ORIGINAL ARTICLE

Financial incentives for generic drugs: case study on a reimbursement program

Incentivos financeiros para medicamentos genéricos: estudo de caso sobre programa de reembolso

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ABSTRACT

Objective: To discuss the use of financial incentives in choice of medication and to assess the economic results concerning the use of financial incentives to promote the use of genetic medication in lieu of reference drugs in a company with a reimbursement program. **Methods:** A case study was carried out in a large supermarket. The data was obtained in the company responsible for managing medication. The study reached 83,625 users between August 2005 and July 2007. The data was submitted to regressions in order to analyze trends and hypothesis tests to assess differences in medication consumption. The results were compared with general data regarding medication consumption of five other organizations and also with data about the national consumption of generic medication in Brazil. **Results:** The use of financial incentives to replace brand medications for generics, in the company studied, increased the consumption of generic drugs without reducing the company expenses with the reimbursement programs. **Conclusions:** This study show the occurrence of unplanned results (increase in the consumption of medications) and the positive consequences of the reimbursement program concerning access to medication.

Keywords: Reference drugs; Health management; Drugs, generic/supply & distribution; Reimbursement, incentive/economics

RESUMO

Objetivo: Discutir o uso de incentivos financeiros na escolha de medicamentos e avaliar os resultados econômicos do uso de incentivos financeiros na indução da substituição de medicamentos de referência por genéricos em empresa com programa de reembolso. **Métodos:** Foi realizado estudo de caso, em um grande supermercado. Os dados foram obtidos na empresa responsável pelo gerenciamento de medicamentos, a pesquisa atingiu 83.625 beneficiários entre Agosto de 2005 e Julho de 2007. Os dados foram submetidos a regressões para analisar tendências, e testes de hipóteses para avaliar diferenças nos consumos. Os resultados foram comparados com os dados gerais de consumo de medicamentos de outras cinco organizações e também com o consumo nacional de genéricos no Brasil. **Resultados:** A adoção de incentivos financeiros para a substituição dos medicamentos de referência por genéricos, na empresa estudada, aumentou o consumo de genéricos sem reduzir os gastos da empresa com o reembolso dos mesmos. **Conclusões:** Este trabalho mostrou a ocorrência de resultados não planejados (aumento do consumo de medicamentos) e as consequências positivas dos sistemas de reembolso para o acesso aos medicamentos.

Descritores: Medicamentos de referência; Gestão em saúde; Medicamentos genéricos/provisão & distribuição; Reembolso de incentivo/economia

INTRODUCTION

The continuous increase in medication prices has caused a rise in expenditures with medication-reimbursement programs. The companies that offer this type of benefit try to cut their costs by stimulating their employees to choose generic drugs when needed, by means of a financial incentive called three-tier list or form.

The use of tiers or ranges aims to distribute medications in groups (ranges), each group with a fixed level of subsidies for the buyer, establishing the co-participation of beneficiaries in a distinctive fashion. The first tier gives preference to generic medication; on the second tier, the preference is given to medication of

unique origin, with no equivalent generic drugs; and the third tier include brand medication that have equivalent generic drugs. The co-participation of the beneficiaries is established in a regressive fashion, starting from the third column towards the first, thus the beneficiaries pay more for brand products that have equivalent generic drugs, and less for the generic medication.

The use of these tiers became a cost containment strategy devised by the North-American pharmaceutical care operators, such as PBM (pharmacy benefit management). In the USA, only 8% of the management operators had used the three-tier form in 1998[1]; in 2002, this percentage was already 57%[2]. The increased adoption of this three-tier form was first motivated by the need to cut expenses with medication. Between 1997 and 2002, the total spent with medication prescriptions increased by 115%, as compared to 42% rise in expenses concerning healthcare services[3].

This reflection on the use of financial incentives or rewards to cause the replacement of brand medication for generic ones is based on motivation theories and that of the benefit maximizing agent. Motivation theories can be grouped into two large categories. On the one hand those of the behaviorist group, inspired in the studies conducted by Pavlov and Skinner; on the other hand, we have those which do not belong to the behaviorist group, with different theoretical origins which express severe criticism vis-à-vis the formers[4-5]. The rational behavior theory of the agent stems from one of the branches of economics, and it can be summarized in the motto that the agent maximizes benefits and minimizes cost as consumers or producers[6].

In the present article, we stress that both behaviorists and economists aligned to the theory of the maximizing agent intend to understand and forecast the reactions of people when exposed to intended stimuli. It is postulated that when the individual is deciding upon consumption, he/she compares three basic elements: price, quantity and quality, choosing the lowest-priced product and the maximum quantity and quality. Thus, they recommend rewards or financial incentives as a means of bringing about the desired behavior.

There is no theoretical support to completely deny the principle of rationality; however, there are many known critics, such as Nobel Prize Laureates Amartya Sem[7] and John Nash[8] who showed that the principle does not explain the entire consumer's behavior. Non-behaviorist studies on motivation also presented the limits and unexpected effects about the use of behavior induction instruments by means of financial rewards[4-5,9].

To try to induce people to perform any type of action (including consumption) by means of explicit rewards (such as higher reimbursement for choosing generics),

is based on the assumption of a single causality relation between the action and the motivation to execute it; and, between the latter and the expected results. In the case of incentives to procure generic medication by the employees of the supermarket studied, it is assumed that: 1) the group's demand for medication is met; 2) the medication prescription and consumption are kept stable, without significant fluctuations; 3) consumers operate within the strictest levels of rationality, such as previously defined. If the three conditions happen simultaneously, then the progressive discounts for generic medications (the three-tier list) should cause an effect of replacement, reducing expenditures with medication.

In the international experience, studies about financial incentives used to influence prescription and consumption had as result a small number of beneficiaries who responded to these incentives[10]. The use of three-tier forms has an unknown impact on the costs of medication quality and procurement[11].

In Brazil, three-tier forms have been implemented by companies that manage pharmaceutical benefits, known as PBM. While the North-American PBM mediates the relations between health insurance plans and the pharmaceutical industry, the market of Brazilian companies is concentrated on the companies from other industries which offer medication reimbursement programs to their employees.

The success of generics is unmistakable[12] and their increased market share brings about discussions on the greater access of the population to medication. At a national scale, there is no data to prove that the increased consumption of generics have broadened access, because we do not know the magnitude of the replacement effect, that is, of the total number of consumers, how many have bought medications and replaced brand names – more expensive drugs – for generics. Anyway, driven by the price effect, the companies which sponsor reimbursement and the PBM noticed in the induction of generic drugs consumption an opportunity: the former, to reduce expenditures, the latter, to sell services for the former.

The PBMs sell pharmaceutical benefit management and associated services. They started activities in the mid 1980's, creating support tools to medication copayment programs in the US. In Brazil, they started activities in the late 1990's. The PBM services comprise pharmacies, payers and consumers (operators' clients and employees), building up financial and epidemiological information that is useful to management of patients and health prevention and promotion. With that, they negotiate discounts in purchase of medication and create the benefit programs (among them, the three-tier list).

OBJECTIVES

To discuss the use of financial incentives in the choice of medications and assess the economic results of the use of these incentives in the promotion to replace brand drugs for generics in a company with a reimbursement program.

METHODS

The case study method is recommended for investigations in which generalizations are not adequate, there is not a long enough time of occurrence of the phenomenon and the relevant variables are very broad [13-15]. Having in mind the very complexity of the individual motivations towards medication procurement, we deemed adequate to choose the case study design. Based on a deductible reference, we started the analysis of the meanings associated to the changes with a quantitative approach.

The study was carried out in a large supermarket. The sample involved all workers who acquired medications through the benefit program, from August 2005 through July 2007. The analyses were carried out in a population of 83,625 beneficiaries, distributed according to table 1.

Table 1. Distribution of population per gender and age group (years)

Female	52.71%
Male	47.29%
0 - 17	33%
18 - 29	41%
30 - 39	19%
40 - 49	6%
50 - 59	1%
Over	0.18%

Source: PBM, organized by the authors.

This population was made up of 55% of beneficiaries directly associated with the organization studied and the remaining 45% by their dependants; it was geographically distributed into 15 Brazilian states, concentrated in the states of São Paulo and Rio de Janeiro.

In order to better understand the impact of the three-tier form, we took five companies which maintained similar benefits throughout the time period analyzed; however, without the application of the three-tier list – which was similar to the situation described for the first period in the organization studied. The comparative analysis serves to help understand whether the behavior seen in this study is consistent with the usual ones in other organizations and whether or not this behavior suffered any impact from the adoption of the three-tier form.

The temporal series analysis allowed us to assess the data throughout the period (trends), and the correlations showed the level and the type of association among them; in order to compare the mean values, we used the traditional hypothesis tests (ANOVA). The studies were carried out using secondary data provided by the PBMs.

As to methodological limitations, this study used human behavior results as basis regarding immeasurable motivations. The analyzed data described situations under the rules of one single organization. The statistical generalization of the results is not among our goals; nonetheless, we hope and believe that the information generated can contribute to the reflections on the use of financial resources in the choice for medications in companies.

RESULTS

The population analyzed was on a medication benefit program throughout a 24-month period; nonetheless under different rules as to pharmaceutical assistance. In the first 12 months, the benefit policy was associated with a standard management practice employed by the PBM – collecting the population's consumption information, limit control over financial values and the very quantity of medications acquired. After the 13th month (August 2006), the three-tier list was implemented and added to the previous management model. We called the first stage of the period as "first period", and the stage after implementing the three-tier list as the "second period".

In order to understand the effectiveness of the new policy adopted, we first compared the means of the *per capita* consumption values of the population analyzed, and noticed that they were higher in the second period (R$ 8.73 *versus* R$ 8.23 in the first period), including a greater variance, with an increase by 6.1% (even if in the five months immediately afterwards, there had been a reduction, reaching a *per capita* value of R$ 6.97 – the lowest value found in the period analyzed). Compliance of the beneficiaries (number of beneficiaries who used the benefit system in the period) to the pharmaceutical care was also observed, raising the mean values of 26% in the first period (before implementing the tiers), to 28.4% in the second period, and the mean value of the last three months from the second period was of 35%, plus 9.23% of people using the benefit.

Contrary to the increases seen in the *per capita* value and compliance, there was a reduction of the mean stamp value for the beneficiaries, who at each purchase spent R$ 31.65 in average and, after implementing the three-tier list, started spending the mean value of R$ 30.73, that is, 2.9% less. By the same token, while the *per capita* consumption and compliance tend to increase in a relatively similar pattern – the *per capita* increase was more intense (Figures 1 and 2) –, the mean stamp value tends to drop (Figure 3).
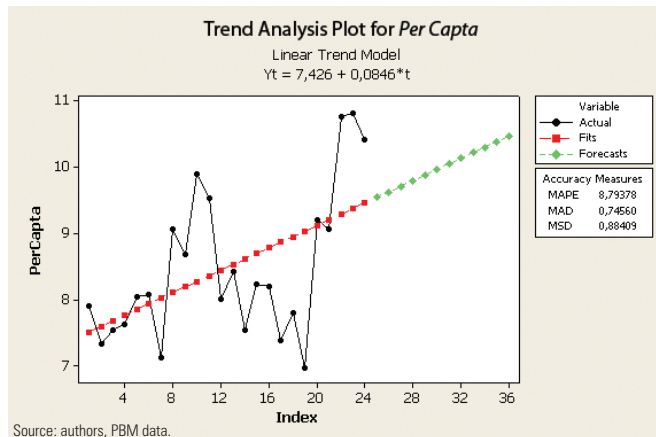
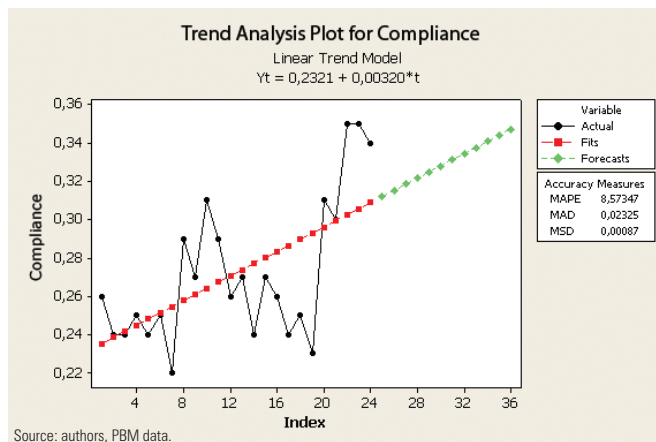**Figure 1**. Trend Analysis Plot for *per capita* consumption

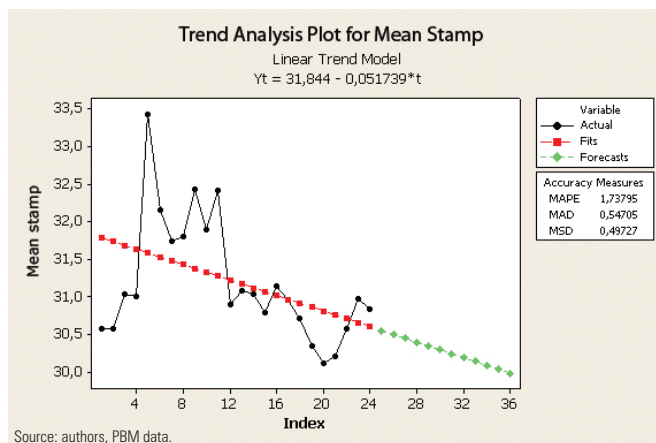**Figure 2**. Trend Analysis Plot for compliance

Figure 3. Trend Analysis Plot for mean stamp

As to the data set, we noticed that the three-tier list had an impact on the behavior of the population, with a larger number of consumers, also generating a higher *per capita* consumption. Nonetheless, these people are buying drugs cheaper, with a falling value of the average stamp. For the supermarket, there was no reduction in expenses; however, from the stand point of access to medication, the progress was effective. All we have to

do is check the *per capita* consumption of units in order to prove this statement: the consumption went from 0.49 to 0.54.

When the data is broken down into brand, similar and generic drugs, the results generated by the application of the three-tier list are verified as to the effective impact of the incentives concerning the generic medication. A positive evolution in the consumption of generic medication was identified since the first period, showing that the new practice came up to consolidate this trend. The *per capita* value at the beginning of the period analyzed was R$ 1.07; when the list was used, it went up to R$ 1.59 (rise by 48.6%), and in the end of the period it was R$ 2.19 (adding by 37.7% that, if taken from the initial moment, evolved by 104.7%).

Considering the evolution of the *per capita* consumption of generic medication, a low correlation with the *per capita* consumption of the reference drugs was noticed ($r = 0.358$); but one had a higher correlation ($r = 0.682$) with the *per capita* consumption of the similar medication; however, it is not as high as it is between similar and brand drugs ($r = 0.866$) (Table 2 and Figure 2). These interrelations appear graphically in the dendogram on Figure 4. It indicates that consumer's behavior is driven by the cost/benefit ratio.

Table 2. Correlation in consumption behavior between medication classes with their respective significance levels (in parentheses)

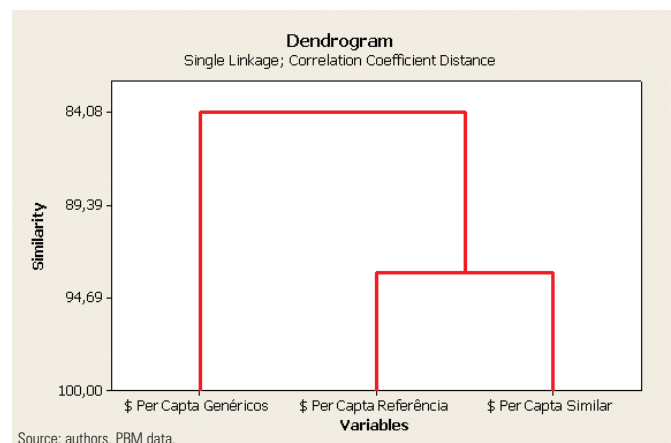|	**Per capita generic**	**Per capita reference/brand**
Per capita reference/brand	0.358 (0.086)	
Per capita similar	0.682 ($<$0.001)	0.866 ($<$0.001)

Figure 4. Dendogram based on correlations, showing relative similarity level of behaviors

In the variance analysis (ANOVA), a marked difference was detected ($F = 231.9$; $p < 0.001$) between the mean values of the brand and generic drugs when compared to the similar drug (Table 3). The same results can be reached analyzing the data from the first and

second periods separately; notwithstanding, during the second period, there was an approximation between the generic and similar drug variables, their approximation increased a little, but the brand drug maintained its position consistently, without any alteration regarding the others.

Table 3. Result of the analysis between averages of reference and generic variables with similar variable

| Source	DF	SS	MS	F	P value
Factor	2	89.943	44.971	231.90	<0.001
Error	69	13.381	0.194		
Total	71	103.323			

One-way ANOVA.

The 95% confidence intervals show significant differences among the three types of drugs.

Individual 95%CI for mean based on pooled standard deviation			
Level	**n**	**Mean**	**SD**
$ *Per capita* Generic	24	1.5654	0.4301
$ *Per capita* Reference	24	4.2754	0.4991
$ *Per capita* Similar	24	2.5838	0.3843

When the comparative developments of the three drugs are considered, they show a marked positive progression in the *per capita* consumption of generic medication, a milder positive progression in the *per capita* consumption of similar medication and still a constant variable in the *per capita* consumption of brand medication (Figure 5). These advances proved to be consistent when their trends were assessed (Figures 6, 7, 8); observing, nonetheless, that the trend in the case of
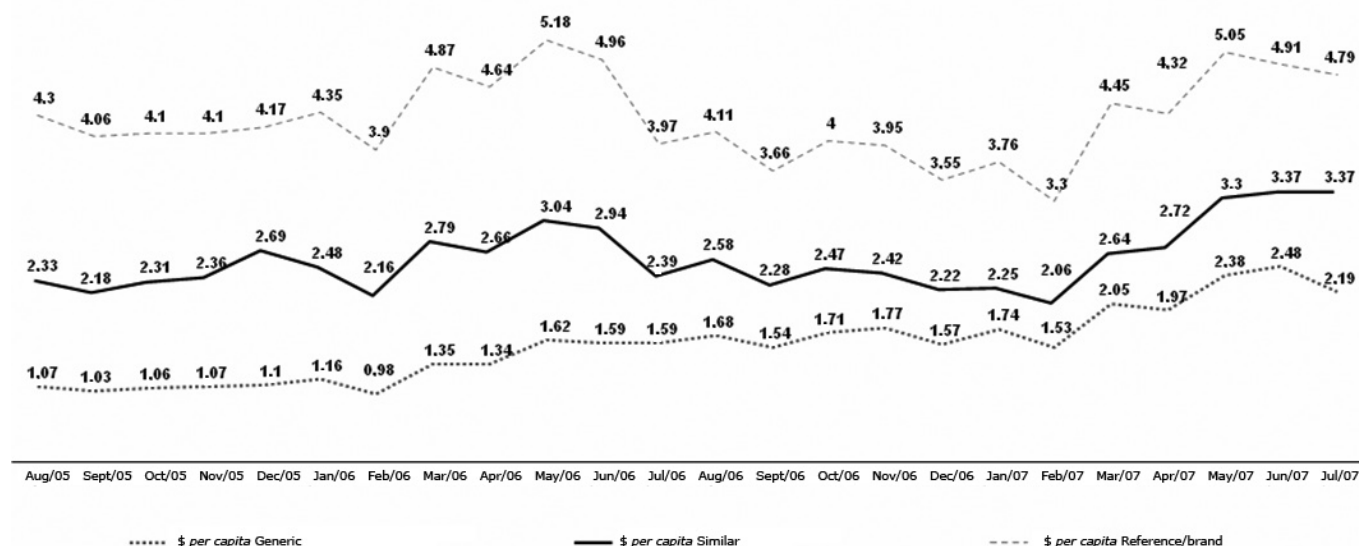
generic drugs (0.056) is twice as high as that for similar medication in the same period (0.025).

Sources: authors, PBM data.
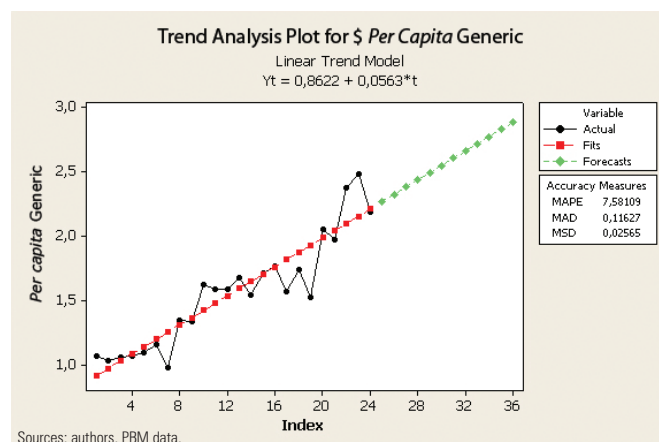
Figure 6. Trend Analysis Plot for *per capita* generic

Sources: authors, PBM data.
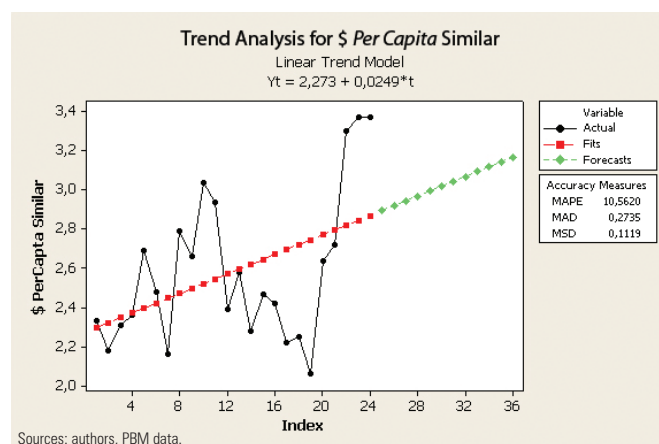
Figure 7. Trend Analysis Plot for *per capita* similar

Source: authors.

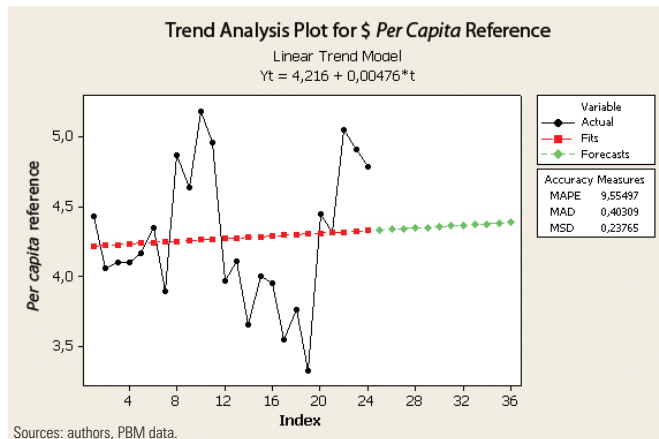**Figure 5.** Development of *per capita* consumption of medication

**Figure 8.** Trend Analysis Plot for *per capita* reference

Studying the *per capita* units consumed in this same period, they matched the *per capita* consumption in values. Following the example for the *per capita* analysis, the participation of each drug within the entire context was assessed. There is a relevant increase of generic medication share when comparing to others, resulting from reduced brand drug share, remaining practically equal and consistent throughout the period. Early in the period, generics represented 14% of all drugs bought, ended in 21%, an increase by 7 percentage points, but they reached a peak of 23% in this period. Breaking the periods down, a positive trend in both cases is noticed. Throughout this development, a higher leap in the month immediately after the employment of three-tier list was verified, which went from 17 to 20%, gaining three percentage points and, after this, it kept its upwards trend.

Brand drugs kept their downward trend throughout the entire period in a very consistent and linear fashion: they started the period representing 57% of the entire consumption and ended it with 46%, loosing 11 percentage points on the way. Nonetheless, based on the analysis already carried out in the studies about *per capita* development, these changes in market share stem from a greater consumption of generic drugs and in maintaining consumption of similar drugs, which did not show any *per capita* development. The market share analysis for similar drugs did not show much variation along the period, differently from what happened with the share of brand and generic medication, which would seem to indicate a natural compensatory effect among them (Figure 9).

The mean values of the shares of the five companies taken as sample for the comparative basis also showed a positive development in the consumption of generic drugs, however in a subtler way. The development seen in the period is of only three percent, that is, less than half the 7% seen in the supermarket. Such result can stem from the use of the three-tier list. The temporal curves of brand and similar drugs shares were also compared. The share of similar medication proved very consistent vis-à-vis the supermarket, including the share figures presented.
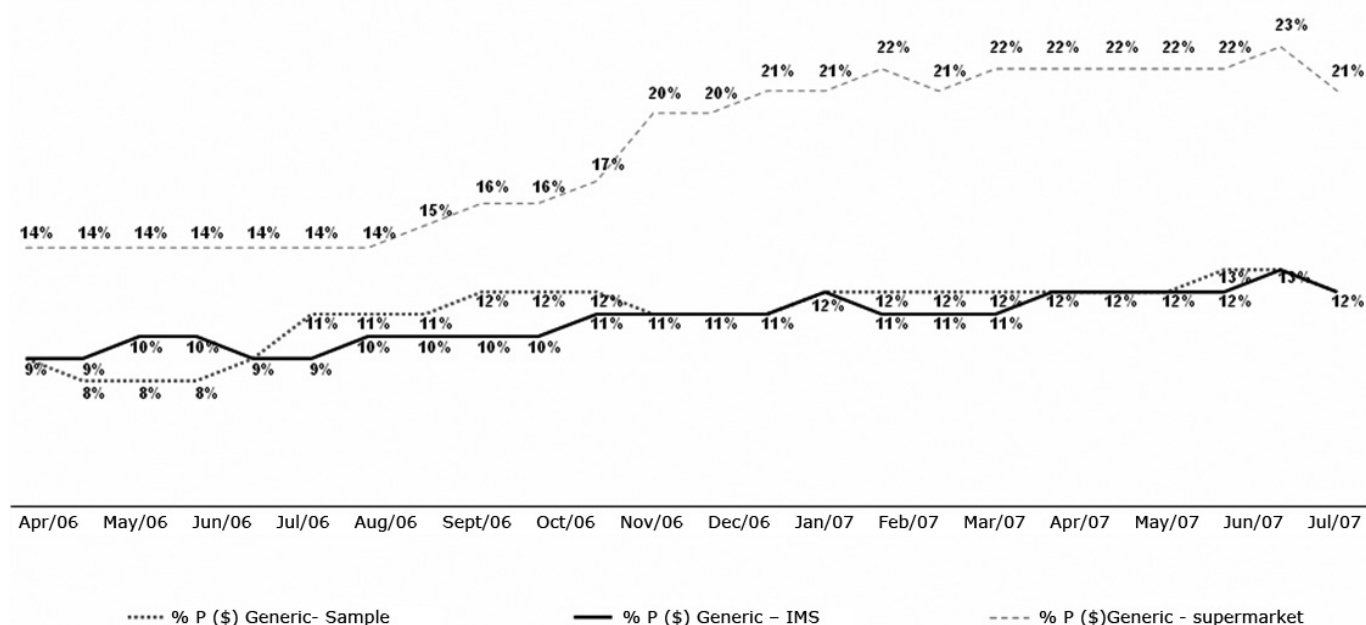
Comparatively, the share of brand drugs shows the same reduction curve trend, however in a subtler way, and the loss suffered during this time was of only 7%, compared to a 11% drop found in the supermarket.

As it was seen in the supermarket, in the five organizations used as comparative basis, we noticed an
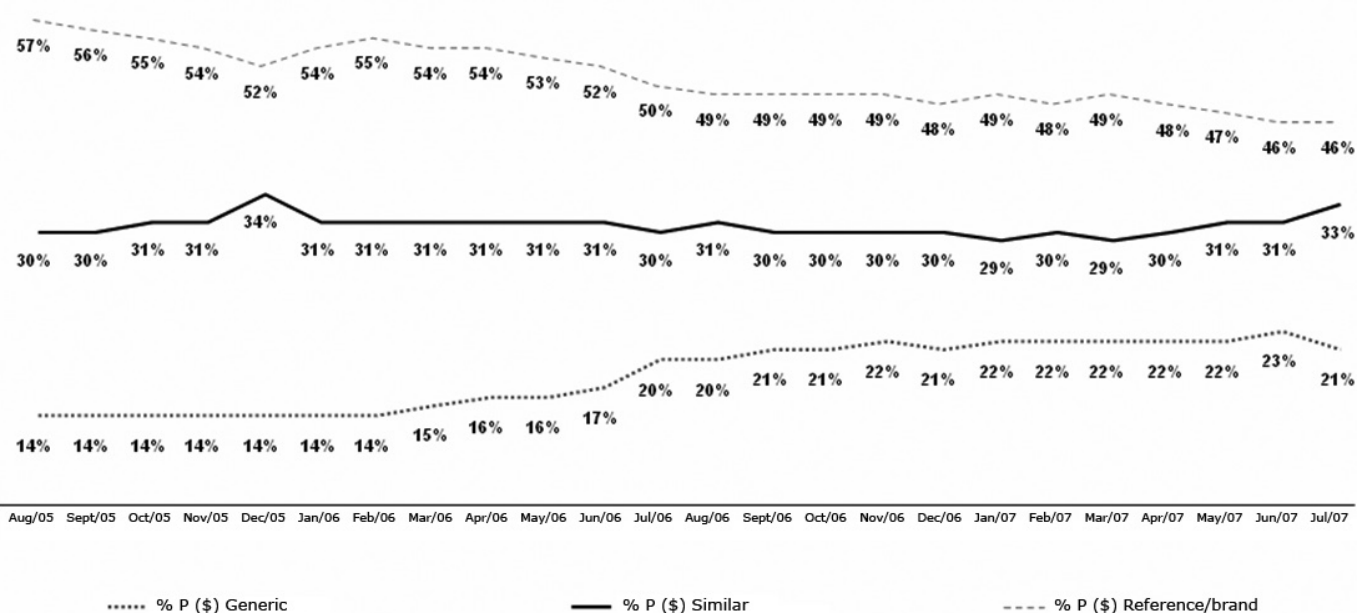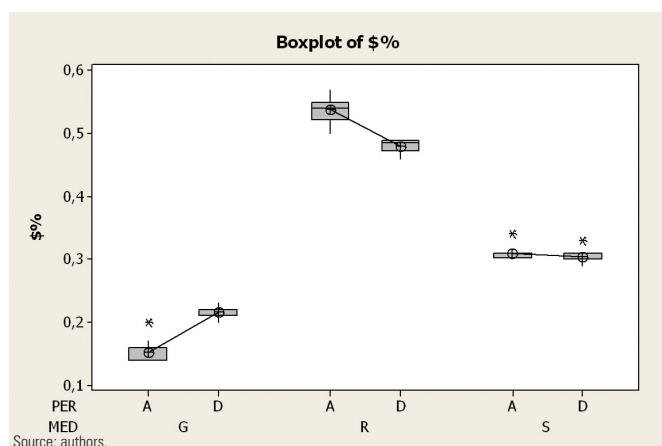

Figure 9. Participation of medication in consumption

Source: authors.

Figure 10. Comparing behavior of generic medications

Source: authors.

Figure 11. Comparing before and after and types of medication

increased consumption of the generic medicines in lieu of the brand drugs, with similar medicines remaining uniform – with suffering no apparent impact. Basically, the difference between the retail organization and the five comparative companies is in the marked progressions seen in the organization studied, since evolutions and correlations have very similar characteristics.

As an extension of our analyses, the five companies and the Brazilian market were also compared (Figure 10). A major proximity in the behavior of generic medicines share between the set of five companies and the Brazilian market was verified, which reinforces the validity and usefulness of this exploratory study. The differences are possibly due to the linear participation of brand medicines throughout the period, without showing any impact caused by the increased generic medicines share.

Finally, in figure 11, very likely as a result of the incentive plan (A = before, D = after), it seems that we had a mutual compensation between the percentage of expenses with generic agents (G) and brand drugs (B); while similar (S) medicines do not seem to have been affected, which could indicate a positive impact on the extrinsic motivation of the conscious consumer of generic medication.

DISCUSSION

Our study stemmed from the intellectual curiosity about the possibilities and limits of the financial rewards in the promotion of medication use. Let us take the theory of motivations and that of the conscious consumer as theoretical references in order to study the phenomenon. A quantitative study was conducted in order to better support our qualitative analysis. In order to do a quantitative study, it was necessary to choose an object, a large size supermarket chain, distributed throughout the entire country.

The behaviorist inspiration line recommends the use of benefits or material rewards; and the other lines, non-behaviorists, do the opposite, pointing to the inefficiency and the consequences expected from it. The neoclassical line of the economic theory is aligned with the behaviorist; nonetheless, some authors, such as Amartya Sem[7] and Jonh Nash[8] (the latter is a mathematician), reduced the reach of the conscious agent assumptions. As a possible theoretical summary, if on the one hand financial incentives impact consumers' behavior, on the other hand, they may also cause

unexpected behavior and even undesired ones. The lower price appeal (financial incentive) is the first cause of increase in sales and consumption of generic medicines throughout Brazil; however, the three-tier list form, as it introduces the reward for the replacement of brand medicines for generics, also promoted a consumption increase concerning the population studied, precluding the reduction of the total expenditures of the company with the reimbursement.

The first motivation of the companies to use the three-tier form is to reduce reimbursement expenses. The companies should broaden the analysis base and consider the positive impacts, not necessarily measurable, of the healthier and motivated workers, for the business's bottom line. The argument associated with health in organizations, especially pharmaceutical care, is still in its beginning. The idea of managing pharmaceutical benefits restricted to financial aspects (lower expenditures to the sponsors), so embedded in the pioneering theories of administration, does not capture the positive outputs of the expansion of medication access, nor the very complexity associated with human behavior.

FINAL REMARKS

As a summary of the data analyzed in this study, the increased consumption of generics by replacement already was seen among the beneficiaries served (before using the tiers).

After the incentive, the trend was intensified and consolidated. An enhanced compliance towards benefits was verified, presumably caused by larger subsidies to less expensive medication (generics); nonetheless, this piece of information could not be corroborated and any other concurrent reason was identified, which would lead to an increase in compliance towards generics; there was an increase in the consumption of generic drugs both by replacement as well as new compliances, changing the consumption profile of the portfolio.

The raise in *per capita* value resulted in a higher consumption volume from the beneficiaries (new users or replacements); however, the average stamp was falling, in other words, the users consumed less expensive medication (generics). The use of the three tiers as a cost-cutting tool was inadequate, it caused consumption results which were lower, but it increased the number of consumers, expanding the total consumption of medication. The data show a lower individual consumption and a higher total consumption.

The present article should not be construed as an advocate of the use of medicines. Prevention and health promotion are still the best ways to provide for a healthy life. The management of medication consumption produces important data for organizational healthcare policies.

CONCLUSIONS

This study did not confirm the technical assumption that financial incentives concerning generics would bring about a cost reduction to the companies offering the reimbursement. Nonetheless, the study results pointed to the potential of three-tier lists to expand the consumption of medication, stimulating a greater compliance concerning disease treatment.

REFERENCES

1. Curtiss F. Perspectives: drugs, PPOs, tiered cost share for beneficiaries and consumer preferences. J Manag Care Pharm. 2002;8(3):177-80.

2. Kaiser Family Foundation and Health Research and Educational Trust. Employer health benefits: 2002 summary of findings. [cited 2010 Jun 7]. Available from: http://www.kff.org/insurance/3252-index.cfm.

3. Levit K, Smith C, Cowan C, Sensenig A, Catlin A. Health spending rebound continues in 2002. Health Aff (Millwood). 2004;23(2):147-59.

4. Kohn A. Punidos pelas Recompensas. São Paulo: Atlas; 1998.

5. Gomes D, Amorim MCS. Liderança e programas de recompensas: limites e possibilidades. Revista de Negócios (Blumenal). 2008. p. 13:3-36.

6. Denis H. História do pensamento econômico. 5a ed. Lisboa: Livros Horizonte; 1987.

7. Sen A. Sobre ética e economia. São Paulo: Cia das Letras; 1999.

8. Kandori M. Social norms and community enforcement. Rev Economic Studies. 1992;59(1):63-80.

9. Bergamini CW. Motivação nas organizações. 5a ed. São Paulo: Atlas; 2008.

10. Rector TS, Finch MD, Danzon PM, Pauly MV, Manda BS. Effect of tiered prescription copayments on the use of preferred brand medications. Med Care. 2003;41(3):398-406.

11. Brennan T, Lee H. Allergic to generics. Ann Intern Med. 2004;141(2):126-30.

12. Amorim MCS, Massuci J, Grimoni M. A introdução do medicamento genérico no Brasil: análise dos resultados de política púbica de saúde. Rio de Janeiro: 2004. [Apresentado no I Encontro Nacional de Administração Pública da Associação Nacional de Pós-graduação em Administração – I EnAP / ANPAD. Rio de Janeiro; 2004].

13. Yin RK. Estudos de caso: planejamento e métodos 2a ed. Porto Alegre: Bookman; 2001.

14. Bruyne P, Herman J, Schoretheete M. Dinâmica da pesquisa em ciências sociais. Rio de Janeiro: Francisco Alves; 1991.

15. Porter ME. Towards a dynamic theory of strategy. Strategic Manage J. 1991;12(1):95-118.