



## **Factors Influencing Hematologists-Oncologists' Prescription of Chemotherapy Drugs in Cancer Treatment in Iran: an Interview Questionnaire Study**

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### **Abstract**

Cancer can be treated by surgery, chemotherapy, radiation therapy, hormonal therapy, and targeted therapy. The choice of treatment depends on the type and stage of the cancer. Chemotherapy drugs play an important role in cancer treatment. The objective of this interview-questionnaire study is to explore what influences Iranian hematologists-oncologists' prescription when prescribing chemotherapy drug. Data collection can be divided into two categories: the interview and the questionnaire. The qualitative part consists of depth interviews, utilizing closed- and open-ended questions, were conducted with oncologists, selected through theoretical sampling. The interview questions consisted of two parts, in the first part; open-ended questions were posed about factors influencing prescription. In the second part, the oncologists were asked to rate predefined factors that might influence their prescription decisions. The quantitative part of the study consists of questionnaire included two parts; the first part consisted of general questions including gender, age, membership in scientific committees and professional background. The second part consisted of 24 specialized questions that covered all the indexes of the effective factors on oncologists' prescription decisions. Ten oncologists were interviewed. Factors affecting chemotherapy drug prescription were grouped into three categories based on qualitative studies carried out and is presented as they were mentioned and rated by the hematologists-oncologists: 1) Products properties, 2) Pharmaceutical marketing, 3) Scientific, experimental confirmation. The findings from the questionnaire suggest products properties particularly (clinical effectiveness) is the most important factor considered in drug prescription choice. Also, the socialized medicine sponsorship and clinical trial respectively are the most effective on increasing the frequency of prescribing. Whilst, prescribing by brand name or higher prices for a drug are not necessarily justified. The results of this study provide new insights to the nature prescribing behavior driven to develop measures which could be used to achieve greater clinical effectiveness and economic efficiency from drug prescribing.

*Keywords:* Chemotherapy drug, Clinical effectiveness, Interview, Pharmaceutical marketing, Prescribing behavior, Questionnaire.

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## 1. Introduction

The success of a pharmaceutical company depends on recognizing and realizing the behavior of the target market and factors affecting selection of a pharmaceutical product by customers especially physicians. Physician prescription behavior could be depending on relevant available information about the company and its drugs and the patient's condition. Some physicians adopt the drugs of certain companies and prescribe the same brand, based on the success of previous treatments [1]. Although patient buys drugs for curing disease but which generic or brand should customer buy is the ultimate choice of physician since the physicians are the most trusted healthcare professionals [2, 3]. Physicians play an integral role in deciding which medication or method of medical treatment best fits the patients' health condition [4, 5]. Therefore, in highly competitive global economy, one of the best pharmaceutical marketing strategies in targeted markets regarding direct focus on physicians and patients [6].

Much of the literature suggests several factors include age and sex of the physician or the

patient, the socio-economic characteristics of the practicing area or the reimbursement status of therapy are fixed and such factors do not hugely impact on modification and improvements in prescribing behavior [7]. On the other hand, there are factors which can be influenced and in turn cause a modification to the prescribing behavior of physicians. Such factors for instance include, pharmaceutical industry marketing strategies, insurance status influences, educate health care, personal medical experience and patient intervention [8].

Irrational prescription is a global problem, the pattern of physician prescription determines the type and class of drugs that are used and this will in turn have effects on the overall cost of patient medications [9].

Several studies have been conducted on factors influencing prescription behavior of physicians. In each of these studies, according to the purpose and conditions of the study, various factors were considered. For example, in Greece and Cyprus some factors investigated in which influence physician's prescribing decisions. The clinical effectiveness of medicine is the most important factor considered in drug prescription choice in both countries. Greek physicians were significantly more likely to take additional criteria under consideration, such as the drug form and recommended daily dose and the individual patient preferences [10]. Similarly, Soremekun *et al.* in another study found that effectiveness of drugs and costs are major factors that guided the

physicians' choice of drugs [11]. Reichert et al. showed in their study that physicians felt the cost of medicines to be an important criterion in prescription choice [12]. Shamim-ul-Haq et al. reported that two factors which impact a lot than any other factor i.e. one is New Drug in market and the promotional tools [3]. Results from a qualitative study by Buusman et al. showed that in addition to being drug price was considered an important factor influencing prescribing decision; pharmaceutical industry sales representatives influenced physicians significantly [13]. Korenstein et al. investigated attitudes and perceptions of physicians across multiple specialties toward specific interactions with the pharmaceutical and medical device industries and its effect on physician prescription behavior have been investigated. The result of this study shows that the attitudes toward industry and gifts were generally positive. More than 65 percent found educational materials and sponsored lunches appropriate, whereas less than 25 percent considered vacations or large gifts appropriate [14].

Lieb et al. showed although pharmaceutical sales representatives (PSR) visits and attempts to influence physicians' prescribing behavior which is part of everyday life in private medical practice, yet only a few physicians consider themselves to be susceptible to this kind of influence [15]. An interview study by Kalkan et al. in Sweden focused on factors influencing rheumatologists' prescription of biological treatment in rheumatoid arthritis, among the factors rated by the rheumatologists

as having the highest impact on the prescribing decision, are those concerning scientific evidences and professional and national guidelines, factors rated as having the lowest impact on prescription decisions are the patients' expressed requests and wishes and non-disease-specific patient attributes, as well as influence from pharmaceutical companies and media [16].

One other published study has estimated quantitatively the impact of pharmaceutical promotions on physician's prescribing behavior for three leading statin brands, after controlling for factors such as patient, physician, and physician practice characteristics; generic pressure; et cetera. Findings reveal that even though detailing, providing free meals to physicians and sample dispensing affect the brand share positively, the magnitude is very brand-specific. Especially in the case (Lipitor and Crestor) and medical journal advertisings (Crestor) had a significant impact on physicians' prescribing behavior [17].

Following previous studies, as a program aiming to evaluate the effect of various factors on prescription behavior of physicians in the choice of drugs, we have selected cancer chemotherapy medications because the cancer is one of the critical public health problems in the world. The corresponding incidence and mortality statistics shows that it is increasing in developing as well as developed countries [18]. Among different strategies used for cancer therapy, chemotherapy is typically the main treatment. Chemotherapy is a category of cancer treatment that uses chemical

substances, especially one or more anti-cancer drugs that are given as part of a standardized chemotherapy regimen [19].

The pharmacotherapeutic treatment of patients with cancer is generally associated with multiple side-effects. Drug interactions and duplicate prescriptions between anti-cancer drugs or interactions with medication to treat comorbidity can reinforce or intensify side-effects. A prevalence study using an advanced screening method shows that developing a pharmaceutical screening programmer, including an automated electronic warning system, to support drug prescribing for ambulatory cancer patient. This programmer could minimize the occurrence of drug related problems such as drug interactions and duplicate prescriptions, thereby increasing quality of life [20].

It is reasonable to expect that more seriously ill patients would be adherent to prescribed medication, and consequently that cancer patients would have high adherence. Although, studies indicate that cancer patients on long-term treatment have a considerable non-adherence similar to the patients with other diseases [21].

Despite the importance of the prescribing for patients with cancer, only a few studies have focused on the impacts of factors in prescription behavior of physicians on chemotherapy drug class. The purpose of this study is to identify qualitative and quantitative estimation of the factors that influence the prescription behavior of physicians in the choice of chemotherapy drugs for the treatment of cancer in Iran.

## 2. Materials and Methods

Quantitative research is defined as the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect, and qualitative research is described as the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships [22]. Mixed methods research, where quantitative and qualitative methods are combined, is increasingly recognized as valuable, because it can potentially capitalize on the respective strengths of quantitative and qualitative approaches [23]. Combining qualitative and quantitative methods has been widely used and accepted in many areas of health care research for a variety of reasons. The integration of qualitative and quantitative approaches is an interesting issue because combining quantitative and qualitative methods may generate deeper insights than either method alone [24, 25].

The purpose of this paper is to focus on mixed qualitative and quantitative method, because the previously published studies often investigated qualitative and quantitative separately. We investigated the factors that influence the prescription behavior of physicians in the choice of chemotherapy drugs for the treatment of cancer in Iran. To this purpose, in quality section was used convenience sampling and the sample volume was selected according to theoretical saturation method [26]. In the quality section, the simple random sampling method was used.

### 2.1. Data Collection

In this study, interviewees and questionnaire respondents were hematologists-oncologists of a major metropolitan area in the Iran (Tehran) in 2014. The sample size for the quantitative study was understandably much larger than the sample size for the qualitative portion.

Data were collected through depth interviews and closed questionnaires in section qualitative and quantitative respectively. The qualitative part consists of depth interviews, utilizing closed- and open-ended questions, were conducted with oncologists, and selected through theoretical sampling. Ten oncologists were interviewed face-to-face. All interviews were digitally recorded and transcribed verbatim. Informed consent for recording of the interviews was obtained before each interview. The participants were also informed about how the collected data would be analyzed and presented, with particular emphasis on the fact that identification of individual prescribers would not be reachable in the final presentation. The interview questions consisted of two parts, in the first part; open-ended questions were posed about factors influencing prescription. In the second part, the oncologists were asked to rate predefined factors that might influence their prescription decisions. The quantitative part of the study consists of questionnaire included two parts; the first part consisted of general questions including gender, age, membership in scientific committees and professional background. The second part consisted of 24 specialized questions that covered all the

indexes of the effective factors on oncologists' prescription decisions. This questionnaire contains 5-choice Likert scales ranging from as below: very effective, effective, average, ineffective and very ineffective [27, 28]. Forty nine hematologists-oncologists responded to the questionnaire. Descriptive and inferential statistics were performed on collected data using SPSS 16.0.0.

## 3. Results and Discussion

### 3.1. Demographic Characteristics

The results demonstrated that 20.4% of the sample groups were female and 79.6% of them were male, while 57.1% of them were academic staff and 42.9% were non-academic staff. In terms of the years of service, 38.8% of them had less than 5 years, 14.3% had between 6 to 10 years, 28.6% had between 11 and 15 years and 18.4% of them had more than 16 years. In terms of the age of participants, 49% of them were between 35 and 45 years old, 32.7% were between 46 and 55 years old, 16.3% were between 56 and 66 years old, and 2% of them were between 66 and 75 years old.

### 3.2. Mapping of Category Prescription Factors In This Study

Factors affecting chemotherapy drug prescription were grouped into three categories based on qualitative studies (depth interviews) carried out and is presented as they were mentioned and rated by the hematologists-oncologists: 1) Products properties, 2) Pharmaceutical marketing, 3) Scientific, experimental confirmation (Table 1).

### 3.2.1. *Products Properties*

The most important sub factors represent the pharmaceutical products properties are as follows: price, quality, effectiveness, popularity, low side effect, existence of slightly medicine vial, using facility, new combination, and belief to prescribing brands not generic. In different studies and researches, the ranges of influence of sub factors have been widely reported. This can be due to selection of different statistical society and rules and regulations regarding prescription.

### 3.2.2. *Pharmaceutical Marketing*

In the media and in medical sources the desirability of specific pharmaceutical marketing activities is a highly debated topic. On average pharmaceutical companies spend 20% or more of their sales on marketing [29]. Many studies investigating the influence of pharmaceutical marketing on the prescribing behavior of physicians, it appears that pharmaceutical marketing influences physician's prescribing behavior in both a positive and negative way. Pharmaceutical marketing uses various instruments such as availability, country name of product manufacturer, company image, acceptability of manufacturer, socialized medicine sponsorship, and exclusive manufacturer. Marketing effects are largest in size in the period right after the introduction of a brand or a new drug and that the marketing efforts directed at physicians become less effective at a later stage in the product life cycle.

### 3.2.3. *Scientific, Experimental Confirmation*

Scientific, experimental confirmation of the pharmaceutical products has considerable influence in the reception and applies the prescriptions by physicians in different countries. A drug can be confirmed among many dimensions, such as its research molecule, its clinical trial, its FDA approval, its sponsorship for conferences, its reliable articles, journals/magazines, its medical representative presentation on new varies, its previous experiment in prescribing, and others recommendation on prescribing. In the United States, before a drug can be prescribed, it must undergo the FDA's approval process. An approved drug is a preparation that has been validated for a therapeutic use by a ruling authority of a government while new drugs are available only by prescription by default. One sample of anticancer drugs; there was a trend towards a shorter clinical trial period than other drugs. Most anticancer drugs approved that using the accelerated approval pathway is eventually confirmed as safe and effective on the basis of successful post-approval studies [30].

### 3.3. *Influential Factors*

In order to investigate the factors affecting the prescription of the drug, in the first stage of the qualitative analyses, method of conceptual analysis and manual coding was used. Eventually 24 indexes were identified in which the mentioned indexes were classified within the framework of three main factors from conceptual point of view. The obtained

**Table 1.** Factors that influence prescription decisions.

Factor	Sub Factor
Products properties	Price, quality, effectiveness, popularity, low side effect, existence of slightly medicine vial, using facility, new combination, belief to prescribing brands not generic.
Pharmaceutical marketing	Availability, country name of product manufacturer, company image, acceptability of manufacturer, socialized medicine sponsorship, exclusive manufacturer.
Scientific, experimental confirmation	Research molecule, clinical trial, FDA approval, <u>sponsorship for conferences</u> , reliable articles, journals/magazines, <u>medical representative presentation on new varies</u> , previous experiment in prescribing, others recommendation on prescribing.

indexes out of the interviews of the experts are summarized in table 1.

As mentioned earlier, the second part of the questionnaire was intended to investigate the criteria which physicians take into consideration when making prescribing decisions. In order to assess the reliability, the degree of reliability index was calculated using Cornbrash's Alpha method [31, 32]. For products properties, pharmaceutical marketing, scientific, experimental confirmation and the entire questionnaire 0.752, 0.862, 0.650 and

0.733, respectively, were obtained. These results show that the questionnaire is reliable. For this purpose, the validity of the questionnaire was evaluated against the ideas of marketing scholars and its conceptual validity was approved. The indexes of mean, standard deviation and correlation between variables of the study are shown in table 2. As it is noticed, the highest mean is seen in product properties, scientific and experimental confirmation as well as pharmaceutical marketing, respectively. The least standard

**Table 2.** Variables means, standard deviations, and correlations.

Variables	Mean	SD	Product properties	Scientific,experimental confirmation	Pharmaceutical marketing
Products properties	3.9473	0.41171	1	0.399(p<0.01)	0.413(p<0.01)
Scientific, experimental confirmation	3.8863	0.49457		1	0.577(p<0.01)
Pharmaceutical marketing	3.3748	0.41736			1

deviation is also seen in product properties, pharmaceutical marketing, scientific and experimental confirmation, respectively. The results of Pearson's correlation test indicated that there is a significant positive relation between the product properties and scientific and experimental confirmation ( $r = 0.399$ ;  $p < 0.01$ ) & marketing activities ( $r = 0.413$ ;  $p < 0.01$ ), also between scientific and experimental confirmation and marketing activities ( $r = 0.577$ ;  $p < 0.01$ ).

For investigating the mean significance of

24 indexes impact on chemotherapy drug selection, one t-test sample was employed. The results of this sample show that, which indexes are effective on choice of one drug and which are not. Also Friedman's test was used to grade the degree of effect among indexes. The results of these two tests are represented briefly in table 3.

The results of t-test on the three factors are presented in table 4. Results show that the three factors are effective in drug selection on the significance level of more than 99%. The

**Table 3.** The results of the t-test and Friedman's test in rating of factors that influence prescription decisions.

Sub factor	t-test		Friedman's test		Sub factor	t-test		Friedman's test	
	t	Sig	Mean rank	Rank		t	Sig	Mean rank	Rank
q1	9.825	0.000	15.66	8	Country name of productmanufacturer	-1.754	0.086	5.88	23
q2	26.535	0.000	19.20	1	Company image	0.785	0.436	8.24	19
q3	28.812	0.000	19.18	2	q15	2.396	0.021	8.51	18
q4	4.781	0.000	12.37	13	Exclusive manufacturer	-4.799	0.000	4.86	24
q5	10.827	0.000	17.24	5	Sponsorship for conferences	-.136	0.892	7.17	21
q6	7.265	0.000	13.57	11	q18	15.333	0.000	16.48	7
q7	8.563	0.000	15.61	9	q19	8.844	0.000	14.97	10
					Medical				
q8	15.130	0.000	18.63	3	representativepresentation on new varies	-1.879	0.066	6.86	22
q9	14.875	0.000	16.98	6	Belief to prescribing specific brands not generic	0.387	0.700	8.24	20
q10	3.683	0.001	10.38	15	q22	9.512	0.000	13.09	12
q11	4.228	0.000	10.64	14	q23	2.914	0.005	9.03	17
q12	3.904	0.000	9.68	16	q24	17.333	0.000	17.53	4
Chi-Square=512.876; Sig= 0.000; DF= 23									

**Table 4.** One sample t-test and Friedman's test for factors that influence prescription decisions.

Factor	t-test		Friedman's test	
	t	Sig	Mean rank	Rank
Product properties	16.106	0.000	2.53	1
Scientific, experimental approval	12.545	0.000	2.26	2
Pharmaceutical marketing	6.287	0.000	1.21	3
Chi-Square =48.726; Sig= 0.000; DF= 2				

**Table 5.** Descriptive statistics of Friedman's test regarding product properties factor.

Product properties sub factors	Mean rank	Rank
Price of product	5.70	4
Product quality	7.17	2
Effectiveness of product	7.18	1
Popularity of product	4.53	5
Low side effect	6.50	3
Existence of slightly medicine vial	3.68	7
Using facility	3.70	6
New combination	3.52	8
Belief to prescribing brands not generic	3.03	9
Chi-Square= 182.324 ; Sig=0.000;DF=8		

index of product properties to select of chemotherapy medicine by the hematologists-oncologists specialists stands on the top of the table as far as the importance of the index is concerned and it is then followed by the index of scientific and experimental confirmation of the specialists as well as pharmaceutical marketing, respectively.

It is worth mentioning that the mean test of a community was also used for all the indexes of the research. Besides, Friedman test was also used for grading the indexes at each level and its results are discussed as follows.

Table 5 contains information regarding the responses of physicians in relation to impact product properties factors. It is noteworthy that sub factors such as effectiveness, quality and low side effects among the sub factors of the product properties are the first, second and third positions respectively and price of drug is located the next rank while brand drug use is in last rank. The majority of physicians in Iran believe that a higher price and brand drug use does not necessarily imply better patient outcomes.

Table 6 presents information regarding attitudes in relation to pharmaceutical

**Table 6.** Descriptive statistics of Friedman's test regarding pharmaceutical marketing factor.

<b>Pharmaceutical marketing sub factors</b>	<b>Mean rank</b>	<b>Rank</b>
Availability	4.48	2
Country name of product manufacturer	2.63	5
Company image	3.16	4
Acceptability of manufacturer	3.36	3
Exclusive manufacturer	2.09	6
Socialized medicine sponsorship	5.29	1
Chi-Square =113.925; Sig= 0.000; DF= 5		

marketing factors. Most physicians chose sub factors such as socialized medicine sponsorship, availability and acceptability of manufacturer products as key factors in this section. And country name of product manufacturer, company image and exclusive manufacturer appear to have a less important role in prescribing behavior of physicians.

Finally, Table 7 presents information regarding physician's attitudes towards Scientific, experimental confirmation issues.

As indicated by the findings, clinical trial, FDA approval and reliable articles are first to third priorities for the oncologists in prescribing chemotherapy drugs.

#### 3.4. Discussion

According to the present analysis, the hematologists-oncologists are well educated and participate frequently in medical conferences. This could be partly explained by

**Table 7.** Descriptive statistics of Friedman's test regarding scientific and experimental approvals factor.

<b>Scientific, experimental confirmation sub factors</b>	<b>Mean rank</b>	<b>Rank</b>
Research molecule	5.80	4
Clinical trail	7.04	1
FDA approval	6.50	2
Sponsorship for conferences	2.75	8
Reliable articles	6.22	3
Journals/magazines	5.74	5
Medical representative presentation on new varies	2.53	9
Previous experiment in prescribing	4.97	6
Others recommendation on prescribing	3.45	7
Chi-Square=187.558; Sig= 0.000; DF= 8		

the fact that cancers with high incidence and mortality rates are a global problem and there are efforts to discover of new drugs and new treatment methods. Drug prescribing is the most important function of a physician worldwide [33]. Chemotherapy drugs play an important role in cancer treatment; on the other hand, branding is also effective in the behavior of prescribing physicians. The findings of this study demonstrate how the use of mixed methods can lead to close result and sometimes similar to previous findings. In the respondents' ranking of predefined factors that may influence the prescription decision, three broad categories of factors can be distinguished (Table 1).

Among the factors evaluated by the hematologists-oncologists as having the highest impact on the prescribing decision are those products property, pharmaceutical marketing and scientific, experimental confirmation of medicines.

More precisely, the qualitative findings of this study show that products property is the most important factor considered by physicians in prescribing drugs. Also, pharmaceutical marketing and scientific, experimental confirmation of medicines were the next in the priorities of physicians. As it is shown in Table 2, properties and scientific and experimental confirmation of drug had significant effect on the frequency of prescription of the brand product.

The quantitative results of this study are consistent with previous studies which have estimated that the drug clinical effectiveness is the most important sub factor considered on

prescription frequency by physicians in relation to the properties of the drug.

As shown in Table 5, quality and low side effects among the indexes of the product properties are the second and third positions respectively. In the case of side effects and adverse drug reactions physicians are informed by the National Organization of Medicines and sales representatives. This is expected since the National Organization of Medicines is responsible for the assessment of safety and the pharmacovigilance of medicinal products. Even though adverse drug reactions may not appear very often, they do have a profound effect on a physician prescribing patterns [10]. According to the results, the price of the drug is estimated to be the fourth factor. Sub factors rated as having the lowest impact on prescription decisions are popularity, existence of slightly medicine vial, using facility, new combination and belief to prescribing brands not generic. As the results show that oncologists are concerned about the effectiveness and quality of anti-cancer drugs for patients and factors such as price are next positions in rank.

Quantitative analysis shows that pharmaceutical marketing influences the choice of anti-cancer drugs by oncologists. As shown in Table 6, socialized medicine sponsorship, availability and acceptability of manufacturer as having the highest impact on the prescribing decision. Sub factors rated as having moderate or lowest influence are country name of product manufacturer, company image, and exclusive manufacturer.

The effectiveness of different pharmaceutical marketing strategies varies widely. The highly effective communication process was public relations. These public relation strategies are more expensive than other strategies. Naturally this puts the physicians under some obligation to prescribe the brands that are promoted [34]. According to several studies [35, 36], physician's prescribing behavior is affected by pharmaceutical marketing directed at physicians in a significant, positive way. This is because marketing efforts make physicians aware of new drugs and their specifics. However, this positive effect occurs up to a certain point, after which the effects of marketing efforts generate adverse effects [37]. The research provided in this paper suggests that in order for the pharmaceutical industry to optimally influence the adoption behavior of physicians the most important consideration that needs to be taken into consideration when developing a marketing strategy are socialized medicine sponsorship, availability and acceptability of manufacturer.

Eventually, clinical trial, FDA approval and reliable articles, other sub factors are influencing the behavior of prescribing physicians. Sub factors rated as having moderate influence are research molecule, journals/magazines and previous experiment in prescribing. Finally, Sub factors rated as having the lowest impact on prescription decisions are the others recommendation on prescribing, sponsorship for conferences and medical representative presentation on new varies. The result is presented in Table 7. Clinical trials are experiments done in

clinical research that serve as the basis of FDA approval of novel therapeutic agents. A cancer clinical trial is a type of research study that tests new drugs for cancer treatment. Clinical trials for cancer drugs are somewhat different from those for drugs used to treat illnesses that are less serious. For example, Studies involving cancer drugs usually do not use placebos, in cancer trials, a new drug is usually compared to a drug or a combination of drugs that are commonly accepted and widely used to treat the same type of cancer, known as the standard of care, or standard treatment. Oncology physicians generally agreed that clinical trials are important in the improvement of cancer therapy [38]. On the other, understanding the strength of clinical trial evidence of newly approved therapeutic agents has important implications for patients and physicians [39]. As shown above, clinical trials are one of the most important factors influential for choosing a chemotherapy drugs in the behavior of prescribing oncology physicians.

Overall, the results obtained in this study to investigate the factors influencing the behavior of prescribing oncology physicians, could have complementary or competitive uses in the medical's and patient's education, technological-innovation advancements' adaptation and imports-exports of pharmaceutical drugs in both the services of drugs and the medical apparatuses in the healthcare section of the Iran.

Medical education has a special role in improving people's health and quality of life; on the other hand, systematic studies and

researches in the field of health and medicine have a significant uses in medical education. Supplementary results of this study can be helpful in the rational drug use especially in the administration of the anticancer drugs. Patient's education is essential to empower the patient in their own care, and educated patients have also played a role in catching medication errors themselves, especially if receiving repeated cycles. Given the role of patient's education in treatment, if the patient knows that most concerns physicians in prescribing, quality and effectiveness of the drug in the patient's recovery, medication orders accepted with interest.

In connection with the technological-innovation advancements' adaptation, there is considerable compatibility between the results of the research and pioneering advances in technology. As a result, new approaches to pharmaceutical development and production include increasing the quality and effectiveness of drugs and reduce drug side effects, these factors are also the priorities of the prescription by physicians.

Iran's health insurance systems reimburse the lowest price of the medicines, in recent years in Iran; the increasing insurance coverage of the chemotherapy drugs has led to a decrease in patients' out-of-pocket. Given that anti-cancer drugs have high budget impact and these drugs are usually imported in Iran, health budget and reimbursement system significantly is spent for anti-cancer drugs. Thus, according results of this research import and production of high quality anti-cancer can

save the health financial resources and thus improve the trade balance of the health sector.

In Summary, given the broad range of factors that were mentioned as influencing the prescribing of hematologists-oncologists, the different conclusions are not unexpected. The qualitative method of the present study is both strength and a drawback. It works well in fulfilling the main purpose of increasing the understanding of possible factors which could influence prescribing practice. However, it might not reveal actual behavior. There is a potential risk of response bias, with the respondent not being aware of, or even wanting to admit, what influences his/her behavior. Accordingly, the responses in the interview and the rating may be biased, and there might be an effect of social desirability at play. Future research about factors influencing prescription decisions could also consider complementary approaches, such as quantitative methods. Thus, the mixed method is suitable for evaluation in this study. Prescribing behavior of physicians affected by many factors, in these study three major categories of factors were evaluated. Given the importance of prescribing for patients with cancer, further qualitative and quantitative studies are needed to investigate actual behavior and to assess the importance of various factors influencing prescribing decisions.

Additional research is therefore required to examine prescription drug use in cancer treatment with a view to clarifying their potential roles in relation to the treatment of patients with cancer. On the other hand, it is

necessary to focus on the main factors influencing the behavior of prescribing physicians, related to a particular brand of chemotherapy drugs or different brands from the same drug class. The involvement of patients was mentioned as an important factor influencing prescribing decisions. Other studies are therefore required to investigate the role of cancer patients in oncologist's prescribing behavior.

### 3.5. Limitations

The present study includes all of the strengths and weaknesses of qualitative and quantitative methods by using interviews and questionnaires [40]. In this study we were faced with another limitation, we had problem with data collection because of difficult access to oncology physicians.

## 4. Conclusion

The present article provides valuable information regarding the prescribing behavior of oncology physicians and factors to consider choosing chemotherapy drugs. In conclusion, the findings of this study are consistent with other published studies regarding physician prescribing behavior. Our results indicate that there are not only similarities but also differences between physicians in different studies regarding the basic criteria upon which they select a pharmaceutical treatment. Taking into account factors used in this study, conclusion suggests that the products properties, scientific, experimental confirmation and pharmaceutical marketing significantly affect the prescription behavior of

physicians and remaining factors do not leave any major effect. With regard to the fact that, pharmaceutical marketing and branding influenced physicians significantly, these insights will help pharmaceutical industry to develop measures which could be used to achieve to greater clinical effectiveness and economic efficiency from drug prescribing. Hence, a constellation of various factors influenced oncologist's prescribing decisions. Factors classified in this article were helpful in understanding the various factors influencing oncologist's prescription practice regarding anti-cancer drug.

It is hoped that the results of this study will serve as a practitioner's guide to promote rational prescribing.

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