Background:
In this diabetes study (by Dr. Monifa Vaughn-Cooke), each patient was instructed to test their blood glucose a prescribed number of times per day. For this report, we define “percent adherence to testing” as the number of actual tests each day divided by the number of intended tests each day.

Higher educated people do not follow doctor’s orders!

Each trend line represents the daily percent adherence to testing levels averaged over each group by education level. The bar chart is averaged over all 60 days of the study. The
least formally educated in the study most strongly adhered to their glucose testing schedule. Those with ‘some college’ adhered the least. Interestingly enough, graduate students were almost as bad as the ‘some college’ group.

Healthcare providers believe in patients more than the patients do themselves.

Doctors are okay at predicting patient adherence, but slightly more optimistic on average. Each bar of the bar chart is colored by the number of patients in that bin - the patient count is also visualized in the bar chart below. (Please note: the trend line minimizes mean square error by counting each bin as one data point rather than minimizing mean square error by counting each patient as one data point. More details under “Critique of Spotfire”.)
However, the trend still holds (albeit less strongly) counting each patient as one data point.

In this chart, each bar is one patient. Each color is a distinct level of provider predicted adherence. (“Identifier” refers to the patient’s unique identification code.) This chart is provided mainly to validate the previous claim: there truly is a positive correlation between provider predicted adherence and actual adherence.
On a side note, we also found that over time, some patients just never learn to fully adhere to checking their blood-glucose levels the prescribed number of times each day. Our expectation was that as a patient learns to cope with their diabetes over time, their lifestyle changes and their average daily adherence would increase (ideally reaching 100%). By grouping patients based on their average daily adherence and then calculating the average diabetes duration (number of years the patient has been diagnosed) of the group, an interesting observation can be seen. The group of patients that have been living with their diagnosis for an average of ~22 years only achieve an average adherence rate of 80-90%, while patients that have been diagnosed for an average of 15 years have, on average, a better adherence rate between 90-100%.
Erectile dysfunction affects adherence to testing (i.e. “Guys who can't get it up don’t bother testing”)

The horizontal lines are the average (mean) for each group (men with erectile dysfunction and men without erectile disfunction). The chart tells the rest of the story.

Other relationships investigated:
The following medical conditions appeared to have an effect on glucose levels during the study: a1c (higher a1c levels => higher glucose levels), nephropathy (diagnosed => higher glucose), hyperlipidemia (diagnosed => higher glucose), insulin pump (prescription => lower glucose levels).
The following medical conditions appeared to have an effect on adherence levels during the study: insulin pump (prescription => higher adherence), type 1 diabetes (diagnosis => higher adherence), nephropathy (diagnosed => lower adherence).

We do not consider any of these results surprising as there are well-documented medical reasons for such correlations to exist.

In addition, we found no visible correlations between age and adherence or glucose levels.

Finally, we investigated correlations between survey questions regarding patients’ attitudes towards testing (referred to as “Task” and “Unsafe Act” surveys) and adherence to testing and found no visible correlations, with one exception: there was a very clear positive correlation between how strongly patients disagreed with the statement “It is hard for me to remember to check my blood sugar” and how strongly the patients adhered to their testing.

**Critique of Spotfire:**

Spotfire appears to be a well-designed tool, allowing a remarkable amount of analysis to be performed with no knowledge of programming. However, we have two serious complaints:

Plotting data over time is surprisingly counter-intuitive. For example to plot 60 columns - each representing one day’s measurement, it is necessary to select the **y-axis**, select the all 60 columns, then select the x-axis and select “(column names)” to display each daily value. This was not well-documented.

Also, there is no (obvious) way of inserting a weighted best fit line. For example, to the left is a chart fitting a line to “percent adherence to testing” vs “intended daily frequency of testing”. Note the positive trend which is very misleading. Crucially, the number of patients in the 1.00, 5.00, and 6.00 “intended daily frequency” bins is less than 10 total. The 4.00 bin represents 56 patients. A weighted trendline (minimizing least squares by treating each record as a single data point, instead treating each bin as a single data point) would be much more representative.

However, once past the somewhat steep learning curve, Spotfire proved to be a valuable, time-saving tool, superbly designed for it’s intended purpose.
Critique of Tableau:
Compared to Spotfire, Tableau serves as a great alternative. There are several features that may make it a better option for new users with little programming experience. There is an abundant amount of online support/training for Tableau, with video tutorials and free live classroom sessions held every few days.

Based on our experience, data integration in Tableau is superior to Spotfire. Users can easily switch between datasets and define various cross links to each one with just one click. Although multiple filters are possible in both Tableau and Spotfire, filters are automatically generated on the dashboard by Spotfire. In Tableau, the user is required to first select a field they would like to filter on, decide on specific parameters pertaining to that variable (i.e. value range), and then proceed to add it to the dashboard. For users exploring data they don’t initially know anything about, this could be problematic or even overwhelming.