

Combining Text and Graphics with ODS Layout and ODS Region

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Virginia SAS Users Group

HMC



- Wellpoint subsidiary
- Experienced provider of total health solutions
- Care management
 - Chronic condition support
 - Lifestyle management
 - Complex condition care
 - Prevention
- Goal - improve the health and financial outcomes of clients

Abstract



- Through the Output Delivery System (ODS), SAS® Software provides a means for creating an attractive, concise, and functional report without post-processing using other software products.
- Because ODS is an object-oriented (OO) technology, it provides the ability to move beyond template descriptions to complete output Layout. This paper presents a combined text and graphics report based on an exploratory analysis of behavioral health cost risk using ODS Layout and ODS REGION and writing to the PDF destination.
- In addition, this paper provides information on additional options that can be used with both ODS Layout and the PDF destination to assist users in the creation of customized presentation and production reports.

ODS



- Output Delivery System
- Components
 - Procedure output
 - Table definition
 - Style definition
 - Destination
 - Display
 - Dataset
 - Inline formatting available

ODS Layout



- Arrangement of text, tables and graphs where you want them
- Experimental in SAS 9.0 and 9.1
- Combination of:
 - ODS statements,
 - Global statements, and
 - Procedures

My First ODS Layout



Incentive Payment Plan of Virginia Quality -In-Sights Hospital Incentive Program Scorecard for Hospital A Quarterly Report: January 2004

Section		Points Possible	% Points Current Quarter	% Points Year to Date
I. Patient Safety	1. Implementation of Patient Safety Programs	15	67%	67%
	a.: Documented compliance in the six JCAHO patient safety goals	10	50%	50%
	b.: Two patient safety indicators	5	100%	100%
	2. Implementation of Patient Safety Initiatives	15	33%	33%
	a.: Computerized Physician Order Entry (CPOE) system	5	0.0%	0.0%
	b.: ICU staffing standards	5	0.0%	0.0%
	c.: Automated Dispensing Devices (ADD)	5	100%	100%
II. Health Outcome	1.: Participation of American College of Cardiology (ACC)'s National Cardiovascular Data Registry (NCDR)	5	0.0%	0.0%
	2.: Cardiac Cath and Percutaneous Coronary Intervention (PCI) indicators	5	0.0%	0.0%
	3. Two JCAHO core measures	30	50%	50%
	a.: First core measures (AMI or HF)	20	50%	50%
	b.: Second core measures (HF, PR, or CAP)	10	0.0%	0.0%
	4.: Coronary Artery Bypass Graft (CABG) indicators	5	0.0%	0.0%
III. Patient Satisfaction	Patient Satisfaction Survey Results	25	100%	100%

1st Layout Code



```
options nodate nonumber nocenter orientation=landscape;  
ods pdf file="a:\qhip.pdf" color=yes style=fancyprinter;
```

```
ods layout start width=11in height=8in ;  
ods region x=0 y=0 width=10in height=5in;  
ods escapechar="^";  
ods pdf text="^S={preimage='a:\qhip.jpg^scaleheight'}"; run;
```

```
ods region x=0 y=1.8in width=10in height=6in;  
proc report data=scorecard nowd style=[font_face='Helvetica'];  
  column sect section_item points_possible total ytd;  
  define sect / group "Section";  
  define section_item / group " " flow order=data;  
  define points_possible / "Points Possible" format=3.;  
  define total / "% Points Current Quarter" format=percent6.1;  
  define ytd / "% Points Year to Date" format=percent6.1;  
run;  
ods layout end;  
ods _all_ close;
```

Final product example 1



Exploration of Behavioral Health Cost Risk

Introduction

As a part of this study, eight impactable behavioral health conditions were identified and defined: alcohol abuse, anxiety disorder, bipolar, depression, eating disorder, other substance abuse, personality disorder, and schizophrenia. These were applied to a test population of about 100,000 members for prevalence and cost of these conditions. Several exploratory analyses were performed.

Analysis

The first exploratory procedure uses kernel density estimation (kde) to provide a smoothed histogram to show behavioral health dollar distribution. The following graphic illustrates the impact of behavioral health on total care dollars and includes both inpatient and outpatient visits for members identified as at risk for future behavioral health.

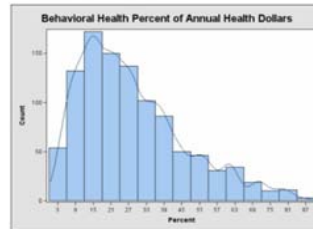


Fig 1. Cost Impact of Behavioral Health.

In this second exploratory procedure, behavioral health admissions are plotted for detection of seasonality for a single client. Data is bi-monthly. The graph shows an increase in admissions over time with an upswing each year either at the beginning of the year or just after. The display suggests a need for further investigative analysis to definitively answer the question of seasonality.



Fig 2. Behavioral Health Admissions Seasonality.

It is important to not only know the behavioral health costs, but how much impact these costs have on total costs, especially in inpatient and emergency department settings. Behavioral health conditions add to inpatient costs regardless of whether the admission is for a behavioral health condition or whether the behavioral health condition is comorbid. This graphic illustrates how those conditions drive overall cost. While the graphic shows a decline in behavioral health cost proportion, further analysis would be needed to understand what is driving this change.

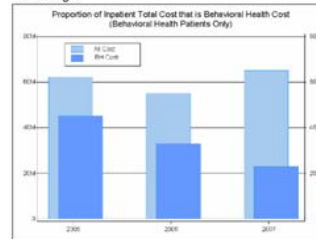


Fig 3. Proportion of Total Cost.

As part of the cost question, it is also important to know whether there are differences in geographic areas for those referred to behavioral health programs. The graphic below shows that the northeast and northwest are more likely to receive behavioral health care.

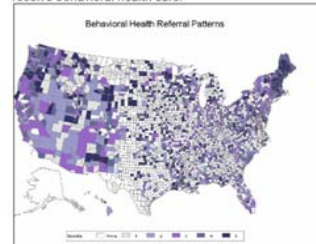


Fig 4. Referrals.

Conclusion

Visual depictions of data relationships assist analysts and other users in better understanding of data through the quick identification of true associations, anomalies, and areas for further study. This information provides a foundation for further analyses to identify additional interactions and critical factors that enhance the behavior health risk modeling process.



ODS Layout modes



- ABSOLUTE Layout:
 - Cover pages
 - Static data or reports
 - Pre-printed forms
 - Single page only
- GRIDDED Layout:
 - Regions that can be dynamically sized
 - Dynamic content
 - Alignment
 - Multiple page documents

ODS Layout syntax



ODS Layout START options;

ODS REGION options;

SAS Code. . ;

ODS Layout START options;

ODS REGION options;

SAS Code. . ;

ODS Layout END;

ODS Region



- Statement inside ODS Layout block
- Defines Layout size and placement parameters
- Used in gridded and absolute Layout

ODS Layout options



- Absolute Layout Only

- WIDTH= Width of overall LAYOUT.
- HEIGHT= Height of overall LAYOUT.

- Gridded Layout Only

- COLUMN_GUTTER= Space between columns.
- ROW_GUTTER= Space between rows.

ODS Region options



- Both Absolute and Gridded Layout
 - WIDTH= Width of REGION.
 - HEIGHT = Height of REGION.
- Absolute Layout Only
 - X= Relative to upper left corner of Layout space.
 - Y= Relative to upper left corner of Layout space.
- Gridded Layout only
 - COLUMN= Column where REGION should be placed.
 - ROW= Row where REGION should be placed.
 - COLUMN_SPAN= Number of columns REGION should span.
 - ROW_SPAN= Number of rows REGION should span.

New ODS Layout options for SAS 9.2



- ENTIREPAGE – LAYOUT should occupy entire page.
- CHAIN – Output that overflows REGION should flow into next designated REGION.
- CONTINUE – Duplicate LAYOUT and continue overflow contents into same REGION space in the new duplicated LAYOUT.

ODS Layout example 1



- One page project summary
- Two-column report
- Mixed graphics and text
 - Free-form text
 - Images
- Banner header
- Company logo

Options used in example



- ODS escapechar – Sets separator character to introduce new syntax and separate options.
- PREIMAGE – Add image before other elements.
- POSTIMAGE – Add image after other elements.
- FONT_FACE – Set font to Arial.
- FONT_SIZE – Set font size:
 - 12 for title;
 - 9 for main text;
 - 7.5 for figure captions.
- FONT_WEIGHT – Set bold on for titles and figure captions.
- JUST – Set justification (center for title – otherwise left).
- Color – Sets colors.

Other Options



- For this example, many regions included text and graphics in the same region.
- Other options that could have been used:
 - Creating new Region for each section.
 - Import text from file.
 - Create graphics output within ODS Layout.

Scaling images in Layout



- NOSCALE – The default.
- SCALETOFIT – Make image conform to space available.
- SCALEHEIGHT – Scale the height to conform exactly to the space available and scale the width as necessary to match the height without distorting the image.
- SCALEWIDTH – Scale the width to conform exactly to the space available and scale the height as necessary to match the width without distorting the image.
- SCALE – Scale the image to fit into the available space such that it doesn't distort the image.
- TILE – Repeat the image (at its "regular" size)/fill up the available space.
- X= Supply the width to use for the image scaling.
- Y= Supply the height to use for the image scaling.

SAS code embedded in Region



```
ODS REGION height=3 in width=3 in x=4.1 in  
y=6 in;  
proc gmap map=maps.uscounty  
data=bhdatamap;  
id state county;  
choro pctbhgrp / legend=legend outline=gray;  
run;  
quit;
```

SAS code



```
ODS PDF file="r:\SESUG 2008\SESUG_bh.PDF" color=yes style=fancyprinter  
STARTPAGE=NEVER;  
ODS escapechar="^";
```

```
ODS Layout start width=8 in height=10 in;
```

```
ODS REGION x=10 y=0 width=8 in height=2 in;  
ODS PDF text="^S={preimage='R:\SESUG 2008\SESUG 2008.bmp^scaleheight'}";
```

```
ODS REGION x=90 pct y=10.3 in width=1 in height=1 in;  
ODS PDF text="^S={postimage='R:\SESUG 2008\hmc.bmp^scalewidth'}";
```

```
ODS REGION x=10 y=1.3 in width=8 in height=1 in;  
ODS PDF text= "^S={just=c font_weight=bold font_size=12pt  
font_face=Arial}Exploration of Behavioral Health Cost Risk";
```

SAS code (continued)



```
ODS REGION x=0.3 in y=1.6 in width=3.5 in height=3.5 in;
ODS PDF text="^S={just=l font_size=9pt font_weight=bold font_face=Arial}Introduction";
ODS PDF text="^S={just=l font_size=9pt font_face=Arial}As a part of this study, eight
  impactable behavioral health conditions were . . .";
ODS PDF text=" ";
ODS PDF text=" ^S={just=l font_size=9pt font_weight=bold font_face=Arial}Analysis";
ODS PDF text="^S={just=l font_size=9pt font_face=Arial}The first exploratory procedure
  uses kernel density estimation (kde) to . . .";

ODS REGION x=0.3 in y=3.95 in width=3.5 in height=8.1 in;
ODS PDF text="^S={preimage='R:\SESUG 2008\graph1.bmp^scalewidth'}";
ODS PDF text=" ^S={just=l font_size=7.5pt font_weight=bold font_face=Arial}Fig 1. Cost
  Impact of Behavioral Health.";
ODS PDF text=" ";
ODS PDF text=" ^S={just=l font_size=9pt font_face=Arial}In this second exploratory
  procedure, behavioral health admissions are plotted . . .";
ODS PDF text="^S={preimage='R:\SESUG 2008\graph2.bmp^scalewidth'}";
ODS PDF text=" ^S={just=l font_size=7.5pt font_weight=bold font_face=Arial}Fig 2.
  Behavioral Health Admissions Seasonality.";
```

SAS code (continued)



```
ODS REGION x=4.1 in y=1.6 in width=3.5 in height=8.7 in;
ODS PDF text= "^S={just=l font_size=9pt font_face=Arial}It is important to not only know
the behavioral health costs, but how much impact . . .";
ODS PDF text="^S={preimage='R:\SESUG 2008\graph3.bmp^scalewidth'}";
ODS PDF text= "^S={just=l font_size=7.5pt font_weight=bold font_face=Arial}Fig 3.
Proportion of Total Cost.";
ODS PDF text=" ";
ODS PDF text= "^S={just=l font_size=9pt font_face=Arial}As part of the cost question, it is
also important to know whether there . . .";
ODS PDF text="^S={preimage='R:\SESUG 2008\graph4.bmp^scalewidth'}";
ODS PDF text= "^S={just=l font_size=7.5pt font_weight=bold font_face=Arial}Fig 4.
Referrals.";
ODS PDF text=" ";
ODS PDF text= "^S={just=l font_size=9pt font_weight=bold font_face=Arial}Conclusion";
ODS PDF text= "^S={just=l font_size=9pt font_face=Arial}Visual depictions of data
relationships assist analysts and other users in better . . .";
run;
ODS Layout end;
ODS _all_ close;
```

Code changes needed for SAS 9.2



- “^Scalewidth” is no longer supported
- Replace with “?width=100pct”
- Example:
 - SAS 9.1 code:

```
ODS PDF text="^S={preimage='R:\SESUG 2008\graph4.bmp^scalewidth'}";
```

- SAS 9.2 code:

```
ODS PDF text="^S={preimage='R:\SESUG 2008\graph4.bmp?width=100pct'}";
```

- Does NOT produce identical results

ODS PDF



- Display output exactly as intended
- Not easily modifiable by recipient
- Formatting options
 - Inline formatting
 - Style attributes
- Can combine text, image, audio and video



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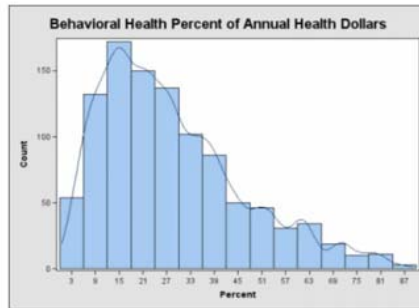


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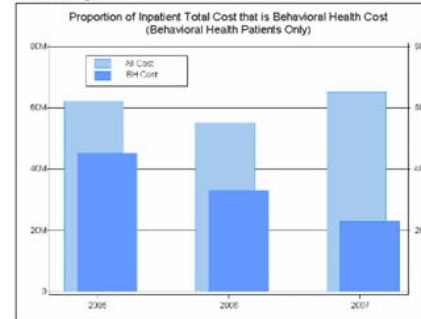


Fig 3. Proportion of Total Cost.

As part of the cost question, it is also important to know whether there are differences in geographic areas for those referred to behavioral health programs. The graphic below shows that the northeast and northwest are more likely to receive behavioral health care.

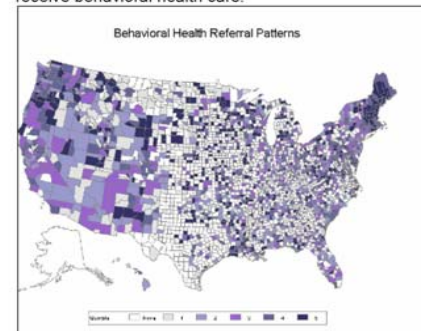


Fig 4. Referrals.

Conclusion

Visual depictions of data relationships assist analysts and other users in better understanding of data through the quick identification of true associations, anomalies, and areas for further study. This information provides a foundation for further analyses to identify additional interactions and critical factors that enhance the behavior health risk modeling process.

ODS Layout example 2



- One page report summary
- Single column report
- Mixed table, graphics and text
 - Free-form text
 - Proc Report output
- Banner header

Final Product Example 2



Health Care Management Annual Outcomes

Introduction

This report reflects activity for cases under program management during the period 1/1/2008 through 12/31/2008. Participants identified as being in the top future risk percentile and enrolled in the program are assigned to a primary nurse. Once a member is identified and has agreed to participate in ComplexCare, their Nurse Care Manager completes a telephonic assessment to evaluate the member's health status, acuity stratification, and identify care needs. Areas assessed include medication, functional ability, home environment/safety, care access, lifestyle, social/cultural factors, legal/financial factors, and medical history. Nurse/Managers with < 10 patients for the time period were excluded from individual measure calculation but included in the site total.

Client Employer Group	Nurse ID	N	Baseline Compliance	Current Compliance		
1	1	189	47%	66%	★	
	2	12	58%	100%	★	
	3	341	49%	89%	★	
	4	150	50%	67%	★	
	5	240	38%	80%	★	
	6	288	49%	85%	★	
	7	246	37%	75%	★	
	8	158	51%	58%	★	
		1,634	46%	77%	★	
2	12	541	84%	94%	★	
	13	85	98%	91%	★	
	14	819	78%	77%	★	
	15	732	83%	81%	★	
	16	765	82%	82%	★	
	17	257	7.0%	41%	★	
	18	768	82%	96%	★	
	19	693	86%	88%	★	
	20	571	87%	91%	★	
	21	314	96%	96%	★	
			5,553	78%	85%	★
			7,187	70%	83%	★

Please Note

The health quality of program participants improves as adherence to recommended self care practices, testing rates and test results improve. The following sections show results for claims based clinical outcomes for each managed condition. The population includes members in the program with healthcare eligibility throughout the review period for all risk levels. Claims based clinical outcomes typically improve with care management.

ODS Layout Code



```
title;
options nodate nonumber nocenter orientation=portrait spool;
ods pdf file="r:\bokerson\sesug 2009\abcbs1v.pdf" color=yes style=fancyprinter;
ods pdf startpage=never;

ods layout start width=8 in height=10 in ;
ods region x=20 y=0 width=8 in height=10 in;
ods escapechar="^";
ods pdf text="^S={just=c preimage='R:\bokerson\sesug
2009\sesug2009.bmp^scalewidth'}";
ods pdf text=" ";

ods region x=.5 in y=.8 in width=7 in height=10 in;
ods pdf text= "^S={just=c font_weight=bold font_size=12pt font_face=Arial}Health
Care Management Annual Outcomes";
ods pdf text= "^S={just=l font_size=9pt font_weight=bold
font_face=Arial}Introduction";
```

Code continued



ods pdf text="^S={just=l font_size=8pt font_face=Arial}This report reflects activity for cases under program management during the period 1/1/2008 through 12/31/2008. Participants identified as being in the top future risk percentile and enrolled in the program are assigned to a primary nurse. Once a member is identified and has agreed to participate in ComplexCare, their Nurse Care Manager completes a telephonic assessment to evaluate the member's health status, acuity stratification, and identify care needs. Areas assessed include medication, functional ability, home environment/safety, care access, lifestyle, social/cultural factors, legal/financial factors, and medical history.

Nurse/Managers with < 10 patients for the time period were excluded from individual measure calculation but included in the site total.";

Code continued



```
ods pdf text=" ";  
ods pdf text="^S={postimage='R:\BOkerson\sesug 2009\client_ann.bmp'}";  
ods pdf text=" ";
```

```
ods pdf text= "^S={just=l font_size=9pt font_weight=bold  
font_face=Arial}Conclusion";
```

```
ods pdf text= "^S={just=l font_size=8pt font_face=Arial} The health quality of  
program participants improves as adherence to recommended self care practices,  
testing rates and test results improve. The following sections show results for claims  
based clinical outcomes for each managed condition. The population includes  
members in the program with healthcare eligibility throughout the review period for  
all risk levels. Claims based clinical outcomes typically improve with care  
management.";
```

```
run;  
ods layout end;  
ods _all_ close;
```

Health Care Management Annual Outcomes

Introduction

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Client Employer Group	Nurse ID	N	Baseline Compliance	Current Compliance		
1	1	189	47%	66%	▲	
	2	12	58%	100%	▲	
	3	341	49%	89%	▲	
	4	150	50%	67%	▲	
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	14	819	78%	77%	▼	
	15	732	63%	81%	▲	
	16	765	82%	82%	▼	
	17	257	7.0%	41%	▲	
	18	768	82%	98%	▲	
	19	693	86%	88%	▲	
	20	571	87%	91%	▲	
	21	314	96%	96%		
			5,553	78%	85%	▲
			7,187	70%	83%	▲

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The health quality of program participants improves as adherence to recommended self care practices, testing rates and test results improve. The following sections show results for claims based clinical outcomes for each managed condition. The population includes members in the program with healthcare eligibility throughout the review period for all risk levels. Claims based clinical outcomes typically improve with care management.

Conclusion



- ODS Layout provides the ability to easily mix text, graphics, and tables on the same page.
- It provides the ability to run SAS code within the Layout code or to use previously created output.
- A large number of formatting options are available to enhance the ODS output, especially for PDF.
- This functionality allows creation of production quality reports without post-processing.
- This is especially valuable in the service industry where timely creation of reports is a major part of securing and retaining business.

Other methods of creating single page reports



- GREPLAY
 - Need SAS/GRAPH
 - Not great for text wrapping
 - Positioning can be tedious
- ODS STARTPAGE=NEVER option
 - Eliminates new page for new output
 - Little positioning control

References



More information on ODS Layout can be found at <http://support.sas.com/rnd/base/early-access/index.html>. Other references used in this paper are:

Chen, Ling Y. "Using v9 ODS Layout to Simplify Generation of Individual Case Summaries", PSUG Proceedings, 2005.

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Contact Info



Your comments and questions are valued and encouraged. For more information contact:

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Fax: 804-662-5364
Email: bokerson@choosehmc.com*