



## Research article

## Explore of the reasons of irrational prescribing in Iran: A qualitative study

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## ABSTRACT

**Background:** Irrational prescribing is highly prevalent in Iran, and it is under the impact of different factors.

**Objective:** This research aims to recognize the reasons for Irrational prescribing in Iran.

**Methods:** A qualitative approach and a conventional content analysis were employed to perform this research. The research community includes some experts and key specialists in medication prescribing. Semi-structured interviews were used for data collection. The intentional sampling method was applied, and theoretical saturation was reached by conducting 40 interviews with experts. The data analysis process was done following the steps suggested by Graneheim and Lundman.

**Results:** Four main categories and 12 subcategories appeared after analyzing the data. The main categories are organizational and management factors, legal factors, cultural factors, and economic factors.

**Conclusion:** Irrational prescribing can be prevented by reforming the referral system, overseeing pharmacies and physicians, raising public awareness and correcting their misconceptions about the medications, and creating an appropriate mechanism for pricing and selling medicines.

## 1. Introduction

Drug therapy is one of the standard methods in treating patients, which is considered an influential factor in ensuring the community's health. It is the responsibility of the health and treatment authorities to rationalize the prescription of the medicine [1]. Rational prescribing to patients means that the appropriate medicine in a proper dose and for the correct period is to be prescribed based on their clinical condition. If possible, it should also have the lowest possible cost to the patient and society [2, 3].

At the Nairobi Conference in 1985, a global effort was initiated to encourage and rationalize medication prescribing. After, the World

Health Organization (WHO) and other international organizations started investigating this issue, emphasizing the developing countries [4, 5].

The Irrational prescription includes the prescription of multiple medicines, drugs without the correct indication, the use of more or more minor than the therapeutic doses, and the unnecessary prescription of expensive drugs. It also includes the prescription of medications for less or more than the appropriate duration or prescribing medications that cause interactions and the difficulties in providing instructions for taking the drug [6, 7, 8].

Irrational prescribing is influenced by various factors such as patient demand, financial incentives, and lack of sufficient knowledge. As a result, inappropriate consequences can happen, such as patient

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dissatisfaction, prolongation, exacerbation of the disease, dangerous side effects, hospitalization, and increasing treatment costs for individuals and government agencies [9, 10, 11]. So, it is one of the main problems related to health worldwide [12, 13]. Studies have shown that the rate of drug prescribing does not follow a rational pattern [12, 14]. Antibiotics comprise 30–50% of prescribed drugs among therapeutic agents in many countries. Although an antibiotic prescription is essential in most bacterial infections, it sometimes can threaten the patient's life. Some studies have shown that 30–60% of prescription cases are inaccurate or inappropriate. Usually, these mistakes are made by physicians, distributors, or due to self-therapy [15, 16].

Inappropriate prescribing of some medications can have severe personal and social consequences, such as inappropriate prescribing of antibiotics. This incorrect use can cause community microbial resistance and unnecessarily burden patients and health systems [17, 18]. Another critical factor is that due to the interactions of drug agents with immune or not immune mechanisms, drug interactions lead to many complications, in such a way that annually in the United States, more than 100,000 death cases are attributed to the drug side effects [19]. Several studies have shown that 1.5–43.5% of hospitalized patients and 2–50% of outpatients have adverse drug complications.

Other studies point out that the side effects of medications can prolong hospitalization. In addition to the therapeutic aspects, medications have economic, sociopolitical, and cultural dimensions. Unnecessary prescription of drugs imposes an extra burden on the community health system and wastes resources, leading to economic and health outcomes for patients [19]. The cost of inappropriate drug prescribing in developing countries is approximately 0.9% of GDP, and pharmaceutical spending in developed countries averages 1.5%. An annual growth rate of 4.6 percent is higher than the growth rate of health costs [20, 21]. In Iran, statistics also show that the average drug prescribing is high, in such a way that 8% of hospital admissions are due to drug side effects [22]. Also, half of the national budget and about 80–60% of people's health expenditures in developing countries are spent on medicine [23].

A study carried out by Moghaddamnia in Tehran showed that the average drug prescribing in Iran is twice the current international standard. This study showed that the per capita consumption of tablets and capsules per Iranian person increased by 17.7% from 2006 to 2011 [24].

Dung et al. conducted a study entitled "Indicators of Prescription in Rural Health Clinics in 10 Provinces in the west of China" in 2010. In that study, 20125 prescriptions were reviewed in 680 primary care clinics with WHO indices, including the percentage of injected drugs, antibiotic medications, and use rate on the national essential medicines list. The results showed that prescribed drugs did not comply with the criteria of WHO and were irrational [25]. Another study in Ethiopia presented that the rate of prescribed antibiotics and injectable drugs was 57.77 and 10.09%, respectively, and that 75% of patients were aware of how to use the medicine. All hospitals had used the National Medicines List. This study showed that the prescribing did not follow WHO standards [26].

Despite the importance of the Irrational use of drugs and their adverse effects on society, especially on the health sector, comprehensive research has not yet been done to identify its causes. Therefore, this qualitative study aims to identify the reasons for irrational drug prescribing in Iran.

## 2. Materials and methods

### 2.1. Study design

The research community includes specialists and experts in prescribing medications. To join this study, the specialist or expert had to have related education and research background in drug administration, experiences in it, and interest in participating in the study. This research was performed with a qualitative approach and a conventional content analysis.

The sampling method used was purposeful with some individuals chosen for interviews, and they must be from organizations with the highest importance and role in the field of rational prescription. The number of participants from the organizations depended on the importance and the role of that organization in rational prescribing. Moreover, their organizational positions and responsibilities were considered to select interviewees to get diverse samples. Those who had less than 5 years of implementation in the field of medicine were excluded. Sampling and interviews continued to theoretical saturation. After interviewing 40 policymakers and critical individuals, theoretical saturation was obtained. Although the researchers got repetitive codes after 34 interviews, they added six more interviews to dodge false theoretical saturation. During the subsequent six interviews, they did not get any new codes linked to the reasons for irrational prescribing. For this reason, the researchers ended the interview process and did not take any new records.

The best time for a semi-structured interview is when the interview is concentrated on a particular subject and needs a bilateral connection between the researcher and the interviewee. This kind of interview provides reliable qualitative data and makes it possible for the researcher to control the process of obtaining information from the interviewee [27]. In this research, semi-structured interviews were used to collect data. After identifying influential individuals in the area of study, by phone or in person, and they agreed to participate, the time and location were determined by themselves.

The interviews first started with demographic questions and then continued with questions such as: What do you think about the status of prescribing in Iran? What are the factors that lead to Irrational prescribing in Iran? What role do health policymakers play in the irrational prescribing process? What are the role of society and people in spreading this phenomenon? Please, explain it.

The average length of each interview was 75 min. Meanwhile, the interviews were done, and some notes were also taken in addition to recording them.

After conducting each interview, the researchers listened to the content of each interview twice. Then they transcribed the conversation on a paper and reviewed the text several times to obtain a general sense. Subsequently, the data was read word by word. The first level coding process began with emphasizing the explicit content by identifying and highlighting the sentences and paragraphing of the analysis unit.

Each analysis unit was given a unique code, and the codes were extracted and classified based on their differences and similarities. Many subcategories were organized into other categories. The codes were repeatedly controlled by the research team in the coding process. The researchers resolved it by discussing it themselves in case of any contradiction. Posterior the classification, the categories were merged into a meaningful conceptual model and the relationship between the identified classes, and then the principal codes appeared. Graneheim and Lundman's method were applied to analyze the data [28].

The acceptability of the study increased with interviews with experts. Other experts who were not involved with the research team investigated the data analysis results. After, their investigations were compared with other research, and the necessary revisions and corrections were made to the data. Data were collected and analyzed simultaneously, aiming to decrease the data bias. Two researchers outside the Iran University of Medical Sciences detected the analyzed results, targeting enhancing consistency. The results of their investigation were almost like one of the study team. Three research team members analyzed data separately, objecting to increasing reliability, and they had relatively similar results. Lincoln and Guba's criteria were met for the robustness of the research [28].

### 2.2. Ethics approval and consent to participate

To observe research ethics, the researchers considered the following issues: Ethical approval was obtained from the Kermanshah University of

Medical Sciences (IR.IUMS.REC.1397.1060). obtaining written consent from all participants, obtaining written consent to record the interview, introducing themselves and the necessity and objectives of the research at the beginning of each interview, observing the principles of confidentiality and maintaining the names of participants in publishing research results, determining the time and place of the interview and the desired time of cutting it by the participants, and observing the health protocols during the interview.

### 3. Results

#### 3.1. Participant characteristics

A total of 40 people participated in the study, with their demographic characteristics shown in Table 1. Also, after analyzing the data, four categories and 12 subcategories were obtained (Table 2).

#### 3.2. Organizational and management factors

Organizational and management factors are among the factors that can improve an organization's process and performance or, on the contrary, act as a deterrent. Some of the factors mentioned here are ambiguity in the description of staff duties, monitoring and controlling the system, lack of attention to meritocracy in selecting individuals, and the incompatibility of the job with the employees.

#### 3.3. Lack of powerful managers

According to several interviewees, some of the most significant problems in the health system are the shortage of proper managerial knowledge and skills, instability in management, shortage of capable managers, and lack of scientific management. People are not selected for managerial positions based on scientific criteria and their professional qualifications in the health system. Furthermore, health system managers lack the necessary managerial skills to perform their duties. That is the primary issue and the root cause of the other problems in the health system.

"The problem in the health and treatment system is that most people in charge of management responsibilities did not study management and knew nothing about it" (Interview #7)

"Unfortunately, in the health system when they want to employ someone, they do not regard their capabilities in management or whether they know management or not." (Interview #14)

#### 3.4. Physician managers

One of the problems caused by the selection of non-management doctors in the system is that these so-called doctors do not interact with other doctors because they are from the same class.

"The work of the Department of Health, Medical Board, and Department of Education are inherently supervisory. If they object to doctors, they will be prevented from approaching appropriate prescribing committees." (Interview #17)

#### 3.5. Programs depend on managers

One of the problems in the health system is that the programs depend on the managers. When new managers are appointed, the program's continuation depends on their interests and opinions, which can be one reason for its failure.

"The point is that by changing the government or officials, the attitude toward this matter would change, and so this program sometimes declines or grows." (Interview #13)

"But its continuity had a problem because our policies are dependent on individuals, not on the system or problem." (Interview #6)

#### 3.6. Ambiguity in the structure of the Ministry of Health

The Complexity and ambiguity in the structure of the Ministry of Health are problems characterized by the organizational factors. Since the division of duties and responsibilities of the health system has not been performed correctly, the boundaries between the activities of the different units are complicated. It is unclear what each unit does, which causes ambiguity in defining the responsibilities of different units.

"For example, at some points in time, the Social Security Organization asked, 'Why do you not do it yourself?', 'Why should we do it?'. Sometimes there were disagreements about who should do this job. However, its movement continues through these ups and downs." (Interview #11)

#### 3.7. Collusion between doctors and pharmaceutical companies

Another factor that is effective in rational drug prescribing, and many interviewees pointed out, is the issue of collusion between a physician and a pharmacy or a drug company.

"When a particular brand is introduced, it comes to the company with an incredible offer. Physicians and pharmacies act in collusion. A doctor says he prescribes this medicine, and the pharmacy says OK." (Interview #23)

#### 3.8. Policy commitment

Policy commitment is one of the essential prerequisites for the success of rational drug prescribing policies and programs. This leads to greater attention and supervision on physicians' performance and ultimately on the rationality of prescribing medication.

"Now we have a national committee for prescribing and consuming the drug. A minister is assigned as the principal of this committee, but unfortunately, the minister never participates in the meetings." (Interview #3)

##### 3.8.1. Legal factors

Legal factors and the full implementation of control and monitoring software have a great impact on the behavior of doctors and the rational prescription of drugs. Among the legal factors that seem to have an effect in this regard are: 1- Not paying attention to the referral system 2- Insufficient supervision of the pharmacy and its staff.

**3.8.1.1. Not paying attention to the referral system.** According to some interviewees, a problem with the country's health system, which significantly impacts physicians' prescriptions, is the lack of a proper referral system. This behavior leads to the addition of costs of the health system, treatments, and a throng of second and third rates of services.

"The next issue is the referral system, which is very good. It is 7 or 8 years since the family physician program started, but the referral system is not implemented. If this system becomes practical, it will be good as 100%, and prescribing drugs will become reasonable." (Interview #37)

**Table 1.** Demographic characteristics of participants.

Code	Name of organization	Service history (year)	Age	Sex	Specialty
1	Ministry of Health	21	52	Male	Specialist
2	Ministry of Health	16	49	Male	Pharmacist
3	Ministry of Health	21	52	Male	Specialist
4	Ministry of Health	24	54	Male	Specialist
5	Food and Drug Administration	19	48	Female	PhD
6	Food and Drug Administration	21	53	Male	Specialist
7	Food and Drug Administration	18	49	Male	Specialist
8	Food and Drug Administration	17	50	Male	Specialist
9	Social Security	11	42	Male	Specialist
10	Social Security	15	53	Male	Pharmacist
11	Social Security	14	45	Male	Specialist
12	Medical Documents	17	46	Male	Specialist
13	Medical Documents	21	52	Male	Specialist
14	Medical Documents	12	43	Male	Specialist
15	Medical System	6	37	Male	Specialist
16	Deputy of Food and Drug	5	35	Female	Pharmacist
17	Deputy of Food and Drug	21	52	Male	Specialist
18	Deputy of Food and Drug	14	48	Male	General Physician
19	IRIB	11	43	Male	PhD
20	Research Center (1)	13	45	Male	Specialist
21	Research Center (1)	4	32	Female	Pharmacist
22	Research Center (2)	4	32	Female	Pharmacist
23	Research Center (2)	3	35	Female	Pharmacist
24	Health insurance	15	52	Male	Master Science
25	Health insurance	20	53	Male	General Physician
26	Pharmaceutical Company (1)	15	42	Female	Pharmacist
27	Pharmaceutical Company (2)	12	43	Female	Pharmacist
28	Pharmaceutical Company (3)	15	45	Male	General Physician
29	Pharmaceutical Company (4)	12	43	Male	Pharmacist
30	Health Department	10	36	Female	Master Science
31	Health Department	5	36	Female	Family Physician
32	Health Department	4	33	Male	Family Physician
33	Health Department	2	31	Female	Family Physician
34	Health Department	5	32	Male	Family Physician
35	Health Department	5	32	Female	Family Physician
36	Treatment Department	24	56	Male	Specialist
37	Treatment Department	25	52	Male	Specialist
38	Treatment Department	16	49	Male	Specialist
39	Clinic	-	40	Female	Outpatient
40	Hospital	-	67	Female	Inpatient

**Table 2.** Categories and subcategories.

Categories	subcategories
Organizational and management factors	Lack of capable managers
	Programs depend on managers
	Ambiguity in the structure of the Ministry of Health
	Policy Commitment
Legal factors	Not paying attention to the referral system
	Insufficient supervision of the pharmacy and its staff
Cultural Factors	The ignorance of the community
	False beliefs of society
	Patients expect the doctors to accelerate the recovery
Economic factors	The financial relationship between physician and patient
	Low drug prices
	Interactions between pharmaceutical companies and physicians

**3.8.1.2. Insufficient supervision of the pharmacy and its staff.** Some interviewees feel that the pharmacies are not accurately monitored. Neither the technicians nor their degrees and expertise nor the medications and their expiration date and interactions are controlled. Also, no serious steps are taken to prevent providing medicines without a prescription.

"Unfortunately, most of the pharmacy staff had just diplomas or degrees of irrelevant majors who did not relate to the field of medicine. They are not educated and not supervised. We should ask their employers did they teach the employees anything, or did they oversee?" (Interview #21)

**3.8.2. Cultural factors**

Culture is one of the most crucial factors shaping one's behavior and desire and profoundly affects patients' behavior. The interviewees indicated that the patients had false beliefs and expectations for quick recovery among these factors.

**3.8.2.1. Having false beliefs.** Some interviewees believed that people's unawareness and misconceptions about prescribing certain medications, including injectable drugs and antibiotics, is one reason for the irrational prescription.

"I was a general practitioner for some time. On those days, I had some patients who forced me to prescribe some antibiotics. Even they wanted antibiotic injection, and they fought for it." (Interview #39)

**3.8.2.2. Patients' expectations for accelerating disease recovery.** According to some interviewees, one of the factors contributing to the irrational prescribing is people's culture and their unreal expectations from doctors, such as expecting a speedy recovery from the disease.

"We are living in a cultural context where everybody expects to receive all the services quickly." (Interview #2)

"It is several days since I am in the hospital. They say different things. It is not known that I should stay until when." (Interview #40)

**3.8.3. Economic factors**

Economic factors are among the things that affect the prescription of drugs and the behavior of doctors. In other words, this factor indicates

the ways of attracting financial resources by doctors, including collusion with pharmaceutical companies and induced demand by doctors.

**3.8.3.1. The financial relationship between physician and patients.** One factor that leads to irrational prescribing is the financial relationship between physician and patient. The physicians' income is dependent on the patient's prompt treatment.

"Most of my colleagues are not happy with their payments. They visit more patients and prescribe so many drugs." (Interview #38)

**3.8.3.2. Not expensive drugs.** One of the interviewees believed that the patient's constant request for medication from a physician and arbitrary medication use is because of the use of not expensive drugs.

"Patient is aware that costs are low, so he asks for more drugs. If drugs become expensive, the consumption will not grow so much." (Interview #34)

**3.8.3.3. Commercialization of prescriptions.** To some interviewees, one of the reasons for physicians' irrational prescribing is the commercialization of medication prescribing and the relationships and interactions between specialist physicians and pharmaceutical companies.

"It is all commercial. The companies are very active in drug, supplement, and cosmetics business. They meet physicians constantly." (Interview #27)

"Doctors suggest this lab and that drug store. It is not known, whether they are good ones, or doctors have a contract with them." (Interview #39)

#### 4. Discussion

This research aimed to recognize the reasons for irrational prescribing in Iran. The underlying factors affecting were divided into four main categories. This classification includes organizational and management, legal, cultural, and economic factors. Each of these categories was subdivided into subordinate factors. The study showed that one factor influential in irrational prescribing is neglecting the referral system in the country's health system. Although the country's Third and Fourth Development Laws explicitly refer to the leveling of the services and observing the referral system, this system is not well observed [28].

A study showed that family doctors were not satisfied with the performance of level 2 specialists. Most of them were delighted with neither the quality nor quantity of second-level specialists' referral feedback. While investigating the status of the patient's referral system in family doctors and the rural insurance plan in the northern provinces of Iran, Naseriasl declared that the rate of family doctor referral feedback from specialists in Mazandaran Province in 2013 was 10%. It occurs due to the problems with the referral system in the family doctor plan and the lack of communication between family doctors and specialists [29].

The importance of the referral system is extensive; 22% of patients with non-emergent health problems referred to the emergency unit could be treated by a general practitioner or just by lower-level staff [30]. Experts have identified the family doctor program as the most appropriate strategy in the referral system in urban areas. Leveling health services could prevent unnecessary referrals to specialized centers and save materials and human resources [31].

In Iran, the family doctor program has been accomplished since 1997. Its comprehensive reforms began in 2005 at the same time with the launch of the national family doctor program and rural insurance in cities with a population of less than 20,000 and rural areas across the country.

Based on the Fifth Development Plan, about 65% of the country's population was distributed in cities. This project was implemented as a pilot project in urban areas of Fars and Mazandaran provinces in 2012. The executive method for the urban family doctor plan is practically different from the rural one. In cities, especially in large ones, because of more accessible contact to the office of general practitioners and specialists (compared to villages) and the lack of a necessary platform to follow the referral system, there was an increase in referrals to the private sector, outside the referral system. So, it imposes a considerable cost on both patients and the health system. In leading countries, a very successful referral system has been designed in the family doctor program. The patient will not be able to be accepted by any specialized service providers without the confirmation of the family doctor [32].

According to the study results, people tend to go to specialists and subspecialists for the slightest problem or illness. They should first be examined by a general practitioner to be referred to specialists if necessary. This tendency leads to problems, such as overcrowding in specialist offices, inattention of specialists to prescribing, and finally, the poor quality of treatment.

The custodianship (of the health system) can play a significant role in the family doctor plan and the referral system policymaking. There is no proper custodianship to accomplish the urban family doctor program. Some parallel organizations alongside the Ministry of Health (such as social security organizations) have disrupted the implementation of this program so that people can easily circumvent the referral system and go to the higher levels without visiting a family doctor and get benefits from insurance services.

In countries that have been more successful in the family doctor program, referral system policies are well-implemented. In this regard, Ferdowsi noted that in countries like the UK, Canada, South Korea, and Chile, a national health system is ruling, and it is based on service levels, a referral system, and family doctors. In Turkey, a family doctor is the first person that does the examination and treatment. If necessary, the family doctor will refer the patient to the second or the third level, and thus the referral rules will be adequately implemented [28].

Nasrollahpour Shirvani pointed out that establishing an urban family doctor in Iran requires more accurate and comprehensive planning and design. The dimensions of the urban family doctor plan are different from the rural family doctor plan. This author mentioned that the family doctor program, as one of the most significant policy reforms, can eliminate many health systems challenges. Achieving this goal requires an accurate edit of family doctor policies, using past health system experiences, reviewing the viewpoints and opinions of role-players and beneficiaries of such policies, and complete monitoring of all stages of the program deployment [33].

Raisi emphasized that the family doctors are the gatekeeper of the referral system, which makes the patients aware of their path and reduces unnecessary referrals to specialty and preclinical centers. In this research, family doctor training has been emphasized as a strategy for equitable distribution of health care services in Iran [34].

Tavakoli believes that public health insurance coverage is one of the urgent needs of society and complementary to the development process of health care in Iran. In addition to the health system's custodianship, it seems that the appropriate structure of health insurance impacts the family doctor referral system. This author also mentioned that insufficient supervision of physicians prescribing and how it is done in offices are big problems that an insurance system will face. Therefore, it is a reason for the induction demand in the family doctor referral system [33].

Maftoon indicated that insurer organizations require extreme attention and fundamental reforms in 4 dimensions: public coverage, financial commitment promotion, available service coverage enhancement, and organizational process reform concerning the transition plan packages to reduce the patient payments. He emphasized clarification and legal re-



quirements and the commitments of insurer organizations, and supervision and control of the Ministry of Health [35].

The role of the insurance system and its executive capacity and adherence are some of the most critical beneficial factors of the referral system in the urban family doctor program [36].

Considering the two aspects of the health system's structure to successfully implement the family doctor program and the service grading system to solve many existing problems. One of the significant cultural factors mentioned in this study is cultural poverty. The results of this study showed that the pressure of society on physicians to prescribe without having the prescription indication leads to an increase in medication prescribing and, consequently, irrational prescribing.

A study by Ahmed Abdu in Oman showed that more than one-third of the patients would not have accepted the treatment if they were not prescribed some medicine [37]. Another study conducted by Khorasani and colleagues in Iran revealed that one of the main demands of patients was the call to be prescribed some medicine in each treatment. They would not be convinced with just an explanation from the physician, which indicated the patients' role in inducting demands, which led to irrational prescribing [38]. Lucas and Sadou's studies also discuss parental demand for irrational prescribing [39, 40].

Make serious efforts to inform people in the society and train them according to their educational, cultural, social, and economic status, maybe overcome this problem. For this purpose, billboards and educational pamphlets can be used across cities and villages. The staff of health care centers and health communicators can also help in providing face-to-face and in-group training and even training people at home. The impact of mass media, such as broadcasting, should not be overlooked.

According to Lionis's study, education is fundamental in rationalizing prescriptions [41]. A global study by the World Health Organization (WHO) showed that educating the public about medicines is considered necessary even in developing countries with limited resources [42]. Based on the results of this study, the financial relationship between the physician and patient is one of the factors that affect irrational prescribing.

When it comes to the financial relationship between physicians and patients, the physician's income depends on the patient's satisfaction. In this regard, physicians prescribe medications regardless of the patient's condition to satisfy the patient to attract more patients. A systematic review of arbitration showed that financial incentives were among the factors that were effective in prescribing medication [42].

Also, a study conducted in India indicated the effect of this factor on a physician's prescription [43].

Collaboration of pharmaceutical companies was one of the results of this study, which is effective in irrational prescribing by physicians. In recent years, the relationship between pharmaceutical companies and physicians has been explored in various ways, with marketing, awarding, and incentives for prescribing drugs being the most controversial [44, 45, 46].

It is necessary to strengthen the role of the Ministry of Health through the reorganization of its structure to advance and accelerate the development of rational drug prescription programs. Furthermore, the attributions of the Ministry of Health should not be limited to monitoring quality and standards, as is the case with the health systems of developed countries such as Germany and Japan.

Provide health services and regulate relations between different health system organizations, including insurance organizations and pharmaceutical companies [47]. It is also recommended to impose a particular tax on the physicians who have a private office. This tax should be proportional to their income. Further, it is suggested to start a performance-based payment system instead of considering merit pay for the physicians who have served in a hospital. A team needs to be formed to evaluate the physician's medication prescribing in the hospital. The physicians are paid based on their compliance with the reasonable prescribing following scientific and reliable guidelines.

One of the strengths of this study is that it seems the first study of its kind to examine the causes of irrational administration of the drug and One of the weaknesses of this study is that some samples did not cooperate and were eliminated during the study.

## 5. Conclusion

The results showed that irrational prescribing in Iran is influenced by various factors such as organizational and management, legal, cultural, and economic factors. Therefore, interventions to prevent and control this damage must be undertaken at the different individual, organizational, and social levels.

Hence, irrational prescribing can be prevented by reforming the referral system, overseeing pharmacies and physicians, raising public awareness, correcting their misconceptions about the medications, and creating an appropriate mechanism for pricing and selling medicines.

## Declarations

### Author contribution statement

Farideh Moradi; Arash Ziapour; Ali Soroush; Javad Yoosefi lebni; Shahriar Mokhtari; Mohammad Bazayr; Manal Etemadi; Fakhreddin Chaboksavar; Fateme Yazdi; Hesam Seyedin: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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### Data availability statement

No data was used for the research described in the article.

### Declaration of interest's statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

## References

- [1] A. Mosleh, S. Darbooy, S. Khoshnevis Ansari, M. Mohammadi, Drug prescription based on WHO indicators: Tehran university of medical sciences facilities with pharmacy, *Tehran Univ. Med. J. TUMS Publicat* 65 (14) (2007) 5–12.
- [2] D.E. Sholomskas, G. Syracuse-Siewert, B.J. Rounsaville, S.A. Ball, K.F. Nuro, K.M. Carroll, We don't train in vain: a dissemination trial of three strategies of training clinicians in cognitive-behavioral therapy, *J. Consult. Clin. Psychol.* 73 (1) (2005) 106.
- [3] A. Rezapour, F.E. Azar, S.A. Aghdash, A. Tanoomand, S.M.H. Shokouh, N. Yousefzadeh, et al., Measuring equity in household's health care payments (Tehran-Iran 2013): technical points for health policy decision-makers, *Med. J. Islam. Repub. Iran* 29 (2015) 246.
- [4] Y.M. Irshaid, M.A. Al-Homrany, A.A. Hamdi, K.K. Adjepon-Yamoah, A.A. Mahfouz, A pharmacoepidemiological study of prescription pattern in outpatient clinics in Southwestern Saudi Arabia, *Saudi Med. J.* 25 (12) (2004) 1864–1870.
- [5] J. Yoosefi Lebni, F. Khorami, F. Ebadi Fard Azar, B. Khosravi, H. Safari, A. Ziapour, Experiences of rural women with damages resulting from an earthquake in Iran: a qualitative study, *BMC Publ. Health* 20 (1) (2020) 1–13.
- [6] A. Austvoll-Dahlgren, M. Aaserud, G.E. Vist, C. Ramsay, A.D. Oxman, H. Sturm, et al., Pharmaceutical policies: effects of cap and co-payment on rational drug use, *Cochrane Database Syst. Rev.* 23 (1) (2008) CD007017.
- [7] N. Montazeri, N. Kianipour, B. Nazari, A. Ziapour, S. Bakhshi, Health promoting behaviors among university students: a case-sectional study of Kermanshah University of Medical Sciences, *Int. J. Pediatr.* 5 (6) (2017) 5091–5099.
- [8] M. Mohammadi, A. Ziapour, M. Mahboubi, A. Faroukhi, N. Amani, F. Hydarpour, et al., Performance evaluation of hospitals under supervision of kermanshah medical

- sciences using pabonlasoty diagram of a five-year period (2008-2012), *Life Sci. J.* 11 (1) (2014) 77–81.
- [9] S.M. Picon-Camacho, M. Marcos-Lopez, J. Bron, A. Shinn, An assessment of the use of drug and non-drug interventions in the treatment of *Ichthyophthirius multifiliis* Fouquet, 1876, a protozoan parasite of freshwater fish, *Parasitology* 139 (2) (2012) 149–190.
- [10] M. Ferdosi, S. Vatankeh, N. Khalesi, F. Ebadi Fard Azar, A. Ayoobian, Designing a referral system management model for direct treatment in social security organization, *J. Military Med* 14 (2) (2012) 129–135.
- [11] L. Pan, R. Zhao, N. Zhao, L. Wei, Y. Wu, H. Fan, Determinants associated with doctors' prescribing behaviors in public hospitals in China, *Ann. N. Y. Acad. Sci.* 1507 (1) (2022) 99–107.
- [12] M. Samadbeik, M. Ahmadi, S.M.H. Asanjan, A theoretical approach to electronic prescription system: lesson learned from literature review, *Iran. Red Crescent Med. J.* 15 (10) (2013), e8436.
- [13] B. Sunderland, S. Burrows, A. Joyce, A. McManus, B. Maycock, Rural pharmacy not delivering on its health promotion potential, *Aust. J. Rural Health* 14 (3) (2006) 116–119.
- [14] M. Kaboudi, F. Dehghan, A. Ziapour, The effect of acceptance and commitment therapy on the mental health of women patients with type II diabetes, *Ann. Trop. Med. Publ. Health* 10 (6) (2017) 1709–1713.
- [15] A. Aslam, S. Khaton, M. Mehdi, S. Mumtaz, B. Murtaza, Evaluation of rational drug use at teaching hospitals in Punjab, Pakistan, *J. Pharmacy Pract. Community Med* 2 (2) (2016) 54–57.
- [16] B. Nazari, S. Bakhshi, M. Kaboudi, F. Dehghan, A. Ziapour, N. Montazeri, A comparison of quality of life, anxiety and depression in children with cancer and healthy children, Kermanshah-Iran, *Int. J. Pediatr.* 5 (7) (2017) 5305–5314.
- [17] P. Goudanavar, J. Jacob, M.S.R. Krishna, S.E. John, Y. Keerthi, A Prospective study on medication prescribing pattern for geriatric patients in a tertiary care teaching Hospital, *J. Pharmaceut. Res.* 6 (56) (2015) 98.
- [18] A. Ziapour, A. Zokaei, F. Kahrizi, A theoretical study of the standing of social investment in the health sector, *Soc. Sci.* 11 (15) (2016) 3682–3687.
- [19] A. Mohamadloo, A. Ramezankhani, Consequences of induced demand for medicine prescription: a qualitative study, *Int Arch Health Sci* 7 (3) (2020) 126–130.
- [20] M. Theodorou, V. Tsiantou, A. Pavlakis, N. Maniatakis, V. Fragoulakis, E. Pavi, et al., Factors influencing prescribing behaviour of physicians in Greece and Cyprus: results from a questionnaire based survey, *BMC Health Serv. Res.* 9 (1) (2009) 1–9.
- [21] M.A. Riedl, A.M. Casillas, Adverse drug reactions: types and treatment options, *Am. Fam. Physician* 68 (9) (2003) 1781–1790.
- [22] G. Bordage, B. Carlin, P.E. Mazmanian, Continuing medical education effect on physician knowledge: effectiveness of continuing medical education: American College of Chest Physicians Evidence-Based Educational Guidelines, *Chest* 135 (3) (2009) 29S–36S.
- [23] H.V. Hogerzeil, D. Ross-Degnan, R. Laing, D. Ofori-Adjei, B. Santoso, A.A. Chowdhury, et al., Field tests for rational drug use in twelve developing countries, *Lancet* 342 (8884) (1993) 1408–1410.
- [24] A.V. Moghaddam, B. Damari, S. Alikhani, M. Salarianzadeh, N. Rostamigooran, A. Delavari, et al., Health in the 5th 5-years Development Plan of Iran: main challenges, general policies and strategies, *Iran. J. Public Health* 42 (Suppl1) (2013) 42.
- [25] L. Dong, H. Yan, D. Wang, Drug prescribing indicators in village health clinics across 10 provinces of Western China, *Fam. Pract.* 28 (1) (2011) 63–67.
- [26] M. Sisay, G. Mengistu, B. Molla, F. Amare, T. Gabriel, Evaluation of rational drug use based on World Health Organization core drug use indicators in selected public hospitals of eastern Ethiopia: a cross sectional study, *BMC Health Serv. Res.* 17 (1) (2017) 1–9.
- [27] H.R. Bernard, *Research Methods in Cultural Anthropology*, Sage Publications, New York, 1988.
- [28] P. Coleman, R. Irons, J. Nicholl, Will alternative immediate care services reduce demands for non-urgent treatment at accident and emergency? *Emerg. Med. J.* 18 (6) (2001) 482–487.
- [29] M. Naseriasl, A. Amini, L. Doshmangir, D. Adham, A. Janati, Challenges of establishing specialty referral system in Iran's health sector (A qualitative study), *Acta Med. Mediterr.* 33 (s1) (2017) 921–926.
- [30] R. Chaman, M. Amiri, M. Raei, M. Alinejad, S. Nasrollahpour, National family physician program in Shahroud: assessing quality of implementation and condition of settings, *Hakim Res. J* 14 (2) (2011) 123–129.
- [31] E.S.S. Nasr, P. Raeisi, M. Motlagh, M. Kabir, A.H. Ashrafian, Evaluation of the performance of referral system in family physician program in Iran University of Medical Sciences: 2009, *Hakim Res. J* 13 (1) (2010) 19–25.
- [32] F. Tavakoli, M. Mahmoodi, Impact of policy making and health insurance structure on the referral system of the doctor Urban city of Iran, *Health Care Manag.* 3 (8) (2017) 85–93.
- [33] S.D. Nasrollahpour Shirvani, E. Mikanik, H. Ashrafian Amiri, M.J. Kabir, N. Jafari, B. Tahmasbi, et al., Evaluation of the referral system situation in family physician program in northern provinces of Iran: 2012-2013, *J. Mazandaran Univ. Med. Sci* 23 (109) (2014) 27–35.
- [34] F. Maftoon, F. Farzadi, A. Montazeri, A. Aeenparast, Contract performance and training conditions in family physician and referral system: the providers' perspectives, *Payesh* 15 (1) (2016) 19–25.
- [35] A. Abdo-Rabbo, M. Al-Ansari, B.C. Gunn, B.J. Suleiman, The use of medicines in Oman: public knowledge, attitudes and practices, *Sultan Qaboos Univ. Med. J* 9 (2) (2009) 124.
- [36] E. Khorasani, S. Karimi, M. Jafarian Jazi, The Role of patients in induced demand from experts' perception: a qualitative study, *J. Qual. Res. Health Sci* 2 (4) (2020) 336–345.
- [37] P.J. Lucas, C. Cabral, A.D. Hay, J. Horwood, A systematic review of parent and clinician views and perceptions that influence prescribing decisions in relation to acute childhood infections in primary care, *Scand. J. Prim. Health Care* 33 (1) (2015) 11–20.
- [38] W. Sadoh, A. Sadoh, F. Eki-Udoko, Parental contribution to over prescription of antibiotics for sore throat in children, *Niger. J. Paediatr.* 42 (2) (2015) 98–102.
- [39] C.-R. Lee, I.H. Cho, B.C. Jeong, S.H. Lee, Strategies to minimize antibiotic resistance, *Int. J. Environ. Res. Publ. Health* 10 (9) (2013) 4274–4305.
- [40] D.A. Friesle, C. Wolfheim, Public Education in Rational Drug Use: a Global Survey, World Health Organization, 1997.
- [41] C. Lionis, E. Petelos, S. Shea, G. Bagiartaki, I.G. Tsiligianni, A. Kamekis, et al., Irrational prescribing of over-the-counter (OTC) medicines in general practice: testing the feasibility of an educational intervention among physicians in five European countries, *BMC Fam. Pract.* 15 (1) (2014) 1–15.
- [42] M. Keyvanara, L. Safaeian, S. Karimi, N. Shojaiezadeh, Rational use and prescription of drugs: a review on WHO's 12 strategies, *Hakim Res J* 18 (4) (2016) 294–305.
- [43] A. Kotwani, C. Wattal, S. Katewa, P. Joshi, K. Holloway, Factors influencing primary care physicians to prescribe antibiotics in Delhi India, *Fam. Pract.* 27 (6) (2010) 684–690.
- [44] D. Katz, A.L. Caplan, J.F. Merz, All gifts large and small: toward an understanding of the ethics of pharmaceutical industry gift-giving, *Am. J. Bioeth.* 10 (10) (2010) 11–17.
- [45] E.G. Campbell, R.L. Gruen, J. Mountford, L.G. Miller, P.D. Cleary, D. Blumenthal, A national survey of physician–industry relationships, *N. Engl. J. Med.* 356 (17) (2007) 1742–1750.
- [46] G.K. Spurling, P.R. Mansfield, B.D. Montgomery, J. Lexchin, J. Doust, N. Othman, et al., Information from pharmaceutical companies and the quality, quantity, and cost of physicians' prescribing: a systematic review, *PLoS Med.* 7 (10) (2010), e1000352.
- [47] P.J. Campbell, J.C. Campbell, N. Ikegami, *The Art of Balance in Health Policy: Maintaining Japan's Low-Cost, Egalitarian System*, Cambridge University Press, 1998.