macro call is replaced with an array containing the appropriate variable names. All of the calculations are done using generic names. The data are then placed into the appropriate values by using a simple do over before and after the calculations. See figure 3 for the SAS code which accomplishes these tasks.

**CALCULATIONS**

Numerous calculations are performed on the data for each hospital. Starting in 1982, with the inception of Section 51539, additional calculations are required. These new calculations require the use of data from all of the hospitals. Section 51539 limits the average reimbursement per discharge to a maximum of the 60th percentile all-inclusive rate per discharge for each hospital's peer group.

The first step in calculating a 60th percentile rate per discharge is to align each all-inclusive rate per discharge to a common point in time. This is necessary since all hospitals do not have the same fiscal year. Hospitals with common fiscal years may also not have the same latest year's data available.
A reference point must be chosen for each peer group. Inflation indices for hospital input prices measuring the inflation during each quarter are obtained from ORI. Next the quarter containing the midpoint of the reference period and the quarter containing the midpoint of the reporting period are identified. There are five possible formulas which may be used to align the data. The formulas and the criteria for selecting the appropriate formula are listed in figure 4. Formula 4 is the formula used most frequently to align the data. Formula 4 is used to align the data forward to a time period in a different quarter. The \( f \) is the alignment factor for a particular hospital.

The formula starts with \((1 + f)^{0.03}\). This part of the formula aligns the data forward from the midpoint of the reporting period to the end of the quarter. The next factor is: \(T-1\)

\[\frac{T}{Q} (1 + \frac{Q}{S+1})\]

This factor inflates the data forward from the first day of the quarter containing the midpoint of the reporting period until the first day of the quarter containing the midpoint of the reference period. The last factor, \((1 + \frac{Q}{S+1})^{0.03}\), inflates the data from the first day of the quarter containing the midpoint of the reference period until the midpoint of the reference period. The other 4 formulas use the same type of calculations.

Output

Each hospital is sent a 17 page computer generated financial output report. This report details the data and calculations used to determine the hospital's maximum allowable reimbursement level. A copy of the summary page of the report is listed in figure 7.

SAS is also used by HRS for many other functions. The appeals and Statistical Data Sheet tracking systems were written in SAS. SAS is used to process several million patient discharge records each year. The discharge data are used to assign the proper Diagnosis Related Group (DRG) to each Medi-Cal patient. These can then be used to calculate case-mix adjustments for each hospital. SAS is also used for many special studies on Capital costs, labor costs, hospital contracting, effects of changes in the reimbursement methodologies and other research endeavors.

Conclusion

The Hospital Reimbursement Section made the right choice when they chose SAS for their programming language. The SAS based system is an excellent data base manager and can quickly retrieve and analyze vast amounts of data. Since all hospitals claim to be unique, the reimbursement programs are constantly being adjusted for individual hospitals. Only SAS can provide the speed, accuracy and flexibility needed by HRS.

References

 Bernstein, Robert O and Tyler Phil, Tim, Hospital Peer Grouping for Efficiency Comparison, California Health Facilities Commission, Sacramento, CA, October 18, 1982.

Figure 1

SAS CLIST for FSEDIT

```
PROC O
ALLOC F(TEMP3) DA('HD.TEMP3.DATA') OLD
SAS OPTIONS('CLIST')
DATA
PROC FSEDIT DATA=TEMP3.AUDITS SCREEN=TEMP3.
SCREENA OPTION: I);
RUN;
%TSO ALLOC F(INPUT3) OA('HO.INPUT3.0ATA') OLD;
DATA INPUT3.AUDIT3;
SET TEMP3.AUDIT3;
RUN;
%TSO FREE F(INPUT3);
RUN;
ENDSAS;
ENDOATA
FREE F(TEMP3)
END
```

Figure 2

Paper Size Routine

```
JCL:
//FTI2FO01 DD SYSOUT=A
//FT16FO01 DD SYSOUT=(3,4001),F CB=8851,
// CHARS=CF15,COPIFS=2
// PROGRAM:
DATA LIC;
INPUT LIC 1-8 ... OUTSIZE $41 ...
CARDS;
```
DATA NULL;
SET LIC(0851);
IF OUTSIZE='L' THEN HH=12;
IF OUTSIZE='S' THEN HH=16;
CALL SYMPUT('UNITPIK',PUT(HH,2.));
PROC PRINTTO UNIT=&UNITPIK NEW;

Figure 3 - Choosing An Array

%MACRO ARRAYNAM;
%GLOBAL ARRAYPIK;
%IF &ARRAYPIK=A
ARRAY ARRAYA FYE3 FYE2 ...
/MONET2 MCDIS8 ...
%END;
%IF &ARRAYAPIK=B %THEN %DO;
ARRAY ARRAYA FYE3 FYE1 ...
/MONET2 MCDIS9 ...
%END
%IF &ARRAYPIK=I %THEN %DO;
ARRAY ARRAYA FYE3A FYE3 ...
/MONET3 MCDIS9A ...
%MEND ARRAYNAM;

DATA B; SET A;
IF FYE3<MDY(6,30,B3) AND FYE2A= . AND FYE3A= . AND CHFCBA= . AND CHFC9A= . THEN REIMPROC='A';
IF FYE3=MDY(6,30,B3) AND FYE3A NE . AND CHFC9A NE . THEN REIMPROG='I';
DATA C; SET B;
CALL SYMPUT('ARRAYPIK',REIMPROG);
%ARRAYNAM
ARRAY DUMMY D1-D400;
DO OVER DUMMY; DUMMY=ARRAYA; END;
IF REIMB NE 'Y' THEN GOTO SKIPIT;
* Reimbursement Calculations ;
SKIPIT: DO OVER DUMMY; ARRAYA=DUMMY; END;

Figure 4

Fiscal Year Alignment Calculations - SAS Code

* BASECOST=The rate per discharge of the latest available data;
* MIDPOINT=Midpoint of the fiscal year covered by BASECOST;
* The first lines assign inflation factors;
IF FIRST.LICC THEN DO;
DRI1 =.025; DRI2 =.015;
DRI13=.033; DRI16=.026;
DRI19=.031; DRI10=.023;
DRI13=.025; DRI14=.016;
DRI17=.012; DRI18=.014;
DRI20=.015; DRI20=.014;
REFSTART=MDY(7,1,82);
REFEND=MDY(6,30,83);
REFPOINT=SUM(REFSTART,REF_END)!2;
TPOINT=REFPOINT;
TYEAR=YEAR(TPOINT);
TMONTH=MONTH(TPOINT);
TQTR=QTR(TPOINT);
TQTR(TPOINT)='1979+TQTR';
END;

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RETAIN DR1=DR20 REFSTART REF END REFPOINT;
TPOINT TYEAR TMONTH TQTR TPOINT TZPOINT;
A =QTR(MIDPOINT);
B =YEAR(MIDPOINT);
IF A=4 THEN BB=YQQ((B+1),I)-1;
ELSE BB=YQQ(B,(A+1))-1;
AA =YQQ(B,A);
SPOINT =AA+BB/2;
SQTR =QTR(SPOINT);
SMONTH =MONTH(SPOINT);
SYEAR =YEAR(SPOINT);
ZZPOINT=((SYEAR-1979)*4)+SQTR;
SPPOINT=(SYEAR*100)+SMONTH;
SM =MIDPOINT;
TM =REFPOINT;
D1 =BB-SM;
D2 =BB-AA+1;
D3 =D1/D2;
D4 =((D2-D1)/D2);
D5 =ABS(TM-SM);
D6 =TM-YQQ((YEAR(TM)-1900),(QTR(TM)));
IF QTR(TM) NE 4 THEN
D7=YQQ((YEAR(TM)-1900),(QTR(TM)+1))-YQQ((YEAR(TM)-1900),(QTR(TM)));
ELSE D7=YQQ((YEAR(TM)-1899),1)-YQQ((YEAR(TM)-1900),QTR(TM));
DB =D6/D7;
IF ZZPOINT-1 OR ZZPOINT-24 THEN DO;
PUT 'ZZPOINT IS NOT VALID'; GOTO ZZMISS; END;
IS =ZZPOINT;
I =((YEAR-1979)*4)+TQTR;
IT =DIR;
IF ZZPOINT>TZPOINT THEN DO;
IF SM<TM THEN INFACTOR=1/(I+IS)**D3;
IF SM<TM THEN INFACTOR=(1/(I+IS)**D3)**(ABS(SM-TM)/D2);
GOTO SAMEQTR;
END;
IF SSPOINT<TPOINT THEN DO;
ISD=(I+IS)**D3;
TTI=1;
DO I =(ZZPOINT+1) TO (TZPOINT-1);
TTI=TTI**(1/DIR);
END;
INFACTOR=ISD*TTI**(1+IT)**D8;
END;
ELSE DO;
VDD=1/(1+IS)**D4;
TTV=1;
DO I =TPOINT TO (ZZPOINT-1);
TTV=TTV*(1/(-DIR));
END;
INFACTOR=VDD*TTV**(1+IT)**D8;
END;
SAMEQTR:
INTEGR=(SM-TM)/365)*.01;
COST_DIS=INFACTOR+INTEGR**BASECOST;
ZZMISS:

FIGURE 6
60th Percentile Calculation
PROC SORT DATA=F;
BY GROUP COST_DIS;
PROC MEANS N;
BY GROUP;
VAR COST_DIS;
OUTPUT OUT=OUTI N=NUN;
DATA B;
MERGE OUT 1 F;
BY GROUP;
IF FIRST.GROUP THEN DO;
PLACE60=.6*(NUN+1);
C=CEIL(PLACE60);
F=FLOOR(PLACE60);
NUM=1;
KEEPFLOR=.
KEEPCEEL=.
TEMP60 =.
FLOORN =.
END;
ELSE DO;
NUM+I;
END;
IF (NUM-.01) <= PLACE60 <= (NUM+.01) THEN
TEMP60=COST_DIS;
ELSE IF NUM>PLACE60 THEN COST_DIS;
ELSE IF CEIL=C THEN CEEL=COST_DIS;
IF FLOR NE . THEN DO;
KEEPFLOR=FLOR;
FLOORN=NU;
END;
IF CEEL NE . THEN DO;
KEEPCEEL=CEEL;
CEELN=CEEL;
END;
IF TEMP60=. THEN TEMP60=KEEPFLOR+
((PLACE60-FLOORN)*(KEEPCEEL-KEEPFLOR));
RETAIN KEEPFLOR KEEPCEEL TEMP60 FLOORN
PLACE60 C F ;
PROC SORT;
BY DESCENDING COST_DIS;
DATA G;
SET B;
BY GROUP;
IF FIRST.GROUP THEN PERCENT60=TEMP60;
M=PERCENT60;
RETAIN PERCENT60;

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Figure 7

Summary Output Page

Determination of Maximum Allowable Reimbursement Level

1. All-Inclusive Rate Per Discharge in Settlement Year
   (See Page 4, Line 3) $3,954.59
2. Total Medi-Cal Discharges in Settlement Year (from the Medi-Cal Cost Report) 1,631
3. Medi-Cal Reimbursement Limitation Resulting from Section 51536 All-Inclusive Rate per Discharge Formula (line 1 X line 2) $6,449,941
4. Medi-Cal Allowable Net Cost of Covered Services in Settlement Year Permitted by Applicable Medicare Standards and Principles of Reimbursement (From the Medi-Cal cost report, Page 3, line 11) $6,981,918
5. Medi-Cal Customary Charges in Settlement Year (From the Medi-Cal cost report) $7,481,114
6. Reimbursable costs as defined in Section 51536 (lowest of lines 3, 4 and 5) $6,449,941
7. Factor to reduce Reimbursement due to low Occupancy as defined in Section 51537 (See page 8, line 13) .9877
8. Maximum Allowable Reimbursement Level as defined in Section 51537 (line 6 X line 7) $6,370,607
9. Maximum Rate Per Discharge as defined in Section 51537 (line 6 / line 2 X line 7) $3,903.95
10. Peer Group 60th Percentile All-Inclusive Rate Per Discharge for Large Complex Hospital Peer Group using a January 1, 1982 to December 31, 1982 fiscal year $3,572.18
11. Peer Group 60th Percentile All-Inclusive Rate Per Discharge Aligned to match your fiscal year of July 1, 1982 to June 30, 1983 $3,722.64
12. Medi-Cal Reimbursement Limitation resulting from Peer Group Limit Formula as Defined in Section 51539 (Line 2 X line 11) $6,071,626
13. Maximum Allowable Reimbursement Limit as Defined in Section 51539 (Lesser of line 8 and line 12) $6,071,626
14. Lessor of Cost or Charges (Lesser of lines 4 and 5) $6,981,918
15. Reduction Due to Section 51536 (line 14 - line 6) $531,977
16. Reduction Due to Section 51537 (line 6 - line 8) $79,334
17. Reduction Due to Section 51539 (line 8 - line 13) $298,981
18. Total Reduction (Sum of lines 15, 16 and 17) $910,292

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