

## SAS® vs Tableau: Creating Adverse Event/ Concomitant Medication Time Line Plot

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### ABSTRACT

The Adverse Event (AE) Concomitant Medication (CM) time line plot displays the events and medications for subject by severity and time. In this paper, we use data visualization software Tableau Desktop to build the graph using drag-and-drop steps to analyze the time-based data. The SGPLOT procedure HIGHLOW plot from SAS9.4 also makes it easy to generate the combined AE and CM graph. This paper compares the two different approaches.

### INTRODUCTION

In clinical studies, by reconciling AE and CM graph on a combined time line, we can clearly view each AE event and the CMs related to the event. This time line plot is also referred to as swimmer's plot. As part of the CM data collection, AE sequence numbers are recorded if the CM is prescribed for an AE. By matching the AE sequence number, we combine the two data sources into one dataset AE\_CM where each AE is followed by related CMs. The events are then sorted by System Organ Class. Proc SGPLOT HIGHLOW statement can be used to create this graph in SAS. Gantt bar can be used to create this graph in Tableau.

### SAS GRAPH

We use the HIGHLOW statement from the SGPLOT procedure to create the time line plot:

```
proc sgplot data=ae_cm;
...
  highlow y=term low=start_day high=end_day
    / type=bar group=color barwidth=1
      lowlabel=term lineattrs = (color=black pattern=solid)
      highcap=aehicap;
...
run;
```

Defining the start day and stop day of the event/medication as the low and high value of each bar, the bars are color coded by AE toxicity grade, with one color reserved for CM. Multiple occurrences of the same adverse event term are displayed in one bar, as shown in Figure 1. The subject experienced AE 4 seven times, out of which one occurrence on day 62 was Moderate, the other six times the event was Mild. Ongoing AE/CM is denoted by a right arrow to indicate that the event or medication does not have an end date.

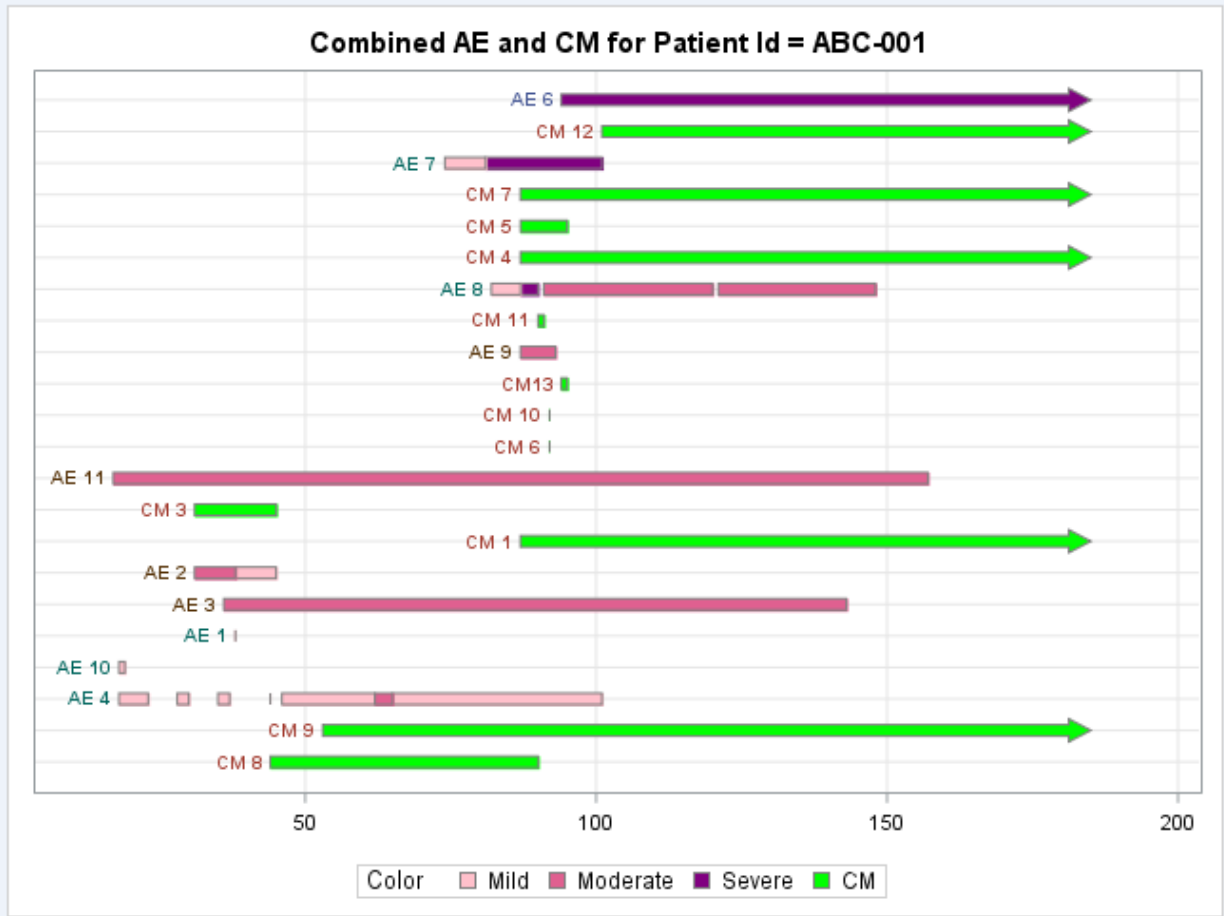


Figure 1. AE CM Plot Generated in SAS

## TABLEAU GRAPH

We use the Gantt Bar in Tableau to create AE CM graph in Figure 2, and organize the bars by the adverse event's system organ class.

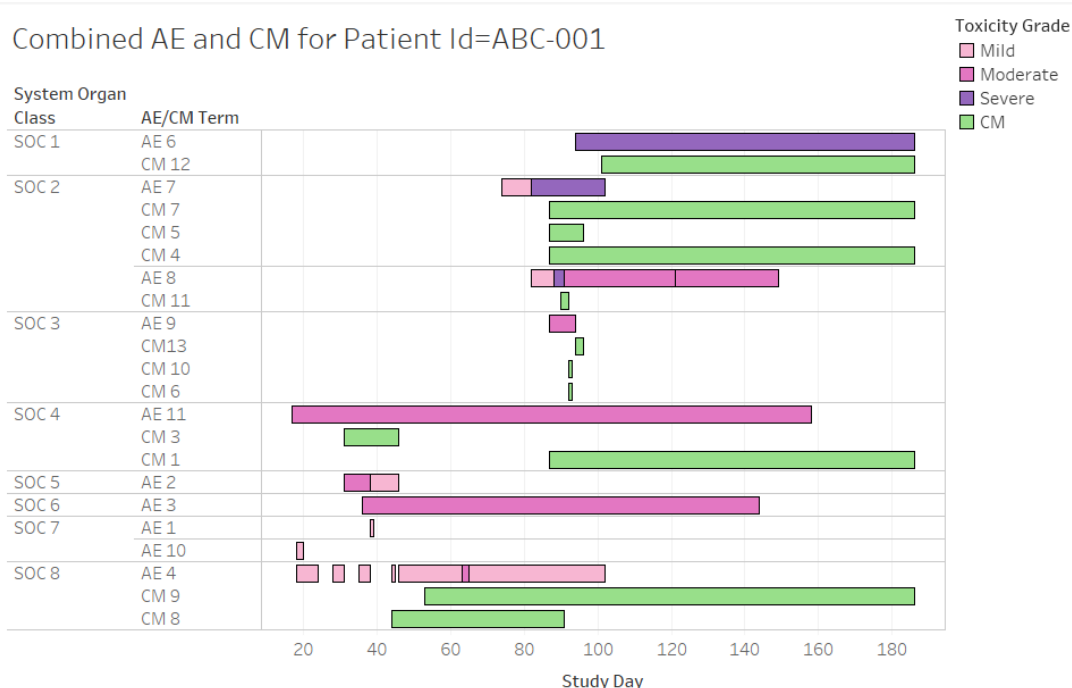


Figure 2. AE CM Plot Generated in Tableau

Additional information is included in the tooltip which pops up automatically when hovering over the graph, as shown in Figure 3 when we mouse over the bar for AE7.

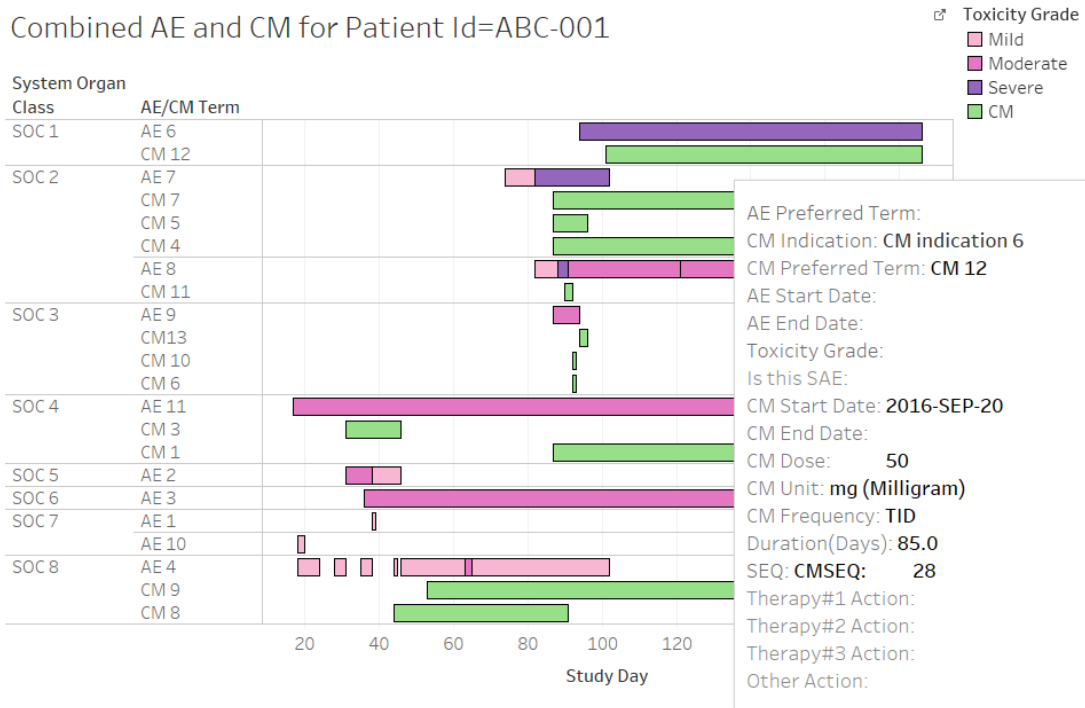


Figure 3. Tooltip Displays Additional Information

To create the graph in Tableau Desktop, we first establish a connection to AE\_CM SAS dataset, then drag and drop the variables to place them in Columns or Rows based on data aggregation, as shown in Figure 4.

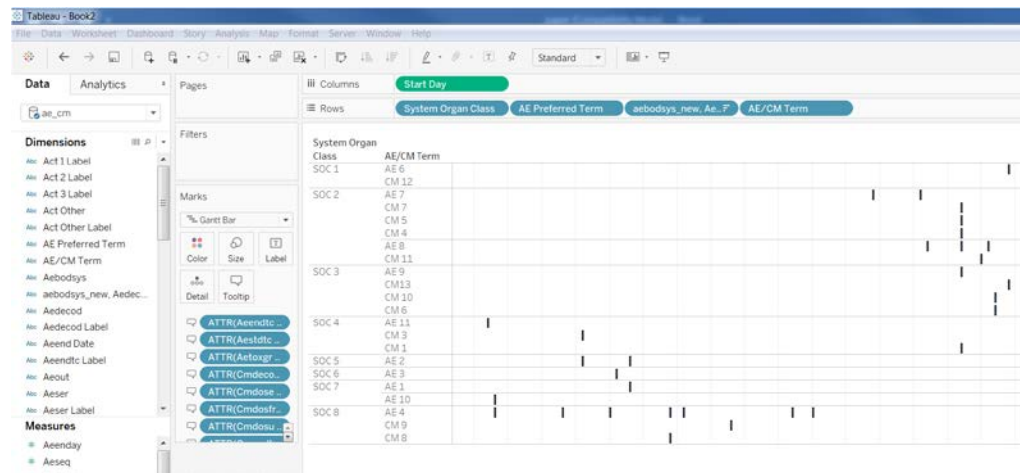


Figure 4. Building the graph in Tableau – Row and Column variables

Next, drag and drop the duration of the event/medication to the Size Mark in Figure 5, and the severity variable to the Color Mark as in Figure 6, and the desired tooltip information to the Tooltip Mark.

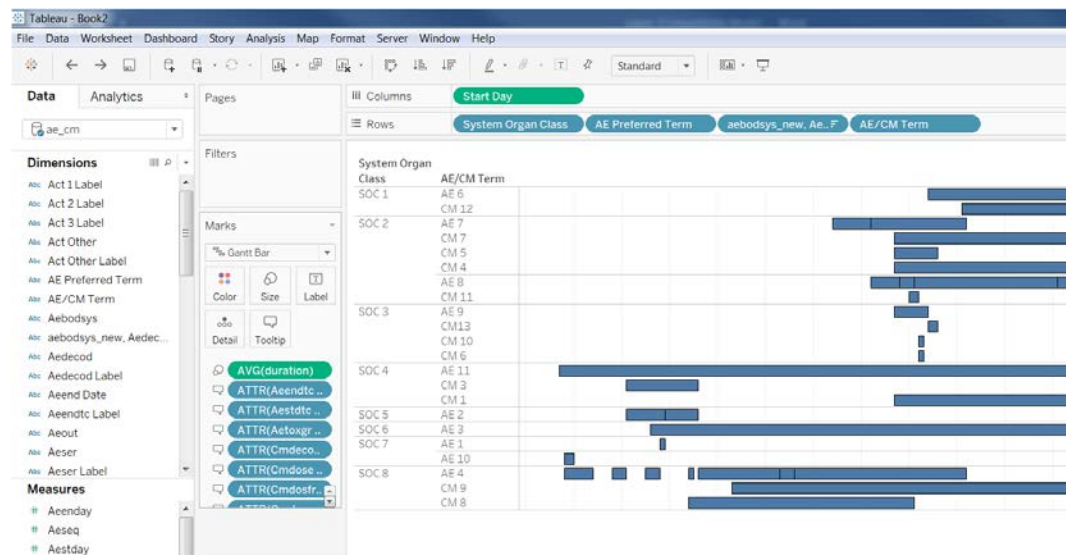
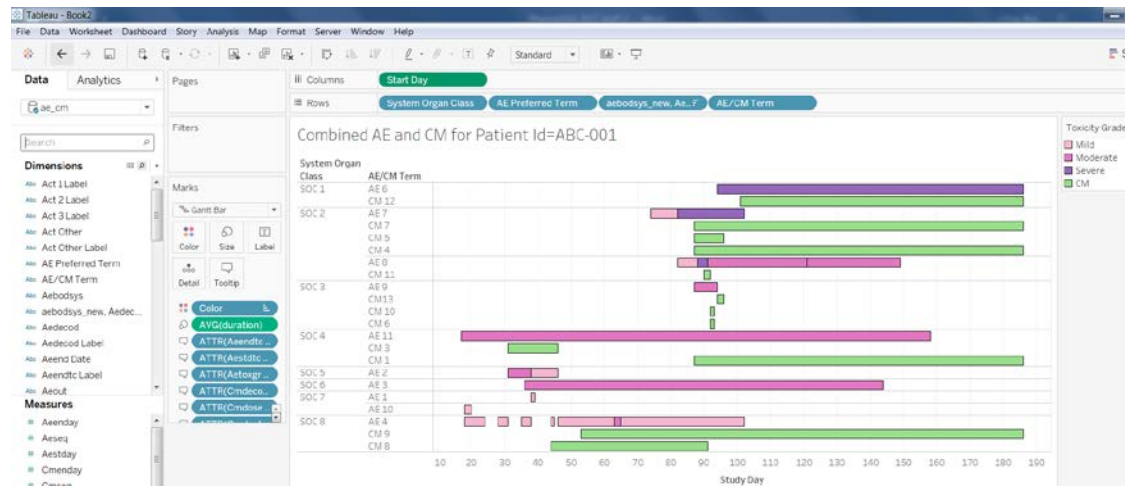


Figure 5. Building the graph in Tableau – Duration of the event



**Figure 6. Building the graph in Tableau – Color the duration by toxicity grade/CM**

Furthermore, we incorporate the AE CM graph into our patient profile dashboard in Tableau where the user can select a subject and have a consolidated view of the subject coming from various data sources, as shown in Figure 7. Besides the AE CM graph, this dashboard also provides information on lab results, study treatment and physical exam.



**Figure 7. Patient Profile Dashboard including the AE CM Graph**

## CONCLUSION

SAS advantages compared to Tableau

- Line up additional contents with AXISTABLE statement
- Bars with different shading patterns
- Bars with arrows using hicap and lowcap
- Use dattrmap for discrete attribute mapping

Tableau advantages compared to SAS

- Easy to use GUI features
- Dashboards can be built and shared with automatic refresh
- Tooltip moves information off the main graph while keeping the additional details within reach

SAS and Tableau are both effective in generating the AE/CM timeline plot. It will be good to consolidate the features.

## ACKNOWLEDGMENTS

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## CONTACT INFORMATION

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