



Main Factors Leading to Supplier-Induced Demand in Iran: A Comprehensive Review

Hesam Seyedin ¹, Mahnaz Afshari ^{1,*}, Parvaneh Isfahani ², Amir Rakhshan ³, Ebrahim Hasanzadeh ¹ and Masood Taherimirghaed ¹

¹Department of Health Services Management, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran

²Department of Health Services Management, School of Public Health, Zabol University of Medical Sciences, Zabol, Iran

³Department of Foreign Languages, School of Health Management and Information Sciences, Tehran University of Medical Sciences, Tehran, Iran

*Corresponding author: Department of Health Services Management, School of Health Management and Information Sciences, Iran University of Medical Sciences, Tehran, Iran. Email: afshari.m@tak.iuims.ac.ir

Received 2019 July 15; Revised 2020 January 20; Accepted 2020 March 16.

Abstract

Context: Supplier-induced demand (SID) is one of the challenges of health systems, leading to unbearable expenses, particularly for people.

Objectives: The present study aimed to investigate the factors leading to SID in Iran.

Data Sources: The present study is a comprehensive systematic review focusing on studies of SID up to the end of May 2018 in six English databases, five Persian databases, and two search engines. The exclusion criteria were publications in languages other than Persian and English and publications after May 2018.

Data Extraction: A data extraction form was used to record authors' names and specifications, year of publication, the city of the study, language, purpose, methodology, data collection method, and factors influencing the induced demand. The risk of bias was assessed using a standard risk of bias tool.

Results: We found 514 papers. Eventually, 16 papers met the inclusion criteria, and they were selected for the study. We found 11 papers in the Persian language and five articles in English. The design of 37.5% of the articles was qualitative, 31.25% analytical, 25% descriptive-analytical, and 6.25% descriptive. Factors influencing SID were classified at four levels including meta-level (Ministry of Health and Medical Education (MoHME)), macro-level (universities of Medical Sciences), meso-level (service providers), and micro-level (patients).

Conclusions: According to the results of this research, creating SID can lead to serious challenges for health systems, service providers, patients, and insurance organizations. Therefore, health managers and policymakers need to design appropriate strategies such as adopting the evidence-based approach to purchasing services by the insurer and approval of standards and rules to reduce such SID.

Keywords: Health Service Needs and Demand, Supplier-Induced Demand, Review [Publication Type], Iran

1. Context

The market for health services differs from other markets due to its characteristics, and thus, it requires its specific analysis. One of the features distinguishing the health sector from other economic sectors is the essence of demand. In the health sector, demand is excessively individual, irregular, and uncertain. Besides, physicians, as the sellers of health services, act differently from other professions. The product is not clear and not definitive. These can act as the main distinguishing features of health care services from other commodities. The market supply condition is among other features of the market for health care services in which a professional regulation would prevent

free access to new service providers. This, in turn, increases the cost of the services. The asymmetry of information between patients and physicians is another feature of this market that tangibly influences the demand and supply (1-3).

Referring to the literature of the economy, we figure out that studying physicians' behaviors has a key role in this arena. This significance is highlighted when physicians are considered the leaders of medical teams. No action in the arena of treatment, including drug consumption, surgical operations, etc., can be carried out without physicians' intervention or agreement. Two salient features of health services, i.e., uncertainty and asymmetry

of information between patients and physicians, drastically influence physicians' behaviors (4, 5). In studies carried out on the health economy, the majority of the analyses emphasize the uncertainty and asymmetry of information. There is uncertainty regarding the results of actions taken, which is called the irreducible uncertainty. Given the fact that uncertainty is the most important factor influencing physicians' behaviors, three factors have been mentioned to contribute to this uncertainty. These factors include: (1) a vast variety of patients with various initial health status, (2) uncertainty regarding the effects of treatment, and (3) unawareness of the patients' preferences (5-7).

In the economic literature, situations in which there is an asymmetry of information between patients and physicians are entitled brokerage. In such conditions, the employer (patient) is influenced by the actions of the brokerage (physician). The relationship between the patient and the physician is based on the information superiority of the physician. Therefore, the patient cannot figure out whether the physician's actions have been sufficiently appropriate or not. Under these conditions, due to the physicians' superiority to the patients concerning information and their dual role in diagnosis and treatment, the physicians can persuade the patients according to their own will to use health services whose medical values are lower than their costs. This inefficient social prescription is called supplier-induced demand (SID) (8, 9).

One of the causes of SID is insurance and government subsidies. The existence of insurance and government subsidies would lead the patients' demand to increase. The innovations in health services would increase significantly in response to the SID, and this leads to an increase in GDP. Statistics in the United States indicate an increase in advancements in major health technologies (111%), innovative preventive technologies (150%), and innovations in diagnosis (500%). Whereas the number of innovations is indicative of the quality and level of new products and services, it does not show the use of these new technologies. Statistics on three major diagnostic technologies in the US show a remarkable rise in their use and consumption. The average number of emergency patients receiving MR/CT/PET increased from 13 per 100 patients in 1996 to 58 per 100 patients, which shows an increase of 346% within a decade. The percentage of adult women receiving mammography increased within 20 years, from 24% in 1987 to beyond 68% in 2007 (National Cancer Institute, 2010). The number of colonoscopies performed on outpatients rose from 677 per 10,000 patients in 1996 to 1,778 per 10,000 patients in 2006, showing an increase of 163% in this decade (10-12).

From the viewpoint of policymakers, the SID can give rise to two major effects. First, it increases the health sec-

tor expenditures, or it pressurizes the governments' general budget. Second, it reduces efficiency, as the national resources are spent on health care services that do not bring about much benefit. To summarize, the problems and complications caused by SID include the waste of resources, particularly when the government pays for the physicians' services, suffering pain, stress, and surgical complications, using unnecessary drugs, the increase of fake demand for services, and creation of a black market in the health system (11, 13).

Supplier-induced demand is one of the challenges that the Iran health system is facing. It has caused an increase in the patients' out-of-pocket payments and massive expenses (14). It is worth mentioning that the SID occurs when the physicians' income is dependent on the number of services provided by them, and when the patients' expenses are covered by health insurance. Since such conditions exist in Iran's market for health care services, the significance of studying this issue is further highlighted (15, 16). Therefore, there is a need for strategies to adopt scientific methods based on service purchase by insurance companies, modify the fee-for-service method, develop and issue standards and regulations, and design frameworks for reasonable, efficient, scientific treatment so that the provision of unnecessary services is controlled and resources are allocated efficiently (16-20).

Massive changes in the health care provision system, execution of the Health Development Plan in recent years, and the increase of financial commitments of the health system, on the one hand, and the necessity for coming up with practical solutions to reduce unnecessary costs, on the other hand, increasingly emphasize the importance of SID. The comprehensive identification of all factors affecting SID can help revise and reform the country's health system. Therefore, it is necessary to find the factors affecting SID and the right solutions to tackle this phenomenon to help the country properly spend its resources in the health sector, take a useful step to improve the efficient management of the health system, reduce the challenges between providers and buyers, control the increasing health care costs in Iran and ultimately, improve the quality of services for patients. Policymakers and health professionals may not have enough time to collect, evaluate, and integrate the whole relevant literature. A comprehensive systematic review fulfills this important task and answers such questions for decision-makers. Thus, the main purpose of this comprehensive systematic review is to improve decision-making by recognizing different dimensions of SID. This will provide insight into the current condition of health-care in Iran. This research attempted to determine the influential factors on SID in health services via a systematic approach to previous studies of SID in Iran.

2. Objectives

A comprehensive systematic review was carried out on previous studies of SID for investigating the factors leading to SID in Iran. The following research questions were addressed:

1. What are the factors leading to SID?
2. Which factors are most important to create SID?

3. Evidence Acquisition

In this review, the Preferred Reporting Items for Systematic Reviews (PRISMA) statement was used as a guideline (21).

4. Data Sources

To find studies published between May 2018 and March 2005, we retrieved articles published in foreign and domestic journals, as well as those available in Persian databases including IranMedex, MagIran, IranDoc, SID (Scientific Information Database), Medlib, and English databases including PubMed, Scopus, Embase, Web of Science, Web of Knowledge, Cochran database, and search engines of Google and Google Scholar. The search strategy included the use of Persian and English keywords and a combination of them. Also, the reference lists of published studies were examined to choose further studies.

5. Study Selection

The keywords used in this search included MeSH and common keywords related to the topic such as "induced demand" OR inducement OR "created demand" OR "initiated demand" OR "demand creation" OR "financial incentive" OR "physician utilization" AND supplier OR hospital OR "health system" OR "health care" OR "health service" OR "physician office" OR clinic AND Iran. We extracted the full-texts of all searched articles and documents. After studying the titles of articles, we excluded duplicated articles. Then, the researchers carefully examined the texts of studies and selected the relevant studies.

5.1. Inclusion and Exclusion Criteria

We selected studies if they were observational (cross-sectional, case-control, cohort) and qualitative studies examining the influential factors on SID in health services, studies published in the Persian and English languages, and studies published until May 2018. We excluded studies if they were books, Randomized Clinical Trials (RCTs), case reports, case series, gray literature, dissertations, and

editorials, had unavailable full-text articles, and reported overlapping results.

A total of 516 articles were extracted, 44 of which were eliminated because of being repetitive. Then, the articles' titles and abstracts were screened considering the inclusion and exclusion criteria. Thus, 450 irrelevant articles were eliminated. Of 22 remaining articles, one review article was excluded; five others were excluded due to not investigating the influential factors on induced demand. In the end, 16 articles were selected for the final analysis. The screening process and the results of searches are depicted in [Figure 1](#).

6. Data Extraction

Data were extracted into Microsoft Excel 2013 spreadsheet for the objectives of this review. Two authors (Mahnaz Afshari and Parvaneh Isfahani) extracted all data and they were independently checked by the third and fourth authors (Ebrahim Hasanzadeh and Amir Rakhshan). A data extraction form, based on the study objectives, was used to collect the data. This form comprised some sections including authors' names and specifications, year of publication, the city of the study, language, purpose, methodology, data collection method, and the influential factors on the induced demand.

7. Risk of Bias in Individual Studies

Four authors (Mahnaz Afshari, Parvaneh Isfahani, Ebrahim Hasanzadeh, and Amir Rakhshan) independently analyzed the methodological quality of the selected studies. The fifth author (Hesam Seyedin) was consulted when the agreement was not reached. For qualitative studies, we used Spencer's tool (22). We used Mitton's checklist for quantitative studies (23).

8. Results

Between January 2005 and May 2018, 16 articles were published on the influential factors on SID in Iran ([Figure 2](#)). Out of these, 11 articles (68.75%) were published in the Persian language and five articles (31.25%) in the English language. The design of 37.5% of the articles (six studies) was qualitative, 31.25% (five studies) analytical, 25% (four studies) descriptive-analytical, and 6.25% (one study) descriptive ([Figure 3](#)).

Based on these studies, various factors can influence the SID. The most important factors in this arena are: (1) the economic problems existing in the health system such as

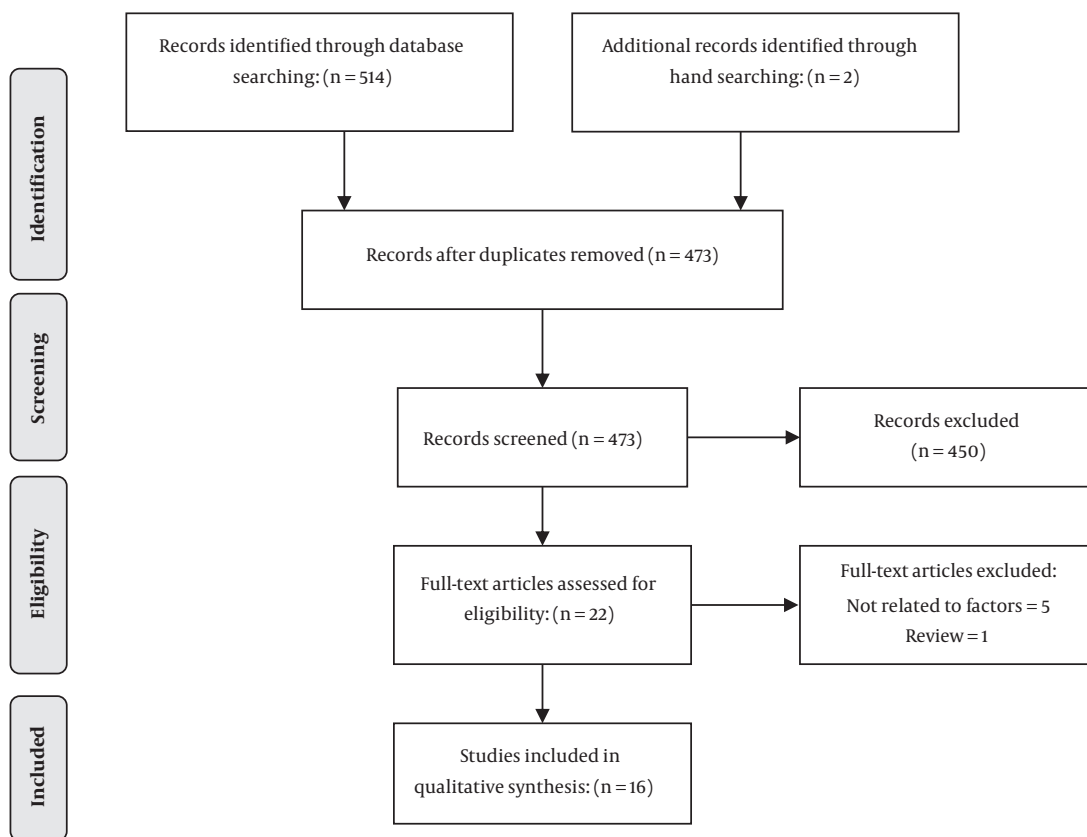


Figure 1. The process of database analysis and finding the papers

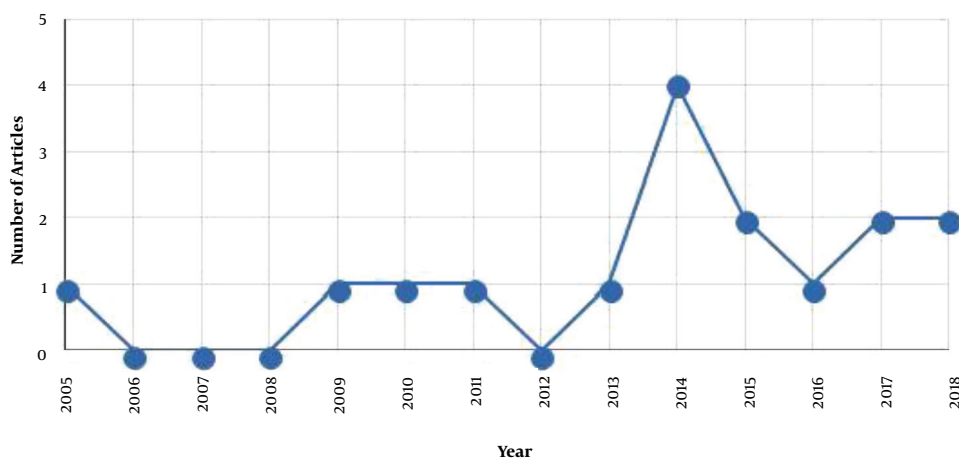


Figure 2. The frequency of published papers about influential factors on supplier-induced demand in Iran

the physicians' employment and payment contracts, inappropriate medical tariffs, and inefficient payment system; (2) factors related to the inefficiency of the health market

such as the complicated nature of medicine, multidimensional nature of health phenomenon, asymmetry of information between providers and consumers, and clinical un-

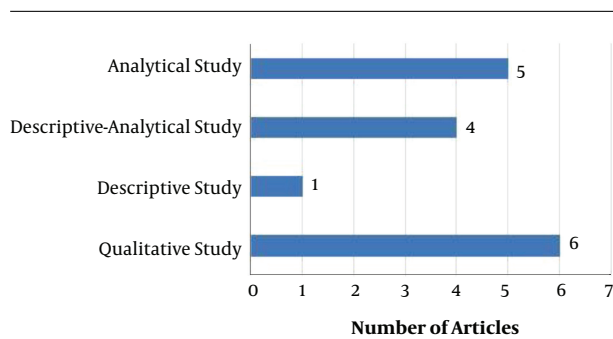


Figure 3. Methods used in studies of influential factors in induced demand

certainty; (3) factors related to the inappropriate execution of health policy such as the inappropriate execution of referral system and failure in the education system; and (4) wrong policy-making such as the lack of a tax system, complexities related to policy-making bodies, and inefficiencies in bills and regulations. Supplementary file Appendix 1 presents a summary of the articles published on SID in health services in Iran. Factors influencing SID were classified at four levels for better understanding. These levels include meta-level (Ministry of Health and Medical Education (MoHME)), macro-level (universities of Medical Sciences), meso-level (service providers), and micro-level (patients) (Table 1).

9. Discussion

This study was carried out to systematically investigate the factors affecting SID in Iran’s health system. We found 16 articles published regarding the factors influencing SID in Iran between January 2005 and May 2018. Studies indicated various factors related to the MoHME, universities of Medical Sciences, service suppliers, and patients that influenced this demand (9, 14, 24-27).

The MoHME has an important role in creating the induced need. The lack of sufficient supervision of physicians’ performance can prepare the ground for creating SID. Medical indications are not investigated and supervised properly. This supervision happens after physicians prescribe the wrong medical services. For example, Keyvanara et al. believe that in the healthcare system, physicians act as both supervisors and decision-makers, which makes physicians’ interests more important than patients (8). Another factor leading to SID is the complexity of medicine. Bickerdyke et al. noted that the more complicated and uncertain a service is, the higher the potential induced demand will be. Poor regulations and inappropriate execution of health system policies may give rise to SID. The lack of a common treatment protocol among physicians has

further complicated the supervision. Clinical guidance is not sufficiently used in Iran’s health system. Put differently, the clinical guidance is not provided with necessary structures and regulations. Therefore, physicians are not obliged to observe the principles of such guidance (12).

An increased load of expenses due to the induced unnecessary services results in the reduction of the budget allocated to other sectors of health, particularly public health and prevention. The massive use of drugs and imported equipment without necessary indications would lead to the loss of currency. Besides, increases in diagnostic and treatment expenses are among the salient effects of SID. The SID would even bring about an unnecessary increase in the expense of each service. The heavy paraclinical expenses are tangible, which plays a key role in increasing the expenses. For example, Amporfu noted that SID could increase medical expenses and impede the development of the health sector (28). Culture and advertisement also play an important role in SID. In fact, in Iran, the community has undergone a medicalization process. This has caused everything to adopt the framework of medical services. Patients with poor knowledge and awareness can be gradually persuaded to seek unnecessary medical services. The increase in the number of specialists can play a key role in increasing SID. Disturbances in the balance of supply and demand in the market for health services may encourage specialists to advertise unnecessary medical services to attract more patients. Lien et al. remarked that the number of competitors in the market is an important factor in creating SID (29).

The SID leads to a raise in uncontrollable medical costs, imposing unnecessary expenses, and further pressure on insurance companies. This may increase the debt and disturb the financial balance of insurance companies and their related organizations. The restricted resources of such insurance companies cannot be managed to cover the ever-increasing demand. In conclusion, the liability and debt of insurance companies to the hospitals and other health sectors will increase. This, occasionally, causes insurance companies to terminate the sections of their agreements and contracts.

The universities of Medical Sciences can prepare the ground for SID. For example, the increasing number of physicians in proportion with the population of the province may play an important role in increasing the health sector expenditures, which can be because of the facilitated access to medical services in underprivileged areas and supplier- or physician-induced demands in the affluent regions. Karimi et al. indicated that with an increase in the ratio of physicians to the population, the demand for health services by households living in each province would increase. This increase, up to a certain degree equal

to 3.45 physicians per 10,000 people, happened because of the ease of access to medical services in underprivileged areas. After this proportion, the SID severely increased with the ease of access to health services and the created competition (20). Jorges indicate that the density of physicians in an area exerted a significantly positive effect on the decisions of patients that had government health insurance to refer to physicians for the first visit and for further visits. On the other hand, the density of physicians did not influence the behaviors of patients that had private health insurance for their first visit; however, for further visits, it significantly influenced the patients' behaviors (30).

The lack of strong supervisory mechanisms for ethical issues by the universities of Medical Sciences is another factor contributing to SID in the hospitals. The universities' supervision of health service providers is not carried out appropriately. The attention is usually paid to what the physicians prescribe and not to the accuracy of prescription. On the other hand, the educational system has an important role in giving rise to SID. For example, Keivanara et al. indicated that one of the reasons for carrying out unnecessary medical services was inefficient educational models, which led to the lack of sufficient skills and capacity to diagnose the patients' problems and diseases (8).

Service providers can have an influential role in creating SID. One can mention the inappropriate payment methods and wrong physicians' tariffs. Various payment methods and compensatory mechanisms can have a marked influence on their professional behavior, profiteering, and their performance to benefit themselves (16, 21, 31, 32). Studies indicate that the payment system for physicians has a direct relationship with the increase of services provided (33-35). Giuffrida and Gravelle, in a study about the market of night shift visits in primary care, concluded that the increase of payment and visit tariffs led to an increase in the number of visits by general practitioners. Managing the patients' demand to increase the payment is indicative of SID by general practitioners in this study (36). Studies indicated that some factors had statistically significant effects on SID, including the type of the payment contract of physicians, especially the payment system for night shifts in primary care (36), the number of laboratory experiments and visit times of level-one physicians in Norway (16), the increase in caesarian sections (37), and the increase in the expenses of prostate cancer in the United States (38).

The commercial approach in treatment has turned the patient into a commodity and disrupted the health-centered attitude. Nowadays, we are facing the phenomenon of the medical market. This market has created unhealthy competition among service providers who merely seek financial profits and disregard the patients'

interests. Ferguson, for example, noted that one of the reasons for SID is the highlighted role of the market in health care services (39).

The patients' and physicians' asymmetry of information can prepare the ground for SID. Physicians' power in the market depends on the asymmetry of information and physicians may exploit this condition for profiteering purposes. Peacock et al. noted that a physician might convince patients that they need further and more intensive treatment (40).

Besides, patients can influence the SID in different ways, one of which is patients' inappropriate requests from physicians, which can be considered a serious ethical concern. In this type of ethical concern, the patient asks the physician to provide unnecessary treatments, which is particularly the case of patients with health insurance coverage. Sorensen et al. indicate that an ethical concern is the excessive use of health care due to insurance coverage (34). Also, Broomberg et al. note that health insurance coverage leads to increased unnecessary demand for health services. Occasionally, patients refer to physicians without any specific reason, which can pave the way for SID. On the other hand, patients expect physicians to prescribe more drugs in their prescriptions than they actually need. This finding is in line with Mahboobi's study. Mahboobi et al. showed that, according to physicians' comments, patients themselves ask for the type and quantity of drugs in their prescriptions (13). Bikerdyke et al. indicate that the increasing expectations of patients lead to a rise in the use of health services (11).

Patients' unawareness and excessive trust in their physicians can cause them to meticulously follow the physicians' orders even though the recommended services are unnecessary. Hence, sometimes the patient receives services that may not be sufficiently useful for his disease. Bickerdyke et al. indicate that when decision-making is delegated to physicians by their patients, it may cause SID (11). On the other hand, SID may give rise to inappropriate resource allocation and, eventually, causes these resources to be consumed for patients who do not actually need them rather than genuinely ill people. The SID can also disrupt the efficient allocation of national resources even if patients themselves pay for the services. Fabbri et al. in 2001 indicated that SID influenced the competitive allocation of services and resources (37).

Another cause of SID is modernized needs. Today, health needs have undergone many changes compared to the past because of changes in disease patterns, patients' lifestyles, and technology. Fabbri et al. and Lien et al. showed that the epidemiologic changes, development of needs, demographic changes, and a variety of tastes have contributed to SID (29, 37).

9.1. Conclusions

The results of this study elucidated numerous factors related to the MoHME, universities of Medical Sciences, service providers, and patients to affect the rise of SID in the Iran health system. In this article, it was tried to map all factors affecting SID to provide insight into the current condition of healthcare in Iran. Because of the review was limited to studies published in English and Persian, the results should be used cautiously in terms of generalizability to other countries. One of the strengths of this study was its comprehensiveness and systematic approach to searching medical databases.

The SID can cause unpleasant challenges for the health system, leading to reduced efficiency, inappropriate allocation of resources, and disrupted positioning of treatment and medicine. On the other hand, insurance companies have to suffer increased unnecessary expenses because of SID, eventually leading to their debt and liability. The patient also suffers the complications of SID, which can lead to social, economic, and other challenges. These factors should be addressed with targeted strategies to improve the health system. Therefore, health managers and policymakers need to design appropriate strategies such as adopting an evidence-based approach to purchasing services by the insurer and approval of standards, rules, and clinical guidance to reduce such SID.

Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Acknowledgments

All experts who participated in this research are highly appreciated.

Footnotes

Authors' Contribution: Mahnaz Afshari and Hesam Seyedin designed research. Mahnaz Afshari and Ebrahim Hasanzadeh conducted research. Mahnaz Afshari and Parvaneh Isfahani extracted the data; Mahnaz Afshari, Hesam Seyedin, Ebrahim Hasanzadeh, Amir Rakhshan, and Parvaneh Isfahani wrote the paper. Mahnaz Afshari has primary responsibility for final content. All authors read and approved the final manuscript.

Conflict of Interests: The authors of the study state that there is no conflict of interest.

Ethical Approval: The present research was approved by the Ethics Committee of Iran University of Medical Sciences following the principles of the National Health and Medical Research Council of Iran (ethics no. IR.IUMS.REC 1396.30888).

Funding/Support: Iran University of Medical Sciences (grant no. 96-02-136-30888).

References

- Andrade Ede O, Andrade EN, Gallo JH. Case study of supply induced demand: the case of provision of imaging scans (computed tomography and magnetic resonance) at Unimed-Manaus. *Rev Assoc Med Bras* (1992). 2011;57(2):138-43. doi: [10.1590/s0104-42302011000200009](#). [PubMed: [21537698](#)].
- Shigeoka H, Fushimi K. Supplier-induced demand for newborn treatment: evidence from Japan. *J Health Econ*. 2014;35:162-78. doi: [10.1016/j.jhealeco.2014.03.003](#). [PubMed: [24709038](#)].
- Bakhnivskiy V, Furman F. [Physicians induced demand in the primary health care level]. *Wiad Lek*. 2018;71(7):1385-91. [PubMed: [30448815](#)].
- van Dijk CE, van den Berg B, Verheij RA, Spreeuwenberg P, Groenewegen PP, de Bakker DH. Moral hazard and supplier-induced demand: empirical evidence in general practice. *Health Econ*. 2013;22(3):340-52. doi: [10.1002/hec.2801](#). [PubMed: [22344712](#)].
- Kim B. Do Doctors Induce Demand? *Pacific Economic Review*. 2010;15(4):554-75. doi: [10.1111/j.1468-0106.2010.00515.x](#).
- Richardson JR, Peacock SJ. Supplier-induced demand: reconsidering the theories and new Australian evidence. *Appl Health Econ Health Policy*. 2006;5(2):87-98. doi: [10.2165/00148365-200605020-00003](#). [PubMed: [16872250](#)].
- Grytten J. Payment systems and incentives in dentistry. *Community Dent Oral Epidemiol*. 2017;45(1):1-11. doi: [10.1111/cdoe.12267](#). [PubMed: [27807881](#)].
- Keyvanara M; Karimi S; Khorasani E; Jafarian Jazi M. [Opinions of Health System Experts about Main Causes of Induced Demand: a Qualitative Study]. *Hakim Health Systems Research Journal*. 2014;16(4):317-28. Persian.
- Johnson EM. Physician-Induced Demand. In: Culyer AJ, editor. *Encyclopedia of Health Economics*. San Diego: Elsevier; 2014. p. 77-82. doi: [10.1016/b978-0-12-375678-7.00805-1](#).
- Altekruse S, Kosary C, Krapcho M, Neyman N, Aminou R, Waldron W. *SEER Cancer Statistics Review*. Bethesda, MD: National Cancer Institute; 2011. 32 p.
- Bickerdyke I, Dolamore R, Monday I, Preston R. *Supplier-induced demand for medical services*. Canberra: Productivity Commission Staff Working Paper; 2002. 97 p.
- National Center for Health Statistics. *Health, United States, 2009: With special feature on medical technology*. 2010.
- Mahbubi M, Ojaghi S, Ghiyasi M, Afkar A. Supplemental insurance and induce demand in veterans. *Med Veterans J*. 2010;2(8):18-22.
- Samouei R, Fathian N, Jafari M, Heidari Z. Identification of behavior change methods in social marketing for countering induced demand in health system. *International Journal of Health System and Disaster Management*. 2015;3(5):6. doi: [10.4103/2347-9019.168570](#).
- Delattre E, Dormont B. Fixed fees and physician-induced demand: a panel data study on French physicians. *Health Econ*. 2003;12(9):741-54. doi: [10.1002/hec.823](#). [PubMed: [12950093](#)].
- Grytten J, Sorensen R. Type of contract and supplier-induced demand for primary physicians in Norway. *J Health Econ*. 2001;20(3):379-93. doi: [10.1016/s0167-6296\(00\)00087-4](#). [PubMed: [11373837](#)].
- Yip WC. Physician response to Medicare fee reductions: changes in the volume of coronary artery bypass graft (CABG) surgeries in the

- Medicare and private sectors. *J Health Econ.* 1998;**17**(6):675-99. doi: [10.1016/S0167-6296\(98\)00024-1](https://doi.org/10.1016/S0167-6296(98)00024-1). [PubMed: [10339248](https://pubmed.ncbi.nlm.nih.gov/10339248/)].
18. Meyer S. Dispensing physicians, asymmetric information supplier-induced demand: evidence from the Swiss Health Survey. *Int J Health Econ Manag.* 2016;**16**(3):215-45. doi: [10.1007/s10754-016-9187-3](https://doi.org/10.1007/s10754-016-9187-3). [PubMed: [27878674](https://pubmed.ncbi.nlm.nih.gov/27878674/)].
 19. Longden T, Hall J, van Gool K. Supplier-induced demand for urgent after-hours primary care services. *Health Econ.* 2018;**27**(10):1594-608. doi: [10.1002/hec.3779](https://doi.org/10.1002/hec.3779). [PubMed: [29781557](https://pubmed.ncbi.nlm.nih.gov/29781557/)].
 20. Sekimoto M, Ii M. Supplier-Induced Demand for Chronic Disease Care in Japan: Multilevel Analysis of the Association between Physician Density and Physician-Patient Encounter Frequency. *Value Health Reg Issues.* 2015;**6**:103-10. doi: [10.1016/j.vhri.2015.03.010](https://doi.org/10.1016/j.vhri.2015.03.010). [PubMed: [29698180](https://pubmed.ncbi.nlm.nih.gov/29698180/)].
 21. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ.* 2009;**339**:b2700. doi: [10.1136/bmj.b2700](https://doi.org/10.1136/bmj.b2700). [PubMed: [19622552](https://pubmed.ncbi.nlm.nih.gov/19622552/)]. [PubMed Central: [PMC2714672](https://pubmed.ncbi.nlm.nih.gov/PMC2714672/)].
 22. Spencer L, Ritchie J, Lewis J. *Quality in qualitative evaluation: A framework for assessing research evidence.* London: Government Chief Social Researcher's Office; 2003.
 23. Mitton C, Adair CE, McKenzie E, Patten SB, Wayne Perry B. Knowledge transfer and exchange: review and synthesis of the literature. *Milbank Q.* 2007;**85**(4):729-68. doi: [10.1111/j.1468-0009.2007.00506.x](https://doi.org/10.1111/j.1468-0009.2007.00506.x). [PubMed: [18070335](https://pubmed.ncbi.nlm.nih.gov/18070335/)]. [PubMed Central: [PMC2690353](https://pubmed.ncbi.nlm.nih.gov/PMC2690353/)].
 24. Khorasani E, Karimi S, Keyvanara M, Afshari S. Factors affecting physicians' behaviors in induced demand for health services. *International Journal of Educational and Psychological Researches.* 2015;**1**(1):43. doi: [10.4103/2395-2296.147469](https://doi.org/10.4103/2395-2296.147469).
 25. Keyvanara M, Karimi S, Khorasani E, Jazi MJ. Experts' perceptions of the concept of induced demand in healthcare: A qualitative study in Isfahan, Iran. *J Educ Health Promot.* 2014;**3**:27. doi: [10.4103/2277-9531.131890](https://doi.org/10.4103/2277-9531.131890). [PubMed: [25013820](https://pubmed.ncbi.nlm.nih.gov/25013820/)]. [PubMed Central: [PMC4089142](https://pubmed.ncbi.nlm.nih.gov/PMC4089142/)].
 26. Khorasani E, Keyvanara M, Karimi S, Jazi MJ. Views of health system experts on macro factors of induced demand. *Int J Prev Med.* 2014;**5**(10):1286-98. [PubMed: [25400888](https://pubmed.ncbi.nlm.nih.gov/25400888/)]. [PubMed Central: [PMC4223949](https://pubmed.ncbi.nlm.nih.gov/PMC4223949/)].
 27. Abdollahiasl A, Kebriaeezadeh A, Dinarvand R, Abdollahi M, Cheraghali AM, Jaberidoost M, et al. A system dynamics model for national drug policy. *Daru.* 2014;**22**(1):34. doi: [10.1186/2008-2231-22-34](https://doi.org/10.1186/2008-2231-22-34). [PubMed: [24690531](https://pubmed.ncbi.nlm.nih.gov/24690531/)]. [PubMed Central: [PMC4229987](https://pubmed.ncbi.nlm.nih.gov/PMC4229987/)].
 28. Amporfu E. Private hospital accreditation and inducement of care under the Ghanaian national insurance scheme. *Health Econ Rev.* 2011;**1**(1):13. doi: [10.1186/2191-1991-1-13](https://doi.org/10.1186/2191-1991-1-13). [PubMed: [22827881](https://pubmed.ncbi.nlm.nih.gov/22827881/)]. [PubMed Central: [PMC3483719](https://pubmed.ncbi.nlm.nih.gov/PMC3483719/)].
 29. Lien HM, Albert Ma CT, McGuire TG. Provider-client interactions and quantity of health care use. *J Health Econ.* 2004;**23**(6):1261-83. doi: [10.1016/j.jhealeco.2004.03.003](https://doi.org/10.1016/j.jhealeco.2004.03.003). [PubMed: [15556245](https://pubmed.ncbi.nlm.nih.gov/15556245/)].
 30. Jürges H. Health Insurance Status and Physician-Induced Demand for Medical Services in Germany: New Evidence from Combined District and Individual Level Data. *SSRN Electronic Journal.* 2007. doi: [10.2139/ssrn.1092811](https://doi.org/10.2139/ssrn.1092811).
 31. Weeks WB, Jardin M, Dufour JC, Paraponaris A, Ventelou B. Geographic variation in admissions for knee replacement, hip replacement, and hip fracture in France: evidence of supplier-induced demand in for-profit and not-for-profit hospitals. *Med Care.* 2014;**52**(10):909-17. doi: [10.1097/MLR.0000000000000211](https://doi.org/10.1097/MLR.0000000000000211). [PubMed: [25215648](https://pubmed.ncbi.nlm.nih.gov/25215648/)].
 32. Madden D, Nolan A, Nolan B. GP reimbursement and visiting behaviour in Ireland. *Health Econ.* 2005;**14**(10):1047-60. doi: [10.1002/hec.995](https://doi.org/10.1002/hec.995). [PubMed: [15791674](https://pubmed.ncbi.nlm.nih.gov/15791674/)].
 33. Lubeck DP, Brown BW, Holman HR. Chronic disease and health system performance. Care of osteoarthritis across three health services. *Med Care.* 1985;**23**(3):266-77. doi: [10.1097/00005650-198503000-00008](https://doi.org/10.1097/00005650-198503000-00008). [PubMed: [3982107](https://pubmed.ncbi.nlm.nih.gov/3982107/)].
 34. Sorensen RJ, Grytten J. Competition and supplier-induced demand in a health care system with fixed fees. *Health Econ.* 1999;**8**(6):497-508. doi: [10.1002/\(sici\)1099-1050\(199909\)8:6<497::aid-hec439>3.0.co;2-d](https://doi.org/10.1002/(sici)1099-1050(199909)8:6<497::aid-hec439>3.0.co;2-d). [PubMed: [10544315](https://pubmed.ncbi.nlm.nih.gov/10544315/)].
 35. Hasaart F. *Incentives in the Diagnosis Treatment Combination payment system for specialist medical care [dissertation].* Netherlands: Universitaire Pers Maastricht; 2011.
 36. Giuffrida A, Gravelle H. Inducing or restraining demand: the market for night visits in primary care. *J Health Econ.* 2001;**20**(5):755-79. doi: [10.1016/S0167-6296\(01\)00094-7](https://doi.org/10.1016/S0167-6296(01)00094-7). [PubMed: [11558647](https://pubmed.ncbi.nlm.nih.gov/11558647/)].
 37. Fabbri D, Monfardini C. *Demand induction with a discrete distribution of patients.* Dipartimento Scienze Economiche, Università di Bologna; 2001. 37 p.
 38. Falit BP, Gross CP, Roberts KB. Integrated prostate cancer centers and over-utilization of IMRT: a close look at fee-for-service medicine in radiation oncology. *Int J Radiat Oncol Biol Phys.* 2010;**76**(5):1285-8. doi: [10.1016/j.ijrobp.2009.10.060](https://doi.org/10.1016/j.ijrobp.2009.10.060). [PubMed: [20338470](https://pubmed.ncbi.nlm.nih.gov/20338470/)].
 39. Ferguson BS. *Issues in the demand for medical care: Can consumers and Doctors be trusted to make the right choices?* Atlantic Institute for Market Studies; 2002.
 40. Peacock SJ, Richardson JR. Supplier-induced demand: re-examining identification and misspecification in cross-sectional analysis. *Eur J Health Econ.* 2007;**8**(3):267-77. doi: [10.1007/s10198-007-0044-7](https://doi.org/10.1007/s10198-007-0044-7). [PubMed: [17401594](https://pubmed.ncbi.nlm.nih.gov/17401594/)].

Table 1. Factors Influencing Supplier-induced Demand Based on Levels

Levels		Factors Leading to Supplier-Induced Demand
Meta-level: Ministry of Health and Medical Education	Governance	Poor implementation of policies of the health system
		Poor implementation of the referral system
		Wrong policy-making and regulations
		Lack of a tax system
		Several confusions in policy-making institutions
		The increasing number of specialists
		Weakness in the educational system
		Lack of national information systems
		Governmental supplementary insurances
		Health care as a priority of health systems
	Promotion of domestic products	
	Promotion imported products	
	Physician-oriented marketing	
	Payment system	
	Supervision	Lack of sufficient supervision of service providers
Lack of supervision of the base and supplementary insurance companies		
Lack of supervision of the role of pharmaceutical, producing, importing, and medical equipment companies in induced demand		
Lack of supervision of advertisement		
The essence of the health sector	Complexities of medicine	
	Multidimensional nature of health phenomena	
	Clinical uncertainty	
Macro-level: universities of Medical Sciences and insurance system	Universities of Medical Sciences	The increasing number of physicians in proportion with to provinces' population
		Lack of supervisory ethical mechanisms by universities
		Insufficient education and training
	Insurance system	Lack of insurance supervision of prescriptions and health care services for outpatients
		Infeasibility of supervision of the accuracy of physicians' recommendations in insurance systems
		Supervision of insurers limited to committed services quantitatively
		Inclusion of supplementary insurance in health care coverage
		Non-specificity of supplementary insurances
		Profiteering approaches to supplementary insurance
	Meso-level: service providers	Asymmetry of information
Unnecessary regular visits		
Physicians' authority in patients' compliance		
Work conditions		Lack of physician's job security in the initial years of services
		The type of physicians' contract and inappropriate medical tariffs
		Workflow of offices
		Physicians' independence from insurance companies and their contracts
		Physicians' insufficient knowledge and skill
		Physicians' freedom in providing different health care services
Medical ethics		Financial and personal motivation of physicians
		Disregard of medical ethics
		Creation of a competitive atmosphere
		Not allocating sufficient time to visiting patients
	The family physician's earning income using unnecessary medical services	

		Admitting too many patients beyond physicians' capacity
		Competitions among physicians
		Physicians' economic problems
		Physicians' tendency to maximize profits
		Compensating for physicians' infringed rights
Micro-level: patients	Asymmetry of information	Lack of patients' awareness of their health status and services
		Repeated visits
		Referral to a physician for minor problems
		Obsessive concerns
		Increasing patients' referral with supplemental insurance
		Compliance with physicians' recommendations
	Ethics	Excessive patient confidence in the physician
		Patient's inappropriate requests from the physician
		Patient's desire to use more free and non-franchise services
		Modern demand
		Patients' fear of losing their physicians
		Insurance coverage and inappropriate demand from physicians