ANALYSIS OF THE COSTS RELATED TO SMOKING HABITS OF BENEFICIARIES OF A BRAZILIAN HEALTH PLAN, WITH THE PURPOSE TO DEFINE TREATMENT STRATEGIES TO REIMBURSE FIRST LINE MEDICATIONS

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ABSTRACTS

Objective: Cigarette smoking is one of the leading avoidable causes of death in the world. However, in many countries, such as Brazil, medications used during pharmacological treatments are not supported by private or public health systems. The purpose of this study is to analyze the financial impact of the costs related to adult smokers, beneficiaries of a health plan and compare it with simulated costs after smoking cessation programs, defining the best strategies. Methods: Smoking habits were analyzed, based on an epidemiologic investigation of 46,407 beneficiaries of a private health plan in Brazil. Expenses with hospitalization and use of medical services during a period of 12 months, of beneficiaries who report a daily smoking habit were compared with those of non-smokers. Simulated analysis were performed with the estimated costs of treatments with nicotin replacement, varenicline and bupropion. A potential decrease of the costs of the heath plan was than estimated. Results: Among the beneficiaries, 29.0% (n=10,270) were smokers and 61.8% of those were male. The majority (86.7%) of the smokers informed a consume up to 20 cigarettes per day; 9.5% consumed 20 to 40 cigarettes per day and the rest of the group (3.8%) consumed more than this amount. 43.3% smoked for less than 10 years; 25.0% from 10 to 20 years and 31.6% for more than 20 years. The prevalence of chronic diseases was higher among the smokers, compared to non-smokers, as well as average per capita cost expenditures (29% more than the non-smokers). Conclusion: Starting from reported efficiency of the nicotine replacement therapies and non nicotine drugs added to psychological support, applied to the group of smokers of the health plan and comparing the costs of this strategy with the effective costs of those beneficiaries, evidences demonstrate the importance of considering financial support systems to smoking cessation interventions, by the health plan.

INTRODUCTION

Cigarette smoking is one of the leading avoidable causes of death in the world. Smoking habits increases the cancer risk and the mortality related to some chronic diseases (for example, chronic obstructive pulmonary disease, hypertension, diabetes). Quitting smoking has immediate as well as long-term benefits, reducing the risks of diseases caused by tobacco and improving health in general. Despite the known impact of smoking on health, treatments for tobacco use (specifically pharmacotherapy) are not supported by private or public health systems in many countries, such as Brazil. In recent years, several drug therapies for smoking cessation have been found to be efficacious in randomized clinical trials.

Based on the fact that smokers see physicians more often and are admitted to hospitals for longer periods than non-smokers, treating tobacco addiction before the development of serious illness, could be an opportunity for the health plan to reduce healthcare expenses. With this vision, a study of actuarial impact to define treatment strategies to reimburse first line medications has been carried out.

METHODS

Smoking habits, based on an epidemiologic investigation of 46,407 beneficiaries of a private health plan in Brazil were analized. Using administrative databases, expenses with hospitalization and use of medical services during a period of 12 months of beneficiaries who report a daily smoking habit were compared with those of non-smokers. Simulated analyses, using a mathematical model, were performed with the estimate costs of treatments with nicotin replacement (NRT), bupropion (BPN) and varenicline (VRN). Analysis of the benefit of smoking cessation was based only on the direct costs. The amount of the opportunity-cost investment with the acquisition of medications was added to the expenses with treatments.

Two simulations were conducted, considering that 10% of the adult beneficiaries attempted to quit. On the first scenario, estimated abstinences rates were 16.0% to NRT[1], 18.4% to BPN[2] and 23.0% to VRN[3,4]; on the second scenario, 5.3%[1], 14.6%[3,4] and 21.9%[4,5], respectively. Scenarios were then compared considering population. These continuous abstinence rates are based on medical literature of randomized clinical studies with a minimal non smoking period of 48 weeks.

Maximal consumer prices for medications in Brazil, defined by national research, were used to calculate the cost of treatments. The inflation estimated for a ten years period after the start of therapy was calculated considering the last pre treatment five years variations costs with medical assistance on both studied groups (29% annual inflation for smokers and 24% for non-smokers). Annual inflation rate calculated from the consumer price index was not discounted.

Methods included the following steps:

1. Identification of the smoking prevalence according to the results of an epidemiologic investigation.

2. Calculation of the average annual medical cost for smokers and non-smokers, sex and age group.

3. Estimate of the expected costs for 10 years of smoking cessation approaches and the probable participation / success rates of each treatment.

4. Estimate of the cost savings by implementing smoking cessation programs with NRT, BPN and VRN, separately.

Table 1 – Pharmacotherapy cost and abstinence rate

Pharmacotherapy	Estimated cost *	Estimated Abstinence Rate	
		Scenario 1	Scenario 2
Nicotine	$ 192.4, 08 weeks	16.0%	5.3%
Buproprion**	$ 183.7, 12 weeks	18.4%	14.6%
Varenicline	$ 538.6, 12 weeks	23.0%	21.9%

* US$ 1 = R$ 1.75; ** Generic drug – bupropion

RESULTS

Among the beneficiaries of the health plan, 29.0% (n=10,270) were smokers and 61.8% of those were male. The average age of the smokers group was 52.4 years (CI 95% = 52.0 – 52.8) and non-smokers was 43.5 years (CI 95% = 43.3 – 43.7). The majority (86.7%) of smokers informed to consume up to 20 cigarettes per day; 9.5% consumed 20 to 40 cigarettes per day and the rest of the group (3.8%) consumed more than this amount. 43.3% smoked for less than 10 years; 25.0% from 10 to 20 years and 31.6% for more than 20 years. The prevalence of chronic diseases was higher among smokers, compared to non-smokers (Table 2). The average per capita cost expenditures for smokers was $613.06 versus $475.11 for non-smokers (+29%).

Table 2 – Chronic diseases referred by beneficiaries, smokers and non-smokers

Chronic diseases referred by beneficiaries	Smokers (n = 13,490)		Non-smokers (n = 32,917)		Relative risk (RR)
	n	%	n	%	
Hypertension	4,530	33.6%	8,048	24.5%	1.37
Diabetes mellitus	1,458	10.8%	2,237	6.8%	1.59
Chronic obstructive pulmonary disease	977	7.2%	1,781	5.4%	1.34
Heart failure	976	7.2%	1,426	4.3%	1.67
Cerebrovascular disease (stroke)	429	3.2%	583	1.8%	1.80

According to conditions listed on the first scenario, the return on investment (ROI) was observed with all three therapies with different periods: six years for BPN, seven years for NRT and nine years for VRN. Observe that all therapies costs were calculated considering the maximal consumer prices. Brazilian pharmaceutical companies usually offer discounts for these kinds of medical projects. Life-years saved, improvement on quality of life and an eventual financial co-participation by the beneficiaries were not considered.

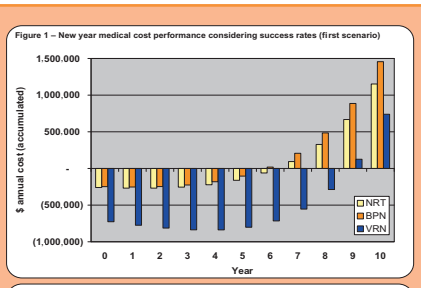
Observing the second scenario, we notice that the ROI occurred one year later for BPN and at the same year for VRN. Both, at lower values than the first scenario. Under these circumstances, nicotine replacement therapy was not cost-effective considering the period of the studies.

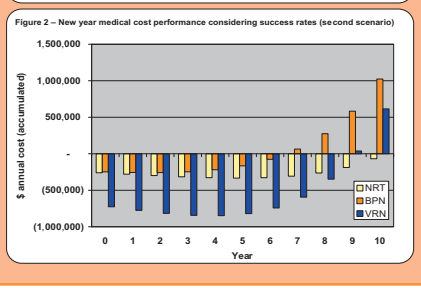
Table 3 – Comparative results in two scenaries

	Scenario 1			Scenario 2		
Number of smokers	13,490			13,490		
Per smoker annual medical cost	$613			$613		
Five year medical cost * (A)	$10,290,112			$10,290,112		
Ten year medical cost * (B)	$44,095,147			$44,095,147		
Percent of smokers attempting to quit	10%			10%		
Number of smokers attempting to quit	1,349			1,349		
Sucess rate	NRT	BPN	VRN	NRT	BPN	VRN
	16.0%	18.4%	23.0%	5.3%	14.6%	21.9%
New non-smokers	216	248	310	71	197	295
Number smokers dont quit	1,133	1,101	1,039	1,278	1,152	1,054
New five year cost * (C)	$10,452,028	$10,394,777	$11,092,195	$10,623,254	$10,455,586	$11,109,798
New ten year cost * (D)	$42,942,704	$42,638,518	$43,355,420	$44,163,549	$43,072,090	$43,480,927
Diference C - A (five year)	$161,916	$104,665	$802,083	$333,142	$165,474	$819,686
Diference D - B (ten year)	-$1,152,443	-$1,456,629	-$739,727	$68,402	-$1,023,057	-$614,220

* medical + pharmacoterapy + opportunity cost, accumulated

The year-by-year cost reductions associated with smoking cessation is unpredictable, but evidences support a conclusion that over time, the health risk of a former smoker tends to return to the non-smoking level. In case of gradual improvement, it can be assumed that after a certain number of years, a former smoker's health care costs will be at least less than if he had continued smoking. This is based on the assumption that smoking rises the cost of health care.





CONCLUSIONS

This analysis presents an actuarial assessment of the benefits derived from smoking cessation programs as compared to their cost. The actuarial impact of smoking cessation programs will be different for each pharmacotherapy. Despite the substantial cost for the implementation of smoking therapies with first line medications, the return of the investment occur even considering only medical expenses. Selecting populations with better perspective of therapeutic success and negotiating discounts on the acquisition of the drugs, will probably lead to more significant results at shorter intervals.

According to many studies, smoking cessation interventions that are delivered in multiple formats (telephone counseling, group counseling, individual counseling) increase abstinence rates and should be encouraged. Considering that 70% to 80% of smokers who use NRT returned to tobacco use and abstinence rates after 48 weeks for individuals treated with VRN and BPN seems to be higher, the ROI of these two drugs must be better.
Although there is a need to corroborate the results of these simulations with reality, evidences demonstrate the importance of considering financial support systems to smoking cessation interventions, by the health plans.

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