3576-2019

Visualizing the Perfect Outcome: Using SAS® Visual Analytics to Reveal Health Care Metrics

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ABSTRACT

Health-care professionals who successfully turn data assets into data insights can quickly realize benefits such as reduced costs, healthier patients, and higher satisfaction rates. Some insights are discovered by comparing your data to national benchmarks while others are found dissecting your data using a different viewpoint or approach. Using SAS® Visual Analytics with various publicly available health-care data resources we demonstrate effective techniques for trending health plan quality performance metrics, highlighting geographical variations in care, and assisting the users in making inferences about their data. Visualizing data enables decision makers and data analysts to uncover new associations, engage users, and communicate their messages successfully.

INTRODUCTION

This paper demonstrates useful techniques for visualizing healthcare data and enhancing SAS Visual Analytics reports and dashboards. The motivation for the paper originated from experiences learning the Visual Analytics graphical interface as experienced SAS programmers.

The paper focuses on using report objects and data features in the Report Designer and Report Viewer modules and less on data visualizations techniques, or what makes an effective dashboard. Examples show screenshots of versions SAS Visual Analytics 7.4 and Visual Statistics (released April 2017) to help users with older versions.

The term "user" throughout this paper refers to a report developer and "viewer" refers to those viewing and interacting with reports. Visual Analytics users of all experience levels will find this paper worthwhile; however, it's intended for newer users who are familiar with the application basics. Those more experienced users may find it helpful for learning and discovering newer features. This paper is also intended for those in the health care industry whom are looking for ways to find data associations and demonstrate value of interventions and quality performance.

GETTING STARTED

With any new tool users are often faced with learning while applying. Or to use a popular Silicon Valley idiom, "We're kind of flying the plane while we're building it."

To help with this harrowing process here are recommended learning paths; somewhat of a quick start guide.

- Read the SAS Visual Analytics documentation on the SAS Support site

- Visit and participate in the SAS Support Visual Analytics Communities

- Watch Free Tutorials on the SAS Support site

- Attend Live Web Classes and Ask the Expert classes

- Read SAS Visual Analytics books and blogs, such as BI Notes

In addition to tapping into the above resources you can work with experts to elevate your skills. Working with an expert for even a few hours can elevate your skillset and allow you to gain more value from the application.

TRENDING QUALITY PERFORMANCE METRICS

In this section we show how health plans can compare their data to other plans and national benchmarks.

The key to showing relative performance is choosing the proper comparator and making it easy to see the difference between the selected group and other groups. Comparators can be a national benchmark or a health similar in characteristics (e.g., size, geography, plan type, etc.). A health plan's own performance can act as a comparator value too as if often used in pre-post analyses.

Figure 1 shows medication adherence rates over 3 years including a national benchmark represented as dashed horizontal lines.

Figure 2 shows forecasting adherence rates 4 months out with a 95% confidence interval.

Figure 3 shows the use of a gauge to show performance relative to a benchmark.

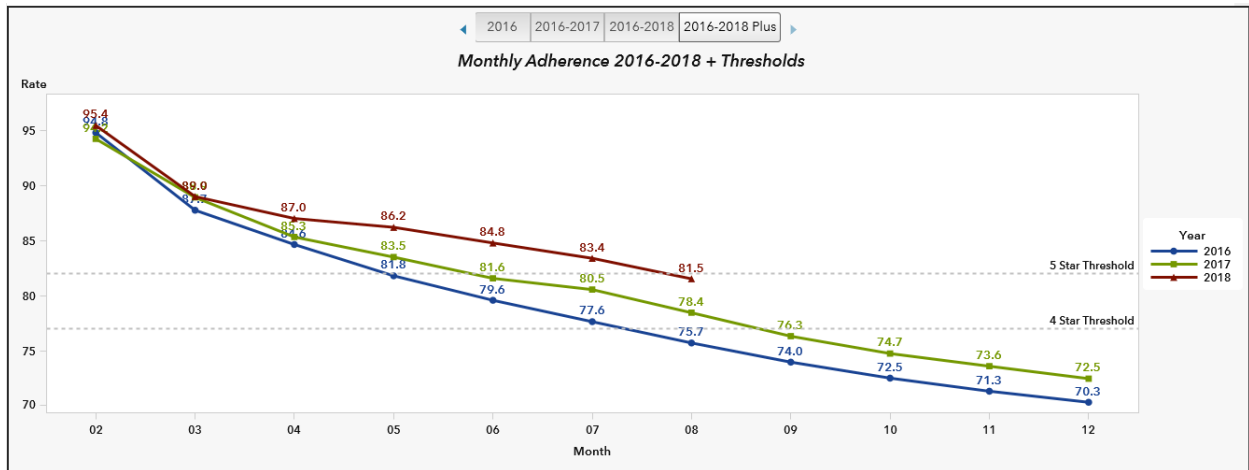Figure 4 uses a scatterplot to show relative performance relative.
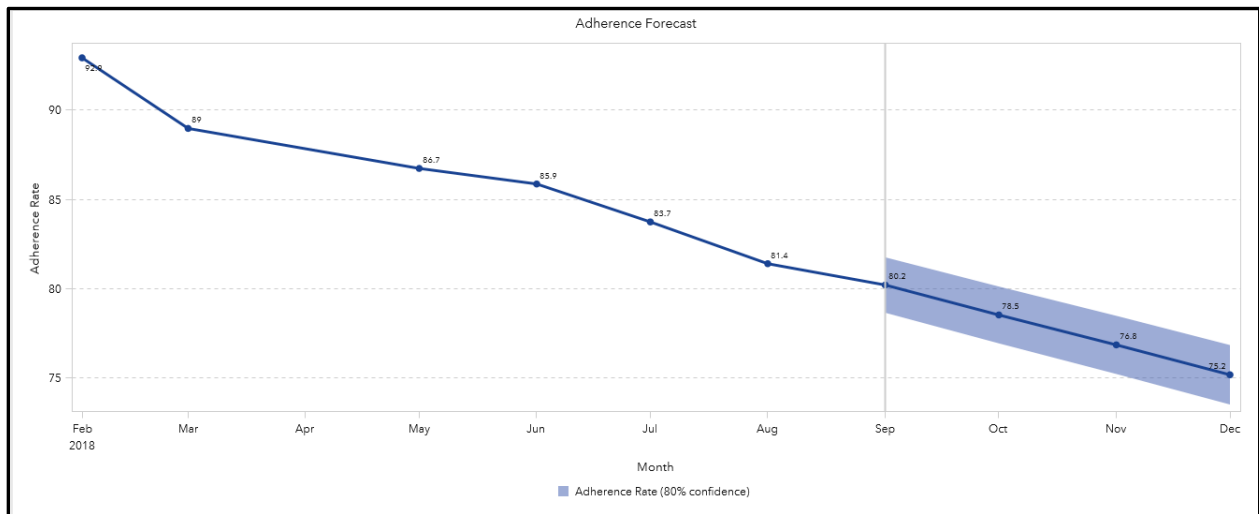

Figure 1. Trending Medication Adherence

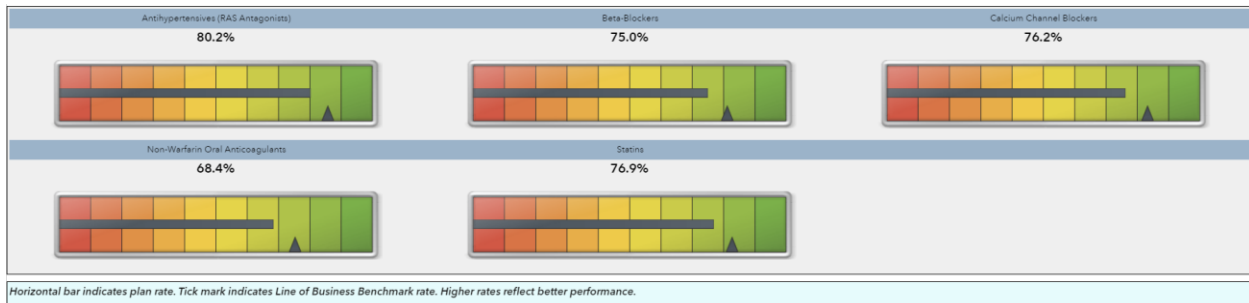**Figure 2. Forecasting Medication Adherence**

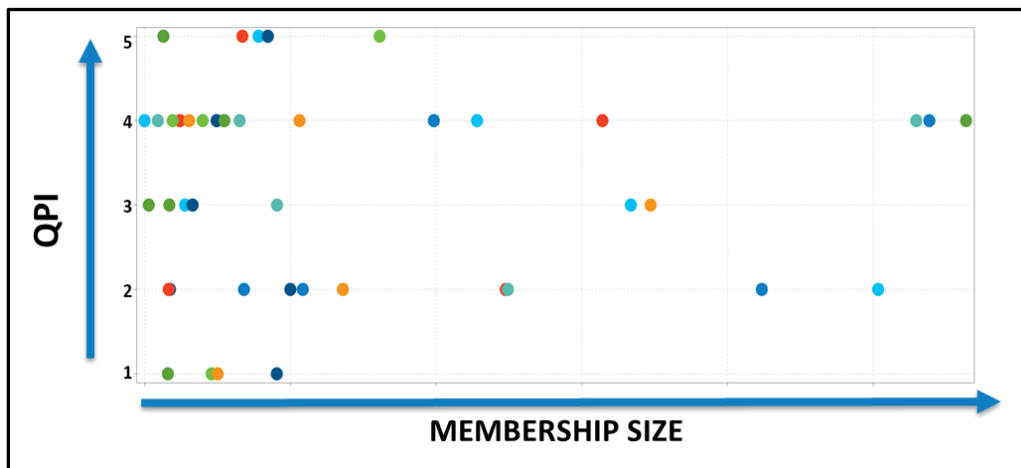**Figure 3. Relative Performance with a Gauge Diagrams**

Figure 4. Relative Performance with a Scatterplot

UNCOVERING ASSOCIATIONS AND MAKING INFERENCES

This section describes techniques to uncover trends and associations within your data.

Sankey diagrams, or what is more recently called path analysis, shows the flow of observations across different paths where each path is proportional to quantity of observations. An often-used example is one from website traffic showing the number of people entering a site and moving to subsequent pages. Applying this to medication adherence where patients are adherent and then an become non-adherent one can take a deeper dive into plan-level adherence rates by breaking patients into cohorts and following them over time. One can also track patient behavior pre and post intervention to understand program effects and identify subpopulations where program worked better or worse.

This is useful to see patients move between adherence levels. In the diagram below patients are in 3 groups: poor, suboptimal and optimal based on continuous adherence rates and monitored over 3 calendar years.
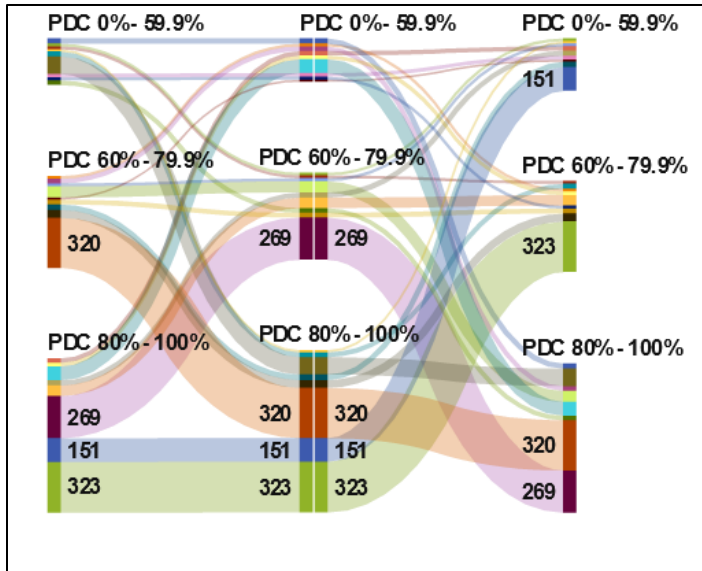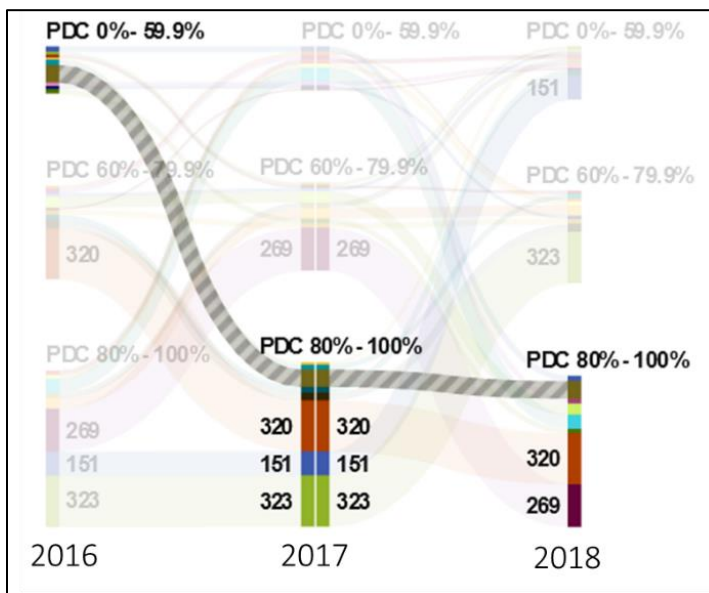
Figure 5. Tracking Member Adherence

Figure 6. Tracking Member Adherence: Poor to Optimal

Required data for generating a Sankey diagram are,
1. Event: It requires the variable to be a category. These values are represented as nodes in Sankey diagram.
2. Sequence Order: A date-time or a measure variable.
3. Transaction Identifier: A numeric or category variable.

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- SAS Support. 2019. "SAS Products-SAS® Visual Analytics". Accessed February 28, 2019. http://support.sas.com/software/products/visual-analytics/index.html#s1=1

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  http://go.documentation.sas.com/?cdcId=vacdc&cdcVersion=8.1&docsetId=vaov&docsetTarget=home.htm&locale=en

- SAS Support. Travis Murphy and Falko Schulz. Supercharge Your Dashboards with Infographic Concepts Using SAS® Visual Analytics. SAS Institute Inc. Available at
  https://www.sas.com/content/dam/SAS/support/en/sas-global-forum-proceedings/2018/2069-2018.pdf

RECOMMENDED READING

- *Aanderud, T. Collum, R. Kumpfmiller, R. 2017. Introduction to SAS Visual Analytics. SAS Institute Inc.*

- *SAS Visual Analytics User Documentation*

CONTACT INFORMATION

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

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