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ABSTRACT
With all the different therapies available to treat a medical condition, doctors must evaluate how the different products perform on different treatment goals in order to select the appropriate therapy for a patient. This evaluation process is used to determine which product is best when treating a particular patient. This paper will discuss the collection and analysis of the treatment goal data. The data is collected on several treatment goals (attributes) for several different therapies (products). The data collected is for existing products as well as future entrants into the market. This is done to not only analyze the current market but to also predict changes in the market as new products are added to the existing market basket. In order to properly analyze the data, the entire process is done as repeated measures using PROC GLM. The program computes means and compares the mean of the comparator drug with the remaining drugs, testing for significant differences. This comparison of means, analyzed across all physicians, highlights which attributes are most important to physicians when selecting one drug over another drug. The program further compares the drug of interest to the other drugs as winning, losing or tying and is analyzed at the individual physician level. These comparisons are then used in a univariate analysis to determine which attributes are driving the use of that drug of interest. This analysis is accomplished using PROC FREQ with a Chi-Square test and the end result provides the independent variables that can be used in a logistic regression analysis to determine product value drivers. Using this analysis, you will be able to determine the attributes that drive physicians’ preference for a certain product when treating patients.

INTRODUCTION
Doctors need to make the correct decision when writing a prescription for a patient. To make this decision, the doctor must consider both the patient and the different therapies (products) available. Once a patient is diagnosed, the doctor is faced with making the correct product choice. In order to make this decision, the doctor will normally evaluate several products at one time and pick the one that is best for the patient. The evaluation of these products is done by considering different treatment goals (attributes) related to the drugs. A quick example follows.

Let’s assume that the patient has visited their physician to review their clinical characteristics after a recent work-up and discuss possible treatments. In the assumption, the physician has all the information about the patient (patient data, physical exam results, laboratory results, family history, current medications, insurance information, etc.) which is needed to properly diagnose the patient with disease A. To treat disease A, there are currently several products on the market that could be prescribed. Which treatment option will the physician choose for this patient? This is where the physician begins to evaluate the different products while thinking about the patient. Does this patient need a treatment that has a rapid onset of action? Does this patient need a treatment that maintains efficacy over a long term use? These are just some of the questions the physicians must consider before prescribing a particular product. While trying to make this informed decision, the physician quickly rates the different products on all of the different attributes. After considering all of this, the physician makes his final decision and prescribes a product to the patient.

In order to understand exactly what the doctor was thinking when a particular product was prescribed and to determine which attributes are driving a doctor’s decision for a particular product, analysis of the product attributes is necessary. If there were only one or two attributes distinguishing the different products, the process would be easy. But that is not the case since there are usually many different attributes thus making the analysis process difficult and time consuming.

DATA COLLECTION
The data that will be analyzed was collected on several attributes for several different therapies. The different products were present in both the current market and future market. This is done to not only predict the physicians' behaviors in the current market but to also predict changes in their behavior as new products become available. During the data collection, the physicians were also asked to prescribe treatment to patients. The
specifics on how this is done will not be discussed in this paper. Suffice it to say that this information will be used to calculate product shares as well as used as the independent variable for the final product value driver analysis.

During the course of the exercise, the doctor rates each product on each attribute on a 9-point scale. Initially, the doctor will rate the current products on all the attributes. As the exercise progresses, new products are introduced and the doctor rates each of them on each attribute. This process is repeated until all new entrants have been rated. The attributes are randomly presented to the doctor each time a new product is rated. The attribute randomization is done to ensure the most accurate answers for each attribute on each product are obtained.

Figure 1 shows an example of a potential list of attributes that a doctor could be shown. In the exercise, the doctor would rate product A on all of the attributes, which would be randomly shown. The doctor would then proceed to rate the rest of the products (attributes are randomly shown) until all products have been rated. As mentioned above, a 9-point scale is used with 1 representing the product performing extremely poorly and a 9 representing the product performing extremely well. The actual list of attributes which are shown will vary from study to study and are designed to capture the most information about that particular class of drugs. The list is usually 25 to 30 in length. Creating the best list of attributes is the first and most important step in this entire process. If time is not taken to create a set of attributes that not only describe these products but also distinguishes between them, then no analyses is going to give the answers you need.

**Fig. 1.0**

1. Please rate how well each of the following products perform on each of the following treatment goals using a 1-9 scale where 1 = “product performs extremely poorly” and 9 = “product performs extremely well”.

<table>
<thead>
<tr>
<th>Market Today</th>
<th>Product A</th>
<th>Product B</th>
<th>Product C</th>
<th>Product D</th>
<th>Product E</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Can be used in a wide range of patients</td>
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<td>b. Delays progression of disease</td>
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<tr>
<td>c. Well tolerated</td>
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<tr>
<td>d. Maintains efficacy in long term use</td>
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<tr>
<td>e. No safety problems in long term use</td>
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<tr>
<td>f. Well tolerated or positive side-effect profile</td>
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<tr>
<td>g. Effective in combination with other agents</td>
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<tr>
<td>h. Improves patient compliance</td>
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<tr>
<td>i. Improves patient quality of life</td>
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<tr>
<td>j. Is affordable for most patients</td>
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<td></td>
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<tr>
<td>k. Rapid onset of action</td>
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<tr>
<td>l. Is easy to write because it is covered by most managed care formularies</td>
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</tbody>
</table>

**AGGREGATE MEAN ANALYSIS**

Now that the data has been collected, the first part of the analysis is done at the aggregate level. The mean for the comparator drug is compared against the other drugs for each attribute. This comparison demonstrates which of the drug attributes are most important to all of the doctors for differentiating between the comparator and another product. This differentiation is important for two reasons. First, it determines those products with which you are truly competing against as well those products that are not important. Second, it provides a hierarchical order to the attributes. Both of these points are important and the information learned will be used later in determining which attributes and drug comparisons to use as product value drivers. This analysis allows you to position your brand against all other brands on the market based on product attributes. This entire process is
done as a repeated measures analysis using the GLM procedure.

The SAS program contains a macro that runs PROC GLM for each of the attributes. The first part of the macro declares the variable ‘var’ to contain the complete list of products, putting the other products first and the comparator drug last. This newly created variable will then be used in the model statement in PROC GLM. The remainder of the macro runs a repeated measures analysis (see Figure 2) and the output created is the means and significance testing for each of the attributes. Finally, the program merges all of the means and significant testing into one final data table for exporting. The final table (see Figure 3) is exported to Excel where it is then used in the final presentation.

This table provides a very good picture of how doctors perceive the different products. Product E is the comparator drug and the drug used while performing the attribute driver analysis. The color green shows where the comparator drug is superior while the color red shows where it is inferior. If there is no color, the products are considered equivalent. There are several key pieces of information that can be obtained from this table that not only help tell a story but will also help make further analysis simpler. First, there are two attributes, j and l, that are seen as equal across all products and can be removed from further analysis. In this example, affordability of these products and formulary coverage are perceived as the same for all the products. Because of this, neither one of these attributes offer any additional information to the value driver analysis and can be removed from further consideration.

```
ods listing close;
ods output repeatedmeans=means&i
   modelAnova=model&i
   multistat=stat&i;
proc glm data=sas;
class test;
model &vars=test / nouni;
repeated drug / mean summary;
quit;
ods listing;
```

Another key piece of information obtained from the table is that Product D and Product E are seen as equals. This allows you to remove Product D from this analysis since that product is not seen as better or worse. When a doctor is choosing Product D instead of Product E, they are not choosing it based on product attributes. Their choice is driven by some other factor like brand loyalty or some particular patient characteristic. Determining
those other factors would be handled with a patient value driver analysis or doctor value driver analysis, not a product value driver analysis which is the focus of this paper.

The products you want to focus on for further analysis are Products A, B and C. But first, there are a few additional pieces of information that can be obtained. Product C is seen as better against Product E while Product B is seen as worse. Since your product is losing to Product C, you now know those attributes that are important in order to change physicians’ opinions and potentially gain market share. It is important to remember that you can not affect change on all the attributes but focus on those attributes where misperceptions exist. For example, attribute A is significantly better for Product C than Product E. If Product E can be used in a wide range of patients then doctors need to be made more aware of this. If, in fact, Product E has limited use on patients and therefore this attribute can not be changed then move on to the next attribute. Where you learn from failure against Product C you can also learn from victory against Product B. In order to stay ahead of Product B, you must maintain your current perceptions. Finally, Product A is a combination of winning and losing attributes. What is done for both Product B and C will be done with Product A to either maintain the competitive edge or possibly gain market share.

**PHYSICIAN LEVEL ANALYSIS**

The next section of the analysis performs the product comparison at the physician level. This is done to provide further information about the drugs as well as create the final set of independent variables that will be used in the product value driver analysis. This part of the program uses only those attributes and drugs that successfully passed through the first part of the program (Products A, B and C, not attributes j and l). In this comparison, each drug is compared to the comparator drug as winning, tying or losing. This is a straight head-to-head comparison with the raw score of the comparator drug compared to the raw score of the other drugs for each attribute. If the comparator drug is greater, the new variable is recoded as winning. If the comparator drug is equal, it is recoded as a tie and if the comparator drug is less, the variable is recoded as a loss. These comparisons are then used in a univariate analysis to determine which attributes are driving the use of the drug of interest. This analysis is accomplished using the FREQUENCY procedure with a Chi-Square Test. The program also creates the distribution of physicians for each newly created three-level variable as well as product shares of the comparator drug for the three levels of each attribute. Figure 4 shows partial output from this phase of the analysis.

The distributions of physicians, the products shares of the comparator drug and the significance testing are all used in deciding which variables to use in further analysis. With the physician distributions you are only con-
cerned with those comparisons that have distributions that you can act upon. You need to consider if enough physicians exist in a category to act upon and cause a change in prescribing pattern. Take for example attribute A when Product E is compared to Product A, 96.3% of the physicians rate Product A as winning or tying Product E (see Figure 4). Since most physicians see Product A as ‘better’, using that combination of product and attribute is not relevant to the final analysis. Using the distribution of physicians, you can remove all comparisons with distributions that do not have enough physicians in them in order to affect any kind of change on the physician population.

The share distribution of the comparator drug and significant testing is important information in telling the story. The different shapes and types of distributions each tell different stories and help further determine which variables to keep. If the shares are similar across all three groups (not significantly different, no *) then the attribute for that particular product does not matter. Whether you win, tie or lose, you will still get the same share of use. Another example would be if the shares show a step increase (or decrease) as you proceed from losing through tie to win. This change might be significant or it might not be. Either way, this allows you to see how much share you can gain (or lose) if you the physicians’ opinions change. Pay particular attention to those comparisons that are significant (marked with an *). Using this, you can pick those attribute and product combinations that are important to you and your product. This along with the above physician distributions will give you the final set of variables that will be used in a logistic regression analysis to determine the product value drivers.

CONCLUSIONS
Determining how doctors perceive your product is very important. Knowing those product attributes that you are winning on and those you are losing on is important in positioning your product in the market. Using an analysis like this, you will be able to determine the attributes that drive physicians’ preference for your product when they are treating patients.

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