

Physician Prescribing Behavior Study to Improve Sales Operations in New Prescription Drug Launch

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The pharmaceutical firm's sales operations centers on identifying the right physicians who would highly view the prescription drug; this process is known as *targeting*. With hundreds of thousands of physicians treating patients, and the expensive nature of detailing, it is especially critical to target the right physicians from the launch of a new prescription drug. In this paper, physician's prescribing behavior and intention to prescribe a new drug is analyzed. In order to obtain such information, a national survey is done on the physician's profile, their past prescription behavior and the future prescription intentions of the new drug. A set of hypotheses about the prescription intentions is tested and found to be statistically significant. The study further discusses the managerial implications to the pharmaceutical firm about targeting the right physicians from the launch of a new prescription drug to improve their detailing effectiveness and the overall sales operations.

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I. INTRODUCTION

The pharmaceutical firm's detailing effort, also known as personal selling by sales representatives, who visit physicians and describe the attributes of products produced by their company, plays an important role in the success or failure of their new products. Mizik and Jacobson (2004) find that detailing and free samples have positive and statistically significant effects on the number of new prescription issued by a physician. However, a detailing visit typically lasts less than 3 minutes and the sales people find hard time achieving what they initially planned to deliver (Chin, 2006; Yi, 2008a). In order for the sales reps to perform an efficient detailing effort for

their new prescription drug, they will need to target their messages to the right group of physicians, right from the start of launching the product to maximize product growth and sales potential.

Currently, anecdotal evidence suggests that the targeted physicians are determined by the volume of prescriptions they generate in both the drug class and the drug itself. The physicians are sorted in order of prescription volume in the disease class, and then they are grouped into 10 equal segments based on volume, with the 1st segment representing the lowest 10% prescribers and 10th segment representing the highest 10%; this process is known as deciling with the 10th decile physicians representing the highest volume

prescribers. The deciling process can also be based on dollar sales. The higher-decile physicians are selected as targets as long as the sales force coverage and physician accessibility are feasible. Among the target physicians, the physicians who belong in the highest-decile physicians receive more detailing visits from the sales reps than did the lower-decile physicians. This current process used by most pharmaceutical firms when launching a new prescription drug in to the market is illustrated in Figure 1.

However, the current approach is suboptimal in many ways. Mainly, the mass targeting approach does not account for physicians' responsiveness to pharmaceutical detailing efforts (Yi, 2003), and secondly, the micromarketing strategy has proven to be more effective because it provides alignment in how physicians utilize information at their most desirable receptive state (Yi, 2008b). For more efficient targeting during the time of the product launch, understanding the physician's prescription intention of the new drug based on the interactions between physicians and the patients would be very important.

When launching a new prescription drug, there is no historical data of the product's performance in the market place, hence there is only limited data that a firm has to work with to strategize its sales operations.

Even when the product is launched, the interaction between sales reps and physicians are known to the firm via sales reporting system, the firm would not know what interaction is really taking place between the physicians and patients at the individual patient-level since the release of such information is prohibited by the law for the patient protection. The firm can only infer the nature of interactions from a survey questionnaire of the physician's profile, the history of the physician's prescription behavior and the future prescription intentions. Figure 2 illustrates this flow of information process from the time of new drug launch.

1.1. Literature

The pharmaceutical industry has faced an unprecedented number of challenges in recent years, with many branded drugs going off patent and not enough blockbuster drugs in the pipeline to replace them (PricewaterhouseCoopers, 2008). Moreover, the industry has received a great deal of negative press from the government and consumers alike, who see its aggressive marketing strategy and spending as excessive and unnecessary, as well as connecting them to rising healthcare costs (Gagnon and Lexchin, 2008).

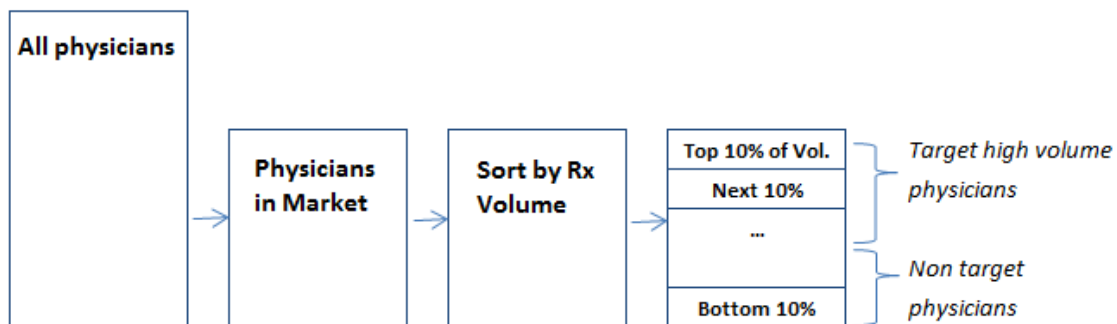


Figure: Physician Targeting Process: Deciling

FIGURE 1. CURRENT PHYSICIAN TARGETING METHOD: DECILING

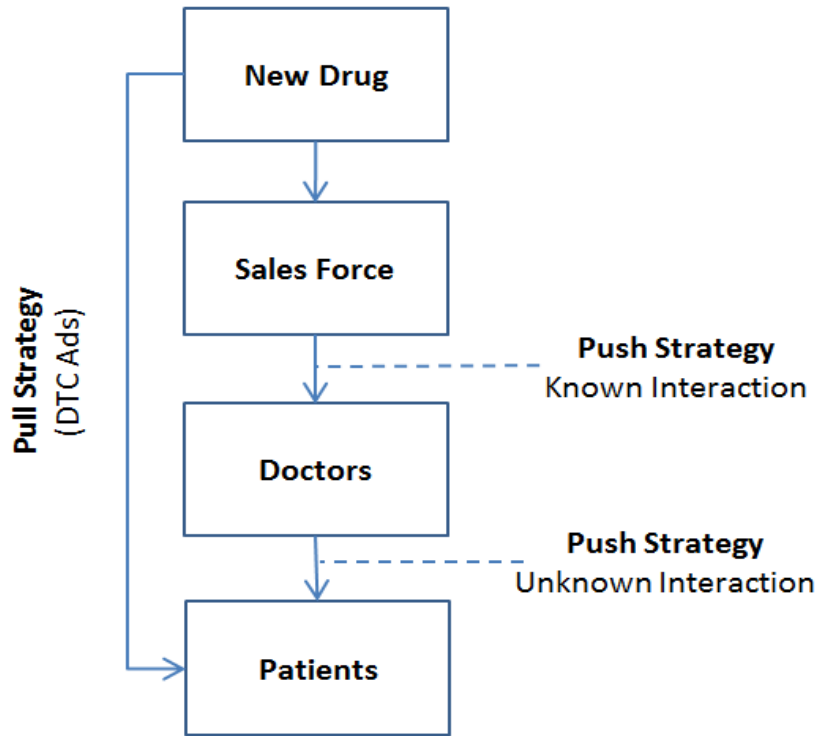


FIGURE 2. NEW DRUG INFORMATION FLOW PROCESS

Sales force operation is the most expensive marketing investment that pharmaceutical companies make; with detailing costing a firm \$150 to \$200 per detail, or approximately \$61,000 per physician per year (Gagnon & Lexchin, 2008). Clearly, improving resource utilization and subsequently reducing unnecessary operational and promotional spending by determining the right set of physicians for the sales reps to target from the beginning of the launch may lead to much-needed cost reduction that can be shared by both industry and consumers.

There has been a large amount of research in the area of pharmaceutical demand in marketing, economics as well as medical sciences. Early studies in the marketing literature (Parsons and Abeele, 1981; Lilien, Rao, and Kalish, 1981) recognized the importance of sale force detailing efforts on

sales and developed mathematical models to include the effect of the detailing efforts using aggregate data. More recent research (Gonul et al. 2001; Kamakura, Kossar, and Wedel 2004) has used panel data to investigate the effect of physician detailing and direct-to-consumer advertising on pharmaceutical demand. Friedman and Gould (2007a) discussed the consumers' attitudes toward direct-to-consumer advertising using a survey data from 321 US residents and noted some negativity towards such advertising approach for prescription drug, but 59% of the respondents did agreed that the advertisement is better than not having one. On the other hand, only 19% of physicians thought their patients made better health decisions (Friedman and Gould, 2007b). Hall, Jones, and Hoekl (2010) analyzed the similarities and differences between the direct-to-consumer advertisement

and disease awareness advertising, and its respective impact on both the physicians and patients. They found that both advertising methods heightened awareness of treatment options and improved discussions with physicians, but many patients were left confused due to unbalanced-nature of information and they often made inappropriate requests for treatment to their physicians.

There has also been research that has specifically investigated informative and persuasive effects of pharmaceutical promotion (Leffler 1981; Hurwitz and Caves 1988; Rizzo 1999). The broad consensus in these literatures is that detailing is so effective that it can speed up new drug's penetration into the market and positively affects prescribing behavior by physicians. However, to the best of our knowledge, no study has been done about improving the detailing effort by targeting the right groups of physicians using the nature of physician-patient interactions from a survey data.

This paper studies the physicians' prescription history and their prescription intention of the new drug and tests hypotheses about the relationship between the nature of physician-patient interactions and the likelihood of prescribing the new drug both as a single therapy and as a part of combination therapy.

II. PHYSICIAN'S PRESCRIPTION SURVEY STUDY

A national survey of physicians is conducted in January-February 2005 to obtain their profile, past treatments before the new drug, and the prescription intention of the new drug. The survey questions are shown in Table 1. The respondents are cardiologists, hematologists, internists, and nephrologists. The name of the new drug and the specifics about the disease it treats are kept confidential per our agreement with the physicians participating in this research.

TABLE 1. SELECTED SURVEY QUESTIONS

1	What is your specialty?
2	In the last month, what is the total number of different patients you have seen across all conditions?
3	In the last month how many different patients have you seen, for kidney-related disease?
4	How many years have you been in practice, since completing residency?
5	What is this patient's gender?
6	What is this patient's age?
7	When did you first see the patient for his/her kidney-related disease?
8	When was this patient diagnosed with the disease?
9	To the best of your knowledge, what caused this patient's disease?
10	How many visits did this patient have for the disease during the last 12 months?
11	What was this patient's first line prescription drug therapy for the disease?
12	Based on the scenario above, and thinking of the last three kidney-related disease patients that you saw, please indicate how you would treat each of these patients if the new drug was available and had been found to perform as specified.

The new drug introduced to the respondents is a prescription drug with better efficacy and safety profile compared to the leading drug in treatment of a specific kidney-related disease. A total of 211 completed questionnaires are collected by in-depth telephone interviews and an online survey. Each respondent is asked about interactions relating to their last three patients suffering from the disease.

The physician profile includes the area of specialty, total number of all patients seen in last month; total number of patients with a kidney-related disease seen in last month; total number of patients with a specific kidney-related disease seen in last month; and the number of years in practice. The data collected for pertaining to past treatments before the new drug includes the patient's gender and age; the first time to see the patient; the time that the patient was diagnosed with a kidney-related disease; the cause of the patient's disease; the number of visits for the last 12 months; and the prescription drug therapy chosen as well as the type of therapy: single therapy or combo-therapy. The prescription intention may be a single-therapy or a combo-therapy. Finally, the new drug is described and their prescription intention is asked in 13 different situations based on existing drugs, market situation and the new drug attribute per patient; this produced 6,747 observations for the study.

III. HYPOTHESES

We set up several hypotheses about the relationship between the physician-patient interactions and the likelihood of prescribing the new drug to better understand the physicians' behaviors and improve targeting. For the majority of the hypotheses, there are not many existing studies to support since, to our best knowledge, this paper is a pioneering study in this topic area.

H1: The physicians who have switched the prescription with their patients in the past are more willing to try a new drug than those who have never switched.

Having switched the prescription in the past may imply that the drug they have used was not very effective in treating the disease and as a result, physicians are less satisfied with the drug. In order to confirm if this statement is valid within our data set, we compare the patient characteristics of the physicians who have switched and who have not. The patients of the physicians who have switched the prescription have been *diagnosed with the disease longer* and *visited more frequently* in the last 12 months, which implies that there was a problem and the treatment has not been very effective. Pickvance, Parry, and Howe (2004) support this and discuss the interpersonal pattern of the patient's problematic frequent attendance. Also, Kim et al. (2006) have found that the high attractiveness of alternatives results in greater propensity in switching behavior.

H2: Among the physicians who have never switched, the physicians with larger number of patients are more willing to try new drug than the ones with smaller number of patients.

The physicians with larger number of patients imply that they practice in a large institution and the large clinic tends to be more research oriented and innovative and is expected to try a new drug. Moreover, these larger practices attract more sales representatives, and more recent information, including new drug samples, is readily available to these physicians.

H3: Physicians currently prescribing combo-therapy will intend to prescribe combo-therapy that includes the new drug more than the single-therapy prescribers.

The physicians who prescribe the combo-therapy tend to believe that the therapy would be more effective when the patients take a combination of drugs rather than a single drug. This implies that there is no single drug that can distinguish itself as the gold standard for treatment. Then in the presence of a new drug that is claimed to be as effective as the current leading drug, they will be more likely to include the new drug as part of the combo-therapy.

H4: Physicians currently prescribing non-leading drugs or generics are more willing to switch to a new drug than the physicians currently prescribing leading drugs.

The physicians who are prescribing non-leading drugs or generics tend to be less loyal to brand name drugs and so in the presence of a new drug and sales representative providing the latest information and study results, they will be more willing to prescribe a new drug so long as the drug is effective. Joyce et al (2011) support this hypothesis and discuss their finding of physicians tend not to have a “favorite” drug and are willing to try new therapies as more clinical information becomes available.

H5: Physicians currently prescribing non-leading drugs or generics to their patients are more willing to try a new drug as a combo-therapy as opposed to a single therapy.

The physicians who are less loyal to brand name drugs will be more willing to try a new drug and prescribe it as part of a combo-therapy to increase the effectiveness of the treatment rather than prescribe it as a single therapy. Rizzo (1999) supports this hypothesis by indicating the strength of detailing efforts with branded drugs, and if physicians are prescribing non-leading drug, they are not impacted by details and with combo-therapy indicating there is no dominantly effective

drug in the class, physicians are more willing to bring a new drug in as a part of combo-therapy.

IV. KEY FINDINGS

Table 2 shows the empirical test results of the hypotheses. *H1* is supported since the switching intention measure is significantly higher for the group of physicians who have switched the drug in the past. Furthermore, the follow-up test of *H1* shows the nature of interaction between the physicians and the patients when the physicians have switched to a different drug. There is an association between the drug switching and length of diagnosis with the disease and the frequency of physician visits. The number of years that the patients have diagnosed with the disease is significantly higher for the group of physicians who have switched the drug. Also, the number of patient visits is significantly higher for the group of physicians who have switched the drug in the past.

H2 is also supported since the proportional intention to switch to new drug measure is significantly higher for the group of physicians who have larger number of patients. We define the group of large number of patients if the number of patients is larger than the average.

H3 is supported by the empirical test. The proportional intention measure to switch to new drug is significantly higher for the group of physicians who have prescribed combo-therapy.

H4 is also supported. The proportional intention to switch measure is significantly higher for the group of physicians who have prescribed non-leading drug.

H5 is further supported since the chi-square test of independence show strong evidence of at least one of the proportions from non-leading drug group is different from the leading drug group. Moreover, those who are currently using non-leading drug have

significantly higher intention of using a new drug and as a single-therapy treatment, while the intention of combo-therapy is not significantly different between leading drug prescribers and non-leading drug prescribers.

TABLE 2. EMPIRICAL RESULTS

Empirical Test of H1:

	Switched drug in past	Never switched drug
Proportion intending to use new drug	76%	66%
Count of switching	1,790	2,911
Observations	2,360	4,387
t Stat	8.09	
p-value	5.99E-16	

Follow-up Test of H1:

	Switched Drug		Not Switched Drug		t Statistics	p-value
Number of Years with kidney problem	Mean	4.7283	Mean	3.8047	8.5542	8.0530E-18
	Stdev	4.1961	Stdev	4.3770		
Number of Years with specific kidney-related disease	Mean	3.2826	Mean	2.3295	11.7907	6.3948E-32
	Stdev	3.4264	Stdev	2.6934		
Number of Patient Visits	Mean	6.3206	Mean	4.5335	19.2984	4.5704E-18
	Stdev	3.7425	Stdev	3.4827		
Observations	2,360		4,387			

Empirical Test of H2:

	Large number of patients in clinic	Small number of patients in clinic
Proportion intending to use new drug	70%	64%
Count of switching	1,285	1,626
Observations	1,842	2,545
t Stat	4.06	
p-value	5.1E-5	

Empirical Test of H3:

	Currently prescribing single-therapy	Currently prescribing combo-therapy
Proportion intending to use combo-therapy with new drug	65%	71%
Count of combo-therapy intentions	1,378	2,910
Observations	2,111	4,103
t Stat	-4.56	
p-value	5.2E-6	

Empirical Test of H4:

	Currently prescribing Leading Drug	Currently prescribing Non-leading Drug
Proportion intending to use new drug	69%	79%
Count of switching	4,288	352
Observations	6,214	442
t Stat	-4.7	
p-value	2.6E-6	

Empirical Test of H5:

	Leading Drug	Non-leading Drug
Proportion intending to stay with existing therapy	31%	20%
Proportion intending to use new drug as single-therapy	18%	29%
Proportion intending to use new drug as combo-therapy	51%	51%
Observations	6,370	481
$\chi^2_{.df=2}$	49.2	
p-value	2.1E-11	

4.1. Managerial Implications

The determination of target physicians starts with the analysis of time-series physician-level prescription data. Such data are available to the pharmaceutical companies through data providers such as IMS Health; these data are expensive to purchase, but most, if not all companies with sales operations presence have them on site. The pharmaceutical firms, therefore, will be able to correctly work with the data and execute the recommendations made in this paper.

The hypotheses about the relationship between the physician-patient interactions and the prescription intentions are supported by the tests. The sales force of the pharmaceutical firm is recommended to target the physicians who have switched in the past. The follow-up test results of *HI* further confirm the reason for such result. The patients whose physicians have switched the drug are the ones who have been diagnosed with the disease longer and have visited the physicians more frequently. There is higher likelihood that the physicians who have switched are not satisfied with the current treatment and hence higher likelihood to switch to the new drug.

The firm can also develop specific messages directly to these patients who may be looking for alternative medicine due to their dissatisfaction with the current treatment. The patients who have long been diagnosed with the disease and who frequently see the physicians can be encouraged to discuss their conditions and newer treatment options with their physician via Direct-To-Consumer marketing.

The sales force is also recommended to target the physicians who have never switched but who are treating large number of patients. In addition, the physicians who favor combo-therapy over single therapy are recommended to be targeted by the sales force because those

physicians are more inclined to include the new drug as a combo-therapy.

Finally, this paper recommends targeting the physicians currently prescribing non-leading drugs. This segment of physicians is more willing to switch to the new drug compared to those who are favoring branded and leading drugs. This is potentially because these physicians are not impacted by detailing efforts from the branded drug companies and are more open to using a new drug based on product attributes. Moreover, these physicians may be more inclined to try the new drug as a combo-therapy, hence the drug interaction data are recommended to be mentioned to them to provide comfort in using the new drug as part of combo-therapy.

V. CONCLUSION

The pharmaceutical sales force is the most expensive promotional investment for the industry, and determining which physicians the sales force should target for the new drug is one of the most important decisions made in sales operations. However, the current approach of blindly targeting the high decile physicians is ineffective and presents opportunities for improvement.

For an efficient and effective detailing effort, the pharmaceutical firm needs to identify and target the physicians who have higher likelihood of prescribing the new drug. In targeting the right physicians, the firm needs to understand the nature of interactions between the physicians and the patients.

The study detects the nature of physician-patient interactions from a survey of the physician's past prescription behavior and the future prescription intentions. The study also investigates the relationship between the physician-patient interactions and the prescription intentions using the survey data and finds the hypotheses for the relationship statistically significant. Using the test results,

the study recommends the pharmaceutical firm the characteristics of physicians and easy-to-follow business rules to determine the targeting physicians in order to optimally utilize detailing effort for the new drug.

This study has few limitations. First, the study result has not been tested in the real market environment, and therefore no data evidence is there to understand how significant this approach is. Second, the study can also be improved by establishing a test versus control study when the new drug is launched. Such study can provide insights on the degree of effectiveness with sales and prescription volume comparison. Finally, there is a need of formal model for the physicians' prescribing intention. Such model can include control variables and covariates and will be able to predict the probability of prescribing the new drug and hence predict the market share. These follow-up studies are in fact currently under way.

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