The study was conducted from June to September 2010 in order to study behavioral, physiological, and technical factors and how they affect self-monitoring of blood glucose (SMBG) patients in their adherence to testing. Ninety-nine diabetics participated in this study over a 60-day study period. Our visualizations are meant to bring out some interesting facts such as identification of a high risk group, ways of increasing adherence, and exploring whether or not the day of the week can affect testing.

Data Source

The data-source was a 60-day study conducted in the Hershey Medical Center Endocrinology Clinic. The data collected consisted of surveys, medical records, and glucometer downloads. The image to the right represents possible performance shaping factors that could affect adherence in the study.
The 67 to 74 age group is a high risk category for Diabetes Treatment.

Both Figure 3 and Figure 4 are plotted over 60 days to examine trends of glucose levels and testing adherence ratios, respectively. Interestingly enough one age group is easily identified as being “high” risk. We are providing the figures selected on the age group from 67 to 74 for you to see the trend. Figure 4 shows that the adherence for this age group dips below 60% at times, on average figure 1 shows that this group represents the lowest average adherence from all other bracketed age groups and Figure 2 shows that this age group represents around four percent of the participants in the study. This age group has the lowest adherence rates and some of the highest glucose levels. We would recommend getting a large sample of people in this age bracket to examine further, although with preliminary results we would recommend that doctors treating their patients should take extra time and care to monitor this particular age group.
Females MUCH More Likely To Adhere to Diabetes Treatment if They Visit the Doctor More Often.

Figure 5 represents 80% adherence for females (left) and males (right) trellised by least frequently visiting the doctor (top) to most frequently visiting the doctor (bottom). Maneuvering from visit frequency equal to zero to one for females, increased their overall adherence by 15%. The most frequently visiting females all adhered over 80% of the time, up over 40% from the previous result. While we did not notice the same performance increase in the males, we did notice that the males who visited the doctor the most had a markedly better performance than that of the other two groups. Hopefully this means that simply increasing interaction with patients will increase adherence in regular testing.

http://onjacksonstreet.com/daily-inspiration-6/
The Beginning of the Week and Weekend Represent the Lowest Average Adherence

When processing the diabetes data, we found that because patients started the 60-Day study on different dates the data was not easily comparable. Figure 6 shows that the study began mid-June, and by mid-July all patients were participating in the study. In order to scale data accurately we compressed the time scale to the seven days of the week, as seen in Figure 7. Looking at the adherence rates over the week, we can see that the average adherence for patients dipped on both Monday and Saturday. We feel that this is because weekly actions significantly change on these transition days, leading to worse patient adherence. We would recommend to the provider that if they wanted to reach out to a patient, they should do it on low adherence days in order to boost adherence for the individual.

![Average Adherence vs. Days of the Week](image-url)

![Misaligned Data](image-url)
Spotfire Critique

Spotfire is a fantastic tool for rapid prototyping and data exploration. We found, however, that improvements in the importing of data, details on demand, and the UI would make the experience more user-friendly.

While Spotfire accepts a multitude of different file formats, we found that there was a potential area for improvement. When working with temporal data from Excel, we found the data rather hard to import. In fact, we had to manipulate the data before importing it through Spotfire. The point of contention was that the temporal data was split over a set number of columns, all labeled with a different day header, such as D1, D2, etc. Spotfire does not recognize this as temporal data and instead imports the columns separately. Instead of being able to select one Day variable, the user could only select the individual days to visualize. (i.e. D1 vs adherence vs. Day vs adherence) This caused us to reformat our temporal data so that Spotfire would properly import it. One additional major issue with Spotfire is that if you change the underlying data structure in your database, you will not be able to open the project back up.

The details on demand feature is great for visualizing specific segments of data. We did find that when we wanted to select a subset of data to examine that we instead had to copy the entire data set. There was no way to select a portion of the data and copy it to another medium. Having a feature like this would help us quickly grab the data that we needed when conducting a quick analysis of the data.

The User Interface was intuitive and quick to learn. There were some features that we would have liked to see, such as adding a close button at the top of tabs and allowing users to change the label on trellised views for rows and columns. We found that these two things alone caused some confusion and led to longer development times.

Conclusion

Our proposal had defined a multitude of tasks for which we were going to conduct in our data exploration experiment. Many of the data points, such as unsafe acts, ended up not resulting in the visualizations that we expected, and in the end we relied more heavily on segmentation via demographics. Manipulating the data stores, while very functional in Spotfire, exhausted much of the exploratory visualization time. This time may also have been exacerbated by the learning curve in using a new tool. In the end this experience allowed us to learn a new tool, learn some insightful information about Diabetes patients, and step forward in our task of understanding Information Visualization.