Evaluation of Effect of Insurance Coverage on Sale Volume and Price of Entered Drugs in Insurance List in 2012 in Iran

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Authors' contributions

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ABSTRACT

Background: Drug industry is considered as the second profitable industry in the world and plays an important role in global economy. The sharp annual growth in drug expenditures imposes heavy loads on the health insurance organizations as a major part of these costs are covered by these companies. Covering a drug by health insurance companies not only reduces the out of pocket costs of patients, but also increases probability of prescribing the covered drug by physicians. Consequently this generally ends to an increase in pharmaceutical sales volume. This enables the health insurance companies to negotiate a lower price with pharmaceutical companies.
Methods: In this study, the effect of insurance coverage of a list of drugs in Iran on increase of their sale volume as well as the reduction in their price has been evaluated. The SPSS software used to assess the trend of numerical, monetary sales and price of the insured drugs compared to non-insured medicines in a cross-sectional study. Paired tests (Student t test and Wilcoxon test) with a significance level of $0.05 < P$ were used to analyze data in the current study.
Results: The achieved results showed that although the sale volume of the insured drugs were increased during the investigated period, this was the same for non-insured drugs as well, However, the prices of investigated insured drugs were reduced following covering by insurance companies while this was not the case for non-insured drugs.
Conclusion: The results of this research can be used by policy-makers to have a better understanding of drug policies in Iran and by insurance organizations in order to evaluate consequences of adding drugs to their coverage list.

Keywords: Insurance coverage; price; volume of prescription; sales volume; Iran drug list.

1. INTRODUCTION

Medicines and pharmaceutical products as one of the basic commodities and treatment chain ring play a unique role in ensuring sustainable health of society. The worldwide mass of drug economy is annually around one trillion dollars and average per capita consumption of drugs in the world, has been estimated to be about $196 which represents an average annual increase of 3%. Pharmaceutical industry as the second most profitable global industry has been raised after the crude oil production industry and relies heavily on research and development. In Iran, this industry with annual sales of about $ 4 billion is one of the pioneer industries and Pharmaceutical market demonstrates an average annual growth of 28.38 percent in a 13-year period (1997-2010). The annual growth equates to 9% for medicines domestically produced and 42% for imported drugs [1].

As a great part of the drug costs are covered by health insurance companies, it is crucial for them to find ways to spend money rationally. On the other hand the price of medicines has always been one of the most important issues to doctors when prescribing. This important factor (the medicine price) is influenced by various factors such as drug insurance coverage, the availability and the lack of the medicines, legal or illegal distribution of medicines, and many other factors, and plays not only a direct role in

administration; but also is more effective in both individual and community health indirectly. Drug insurance coverage is of great importance particularly in countries such as Iran, as on the one hand results in Improvement in the administration of the covered drugs and on the other hand can reduces the out of pocket expenditures by patients [2].

The main insurance organizations in Iran include the Iranian social security organization, the Iranian health insurance organization, and the Iranian armed forces insurance organization. Also Imam Khomeini Relief Foundation as a supporting organization is responsible for the health insurance coverage of a part of low income community of the country. According to official statistics, more than 90% of the Iranian people are covered by at least one type of health insurance [3]. One of the putative ways to diminish health-care costs is to reduce the drug prices after their entrance in drug lists which are covered by health insurance organizations, as pharmaceutical companies desire to enter their productions into the reimbursed medicines lists due to increase in their sales volume. The experiences of developed countries also reflect this theme. For example in Australia, drug prices 30% lower than the average of European Union and is about 50% less than the world average. Experts know this as one of the results of the price agreement between pharmaceutical companies and the Australian government

following the entrance of drugs to reimbursed medicines lists. This is named PBS (Pharmaceutical Benefit Scheme) [4].

Nikolentzos et al. [5], in a cross sectional study in London looked at the impact of the insurance coverage on medicine consumption in 13 countries, including Australia, Canada, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, New Zealand, Spain, Sweden and Switzerland. The results of this study showed that the majority of new drugs in these countries, apart from Germany, faced reduction in price when entered the reimbursed medicines lists. In all these countries, insurance coverage, led to greater prescription and usage of these drugs [5].

Also in a qualitative study in 2005 by the United States Commerce International Trade Administration on the drug insurance coverage and prescription trend in OECD (Organization for Economic Cooperation and Development) member countries, it was released that in 9 of the 11 above mentioned countries, expensive drugs, particularly the new medicines, when were covered by health insurance companies, faced with increase in their prescription and usage [6].

In March 2008 Mark Duggan from the University of Maryland in the United States of America conducted a study that showed, conducting the medical insurance plan section D (Medicare Part D) by the Federal Government on January 1, 2006 decreased the prices and increased the usage of medicines by the recipients of the Medicare Part D plan [7].

Also a cross sectional study conducted by Ngorsuraches et al. [8] in three countries including South Korea, China and Thailand, (published in 2012), revealed that almost all expensive medicines in pharmaceutical baskets were covered by health insurance organizations and this led to increase in the prescription of these drugs.

Considering the statement of the Iranian authorities in 2/8/2012 to cover 53 drugs used in cancer therapy and some other severe diseases by the health insurance companies and the significant financial burden that this decision imposed to these organizations in Iran, this year was considered as the base year in this study to review the changes in sale volume and price of these drugs, two years before and after this year. this study tried to analysis the effects and outcomes of drug insurance and it pay to check whether drug insurance in Iran, has significant impact on sales and the price of the drug or not. Because data from the result of drug insurance, can provide useful information to health insurance organizations and policy makers.

This should be taken into account that considering all the potential factors that influence the sale volume and price of pharmaceutical products, e.g. variation in accessibility due to sanctions, fluctuations in exchange rate, inflation and, is practically impossible. Consequently, to eliminate the potential confounding effect of such factors in the current study, the entered drugs to reimbursed medicines list were compared to uncovered drugs by health insurance companies at the same period of time.

2. METHODOLOGY

The paired test is commonly used when a sample is exposed to an intervention and the existence of a significant change, before and after the exposure is under question [9]. In order to conduct such test, normality of statistical distribution of variables should be assured. Normality of statistical distribution of variables is specified with certain methods –usually Kolmogorov-Smirnov (KS) test-. This test is a preliminary test that gives some information about the correct use of parametric or non-parametric tests.

Parametric tests would be used for variables with normal distribution while non-parametric tests should be used for other distributions [10]. The student t-test was used in the current study as a parametric test for paired comparison of the continuous variables with a normal distribution. The Wilcoxon test was employed as a nonparametric test to compare variables not normally distributed [11].

To analyze data in this study, two different lists of drugs were prepared. The first list includes the 53 drug items which were entered to the reimbursed medicines list in 2012 with their dollar cost and the numerical sale volume which were extracted from Iran drug statistics in timespan between 2010 and 2014. The second list includes those drugs which were not covered by the main Iranian health insurance organizations at the same period of time. The latter list was extracted using the published Iran Drug List (IDL) as well as the reimbursed medicines list published by the Iranian health insurance organizations. The trend of changes in price and sale of the drugs included in each list were evaluated before and after 2012 (year of

covering the 53 drug items by the insurance companies) and compared with each other, using statistical software of SPSS 16.

3. RESULTS AND DISCUSSION

3.1 Sale Volume

To evaluate the normality or abnormality of data distribution, the K-S test was used. According to the results of the performed K-S test, the sale volume variable neither for the insured nor for the non-insured drugs shows a normal distribution. Accordingly the non-parametric Wilcoxon test was employed to evaluate changes in this parameter.

Wilcoxon test has been used in order to evaluate before and after changes in monetary and numerical sale of the insured and non-insured drugs. The results are shown in Table 1.

The assessment revealed that for 90.6% of insured drugs, the numerical sale volume increased after entrance to reimbursement list while reduction in numerical sale volume was seen for only 9.4% of these 53 items. The reported value of z statistic and significance level related to it, show a significant increase in numerical sale of these insured 53 drug items after entrance to reimbursement list. Also evaluation of dollar sale of the 53 insured drugs before and after 2012 shows an increase in sale

for 67.92% of these drugs. Although for 17 items of these drugs the average monetary sale decreased after entrance to reimbursement list; however the results of the total monetary sale demonstrated a significant increase after covering the drugs by the health insurance companies. On the other hand, among non-insured drugs increase in average numerical sale and dollar sale after 2012 was seen in 60.82% (sig=0.000) and 52.66% (sig=0.001) of the evaluated items, respectively.

3.2 Price

According to obtained results of K-S test the distribution of these variables is not normal and consequently, non-parametric tests should be used to evaluate changes in price before and after entrance to insurance list.

The results of the Wilcoxon test to compare the average changes in price of the insured and non-insured drugs before and after 2012 are shown in Table 2.

The investigation revealed that for 80.77% of the insured drugs the dollar price reduced after covering by the insurance organizations. The results show a significant decrease in total dollar price for the insured drugs following entrance to the reimbursement list. However no significant change was seen for this variable in non-insured drugs after 2012.

Table 1. Results of Wilcoxon test in order to compare dollar and numerical sale of insured and non-insured drugs before and after 2012

Wilcoxon signed ranks test	Negative ranks	Positive ranks	Ties	Total	Z	Asymp. Sig. (2-tailed)
Numerical sale of 53 insured drug	5[a]	48[b]	0[c]	53	-5.121	0.000
dollar sale of 53 insured drug	17[a]	36[b]	0[c]	53	-3.085	0.002
Numerical sale of non-insured drugs	509[a]	790[b]	0[c]	1299	-12.317	0.000
dollar sale of non-insured drugs	863[a]	960[b]	0[c]	1823	-3.246	0.001

a. after < before
b. after > before
c. after = before

Table 2. Results of the Wilcoxon test in order to compare dollar price of insured and non-insured drugs before and after 2012

Wilcoxon signed ranks test	Negative ranks	Positive ranks	Ties	Total	Z	Asymp. Sig. (2-tailed)
Dollar price of 53 insured drugs	42[a]	10[b]	0[c]	52	-3.943	0.000
Dollar price of non-insured drugs	549[a]	588[b]	71[c]	1208	-0.067	0.947

a. after < before
b. after > before
c. after = before

Table 3. Results of Wilcoxon test in order to compare dollar and numerical sale of insured imported drugs

Wilcoxon signed ranks test	Negative ranks	Positive ranks	Ties	Total	Z	Asymp. Sig. (2-tailed)
Numerical sale of imported drugs	1[a]	29[b]	0[c]	30	-4.474	0.000
Dollar sale of imported drugs	8[a]	22[b]	0[c]	30	-2.869	0.004
Dollar price of imported drugs	23[a]	7[b]	0[c]	30	-2.396	0.017

a. afterII < beforeII
b. afterII > beforeII
c. afterII = beforeII

Table 4. The results of t-student and Wilcoxon tests in order to compare dollar and numerical sale of the insured domestic drugs

Paired samples test	Lower	Upper		df	T	Sig. (2-tailed)
Numerical sale of domestic drugs	-1.02939E7	-1.19067E6		22	-2.616	.016
Dollar sale of domestic drugs	-1.18233E6	2.97272E5		22	-1.241	.228
Wilcoxon signed ranks test	**Negative ranks**	**Positive ranks**	**Ties**	**Total**	**Z**	**Asymp. Sig. (2-tailed)**
Dollar price of domestic drugs	20	3	0[c]	23	-3.832	0.000

3.3 The Imported Drugs

Evaluation of normality of the distribution of variables related to numerical sale, dollar sale and dollar price shows the abnormality of these distributions. So, the non-parametric test of Wilcoxon was used to test the proposed hypotheses about the imported drugs.

The results demonstrate that both the dollar and numerical sale volume increase significantly in these drugs. This means that entering these 30 imported drug items to the reimbursement list has increased their sale volume. Also dollar price has been reduced for 77% of these drugs after entrance to the insurance list.

3.4 The Domestic Drugs

The evaluation of normality of variables of numerical sale, dollar sale and price of the Iranian insured drugs demonstrated the normality of the distribution of sale variables and abnormality of the distribution of drug price. Consequently, t-student test used for evaluation of sale volume and Wilcoxon test employed for price variable. The results are presented in Table 4.

According to the presented results in Table 4, it can be concluded that entrance to the insurance list increased the numerical sale of the Iranian drugs. But results for dollar sale is unlike the previous variable and didn't show significant difference between before and after entering to the insurance list for the Iranian drugs. The price reduction for dollar price was seen for 87% of the domestic drugs after entering the insurance list.

4. CONCLUSION AND PRESENTING SUGGESTIONS

As covering a drug by health insurance organizations reduces the out of pocket payment by patients and also increases the probability of prescribing them by physicians, totally this will end to an increase in its sale volume. In this case, the insurance organizations can negotiate price with the pharmaceutical companies to benefit from a lower price. This study was performed to recognize the behavior of the Iranian pharmaceutical market in response to this phenomenon.

Based on the obtained results regarding the sale volume of the evaluated insured and non-insured drugs, it can be concluded that due to the growth in sale volume in both lists, this increase in sale can not necessarily be ascribed to entrance of these drugs to the insurance list, although the results of the studies by Nikolentzos et al. in 2008 [5], Giaccotto C et al. in 2005 [6], Mark Duggan in 2010 [7] and Ngorsuraches in

2012 [8] represented a significant increase in the sale volume of drugs following their covering by the health insurance companies. The results of this study showed a reduction in price of the evaluated insured drugs, while no significant difference was seen in the price trend of non-insured drugs before and after 2012. These findings are consistent with the results of the studies conducted by Nikolentzos et al. in 2008 [5], Giaccotto C, et al. in 2005 [6], Mark Duggan in 2010 [7] and Ngorsuraches in 2012 [8] in which, the authors concluded a reduction in drug price following their coverage by the health insurance companies.

One of the limitations of this research was the existence of confounding factors such as variation in accessibility to drugs, exchange rate fluctuations and inflation. However to take out this effect, we compared the insured drugs with non-insured ones at the same period of time.

We believe that the results of this study can be used by the health policy decision makers to employ these evidences for price negotiation with pharmaceutical companies when their produces are covered by insurance organizations.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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