

RESEARCH

Open Access



# Performance trend of the family physician referral system before and during the COVID-19 pandemic: a study in northern Iran

Seyed-Amir Soltani<sup>1</sup>, Mehrdad Fallah<sup>1</sup>, Aboalfazl Marvi<sup>2</sup>, Malihe Naderi<sup>3</sup>, Ehsan Abedini<sup>4</sup>, Mohammad-Ali Jahani<sup>5\*</sup> and Ghahraman Mahmoudi<sup>6\*</sup>

## Abstract

**Background** Considering the challenges of the referral system in the family physician program and the impact of COVID-19 pandemic on the performance of the relevant ministry's programs, it is necessary to assess the performance of the referral system. This study was conducted with the aim of investigating the performance of the family physician referral system before and during COVID-19 in Golestan province.

**Methods** The present repeated cross-sectional study was conducted on secondary data Recorded of 786,603 cases referred and cared by family physicians (including information on physicians' and midwives' visits, percentage of prescriptions and other information) in Golestan province from 2017 to 2022 in a census and retrospective manner. Data were collected using the reference ratio checklist and analyzed with SPSS 23 software at a significance level of less than 0.05.

**Results** Referral to 10 types of medical specialties and 10 indicators of family physicians referral before and during COVID-19 were investigated. The highest and lowest percentages of referrals by family physicians were belonged to the surgical (17.6%) and infectious (2%) specialists before COVID-19, and internal medicine (15.07%) and urology (3%) specialists during COVID-19, respectively. Referral due to physician's diagnosis increased by 19.3% compared to before Covid-19, target group increased by 0.86%, care decreased by 2.69% and reverse referral decreased by 36.1%. The amount of population covered by rural insurance, the amount of visits to midwives, the percentage of electronic appointments in the post-Covid-19 years have changed significantly compared to before.it (P-Value < 0.05).

**Conclusion** The present study showed that the COVID-19 pandemic had a significant impact on family physician referral indicators, such as the process of referral to specialists, drug prescriptions, insurance coverage, one-time service population, and patient care, which can be used to eliminate the weaknesses and Strengthening the strengths of the programs being implemented in the face of possible pandemics is very useful and effective and can be used in the country. Finally, the results obtained from this research provide evidence to discuss the importance of the family physicians care and referral system in the face of special conditions for quality control in health policies.

\*Correspondence:

Mohammad-Ali Jahani  
Drmajahani@yahoo.com  
Ghahraman Mahmoudi  
Ghahraman48@yahoo.com

Full list of author information is available at the end of the article



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

**Keywords** COVID-19, 2019-nCoV infection, Family physicians, Consultation and referral

## Background

Today, health is the focus of social, economic, political and cultural development of all human societies and is of particular importance in the development of the infrastructure of different parts of society [1, 2]. Health systems are always looking for effective reforms in their structures and processes to achieve better results [3, 4]. The classification of the health care system into three levels, first, second and third, is the biggest reform that most countries have implemented with the aim of greater efficiency and effectiveness, as well as creating justice and access to people. In the stratified system, the family physicians place at the first level of health care and perform preventive, diagnostic, therapeutic and quality of life measures. If a percentage of the covered population needs more specialized services, they guide them to the second level through the referral system and follow up their fate until the result is achieved [5]. In this regard, the family physician and rural insurance programs were implemented in Iran with such goals as strengthening the referral system, increasing service coverage, responding in the health market, increasing people's access to services and reducing unnecessary costs from the beginning of 2014 in rural areas and cities with less than 20 thousand people [6]. Lack of proper formation of referral system is one of the most important weaknesses of primary health care in Iran. Despite more than a decade of implementation of the family doctor program in Iran, acceptable results have not yet been achieved [7].

The COVID-19 pandemic started in December 2019 from the Wuhan in China and quickly involved the whole world in multiple problems [8]. COVID-19 affected all social, cultural and political aspects of the Iranian society and severely affected the Iranian health system. Considering the severity of this disease, the health system should have an acceptable plan to deal with this disease [9]. The COVID-19 pandemic has created a serious problem in the delivery of services for health care organizations [10] and has caused a wide range of negative impacts [11]. This has made the process of improving the quality of healthcare services difficult for healthcare providers [12]. This pandemic destroyed the performance potential of health care units - even in the most developed countries - due to the increased rate of infection [13]. According to the World Health Organization, over 690 million COVID-19 cases and more than 6.8 million deaths were reported globally by September 2023. More than 7.5 million cases of COVID-19 were reported just in Iran. The increasing number of cases of COVID-19 around the world has created many challenges for the current health care delivery system of countries, especially in developing

countries [14]. Irresponsible behavior, inequality in accepting and treating patients due to the COVID-19 pandemic affected the referral system and created problems for many patients [15]. The public sector of the health care system in most countries was organized into the first, second, and third levels in order to be more efficient and effective, justice and the possibility of people's access [16]. The leveling of services reduces the frequent and unnecessary visits to specialized centers, the waste of material and human resources, provides quality services to patients, and reduces para-clinical and travel costs. In this way, with the establishment of the referral system, every patient gets the service he/she really needs [17]. The referral system, as a bridge between different levels of healthcare services, reduces costs and provides access to more specialized services. Forming an electronic file in the family physician-centered referral system for the covered community provides the possibility of controlling the quality of services, financial discipline, performed services follow-up, and response to the patient at three levels [16].

In a study, it was stated that 55% of patients with non-emergency health problems who referred to the emergency department could be cared for and treated by a general practitioner or only with recommendations. It seems that many of the referral rules are not followed at the first and second levels of the referral system [6]. The evidence indicates that the most important weakness of the family physician program is the inefficiency in the implementation of the referral system, and this challenge has hindered its progress according to its goals [13]. Access to the most specialized health services outside of the referral system and only at the patient's diagnosis and request leads to the imposition of many and unnecessary costs, lack of timely diagnosis and depletion of human and financial resources [18]. A clear example of this can be seen in the COVID-19 -19 pandemic. In the early days of the spread of this virus in Iran, there were high and non-stop visits to specialized hospitals. This is despite the fact that if the referral system had been implemented in the country, the volume of referrals could be easily controlled [19]. Many similar studies conducted on family physician services during the COVID-19 pandemic showed the impact of the pandemic on it [20]. Among other things, a retrospective study was conducted in 2021 on the activity of the Emergency Dispatch Center of the University of Nantes, France in accordance with the quarantine period in France. The findings showed that a significant increase in calls related to respiratory and infectious problems, in contrast, a significant decrease in calls related to severe trauma was observed [21].

Regarding the impact of the COVID-19 pandemic on emergency medical services, a study in Tehran, Iran in 2020 showed that the coronavirus disease significantly affected the medical service delivery system. In addition, a significant increase in the main complaints of fever and infectious diseases and respiratory symptoms was observed after the pandemic [22]. In a retrospective study conducted in Saudi Arabia in 2020, the number of service requests during the COVID-19 period showed a significant increase compared to the before of pandemic. Increases in all disease types, except trauma-related, occurred during COVID-19 [23].

During the course of the COVID-19 pandemic, the country has witnessed many shortcomings in the primary healthcare delivery system such as the disruption of routine health services due to repurposing of manpower for COVID-related services, inadequate supply of personal protective equipment and drugs, inadequate training of COVID-19 frontline health workers and increased absenteeism from work due to elevated stress and anxiety. Considering the challenges of referral system in the family physician program, the existence of COVID-19 disease in the country and its effect on the performance of the relevant ministry's programs, it is necessary to investigate the performance of referral system, identify its strengths and challenges and determine the level of achievement of the goals. If needed, effective interventions should be made to improve the quality of the program. Therefore, the present study was conducted with the aim of investigating the performance indicators of the family physician referral system before and during COVID-19 in Golestan province.

## Data and methods

This practical study was conducted in a descriptive and analytical manner to investigate the performance indicators of family physician referrals before and during COVID-19 in Golestan province using the information recorded from 2017 to 2022. This study was conducted as a repeated cross-sectional study. This research was approved by Golestan University of Medical Sciences ethics committee under number IR.IAU.SARI.REC.1401.239. Recorded data of 786,603 cases referred and cared by family physicians with 943,277 rural and cities fewer than 20,000 people were extracted from 14 cities, Golestan province. Data gathering instrument was the referral system functional monitoring checklist including the ratio of referrals from family physicians to specialists, the percentage of feedback received from level 2 to level 1, the percentage of feedback observed by family physicians, the number of patient referrals to family physicians, the percentage of family physician visits recorded in the system, the percentage of drug prescriptions by family physicians, percentage of para-clinic

prescriptions (laboratory and radiology), number of midwives' referrals, number of population covered by rural insurance, frequency of referrals to specialties, frequency of referral reasons (physician's diagnosis, target group, reverse referral, etc.) of family physicians, the frequency of the once-served population from the health department. All data had been recorded in the comprehensive healthcare services centers system covered by the Golestan University of Medical Sciences including the health information software, the integrated electronic patient guidance program, and the information and statistics database of the health deputy as excel file. The inclusion criterion was the completeness of the information related to the cases referred and placed under the care of the family physicians in the health information system of Golestan province and the exclusion criterion was the lack of information in the registered files. For data analysis, SPSS V. 23 software and descriptive statistics as well as Kolmogorov-Smirnov normality statistical tests, paired t-test and Wilcoxon at a significance level of less than 0.05 were used.

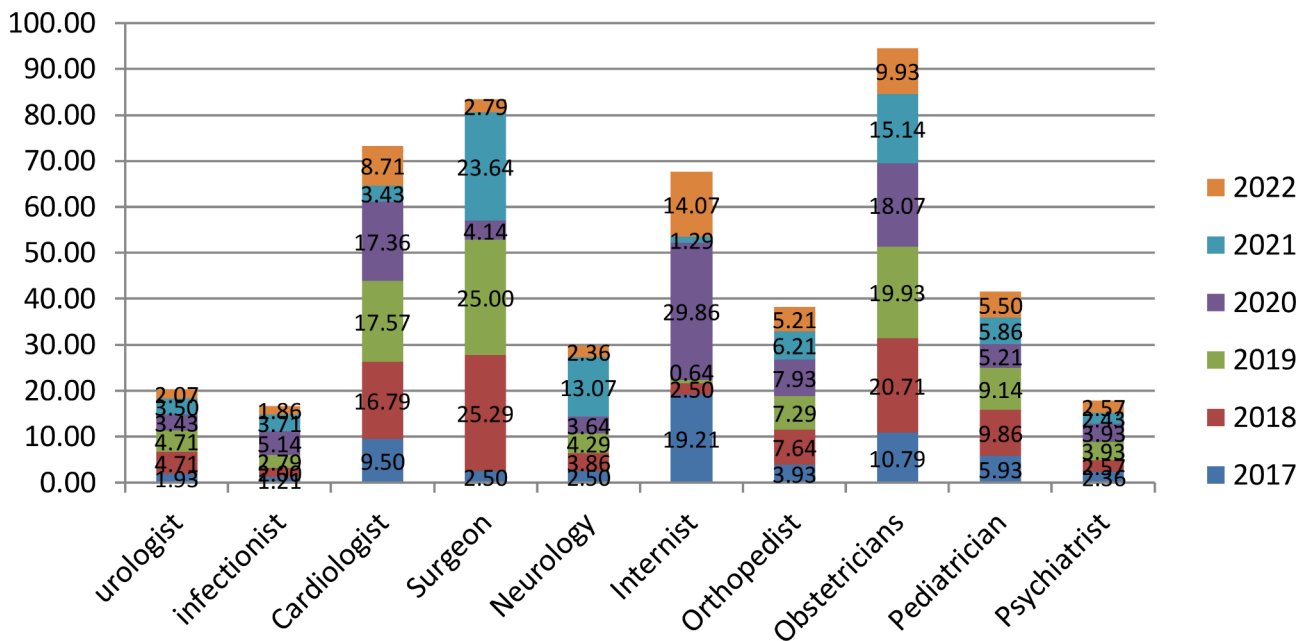
## Results

In 2019, 2020 and 2021, the biggest change in the referral process was belonged to the internal medicine, surgery and cardiology specialties. In addition, the referral process of infectious diseases specialty increased more than twice in 2020 (Fig. 1).

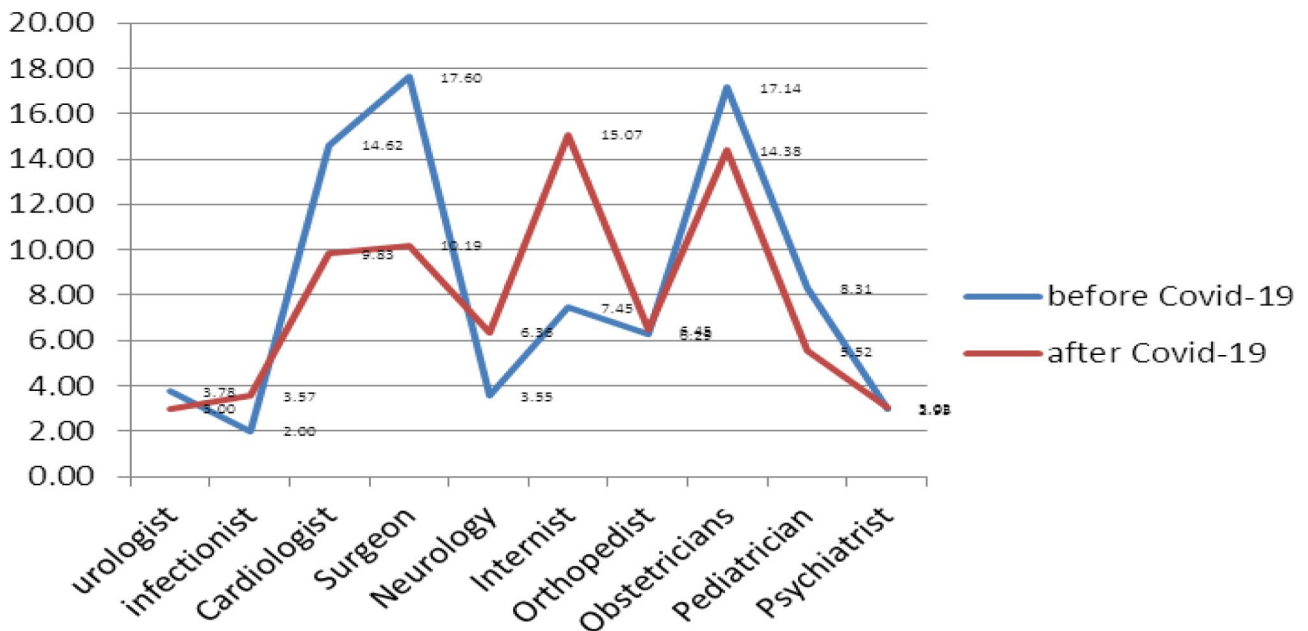
As can be seen in Fig. 2, the highest and lowest frequency (percentage) of referral specialty by family physicians before COVID-19, related to surgery 15,169 (60.17%) and infectious 8,944 (0.2%) and during COVID-19, internal medicine 52,563 (07.15%) and urology 11,632 (00.3%), respectively (Fig. 2).

As can be seen in Table 1, referral due to physician's diagnosis increased by 19.3% compared to before COVID-19, target group increased by 0.86%, care decreased by 2.69%, and reverse referral decreased by 36.1%. The percentage of the total population who once served during COVID-19 has decreased by 0.6% compared to before. The percentage of referrals from level 2 to level 1 during COVID-19 has increased by 12,520 (1.7%) compared to before, and the percentage of electronic appointments from specialists for patients referred during COVID-19 compared to before has increased by 74,184 (18.9%).

Wilcoxon test indicated that the rate of referrals by family physicians to specialists during COVID-19 has not changed significantly compared to before in Golestan province ( $P$ -Value=0.205). In the family physician program, the amount of population covered by rural insurance, the amount of para-clinic prescription by the family physician and the amount of drug prescription



**Fig. 1** Comparison of the percentage trend of all types of specialties referred by family physicians from 2017 to 2022 in Golestan province



**Fig. 2** Comparison of the percentage of referral specialties by family physicians before and during COVID-19 in Golestan province

have changed significantly during COVID-19 compared to before in Golestan province ( $P$ -Value < 0.05) (Table 2).

**Discussion**

The impact of COVID-19 pandemic on the performance of family physician referral indicators was investigated in this research. The referral process of infectious diseases increased more than twice in 2020. Before the COVID-19, the highest and lowest percentages of referrals by family physicians were belonged to surgery and infectious

diseases, and during COVID-19, internal medicine and urology, respectively. Considering the lack of anticipating and management of service centers at the PHC level in Iran, a center for providing services to target groups according to service packages had not been considered. As a result, the care of chronic diseases has been carried out with a model based on the presence of the individual and it has definitely had an impact on the process of care and referral of this group of patients who allocate a significant share of the resources of the health system. This

**Table 1** Performance indicators of the referral system (referral reason, once-served population, 2-to-1 level feedback and electronic scheduling) before and during COVID-19 in Golestan Province

		Before COVID-19				During Co COVID-19			
		2017	2018	2019	Total	2020	2021	2022	Total
		Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Cause of referrals	Physician's diagnosis	10,727 (51.36)	81,814 (50.93)	83,257 (57.43)	175,798 (53.24)	49,329 (57.56)	69,749 (57.07)	109,225 (55.64)	228,303 (56.43)
	Target group	3470 (16.57)	25,927 (16.14)	24,949 (17.21)	53,346 (16.64)	15,443 (17.71)	20,251 (16.57)	35,747 (18.21)	71,441 (17.50)
	Taking care	4732 (22.86)	37,172 (23.14)	24,645 (17.00)	66,549 (21.00)	15,513 (17.79)	21,742 (17.79)	38,007 (19.36)	75,262 (18.31)
	Reverse referral	1935 (9.21)	15,614 (9.79)	13,482 (8.36)	91,031 (9.12)	6915 (7.93)	10,474 (8.57)	13,329 (6.79)	30,718 (7.76)
The percentage of the population served once		1,244,346 (92.00)	1,364,548 (88.00)	1,465,745 (89.00)	4,074,639 (89.70)	1,136,582 (97.70)	1,799,861 (93.00)	1,411,426 (76.50)	4,347,869 (89.10)
The percentage of feedbacks reached from level 2 to level 1		2825 (13.43)	21,574 (22.00)	38,519 (26.57)	62,918 (20.70)	29,465 (33.79)	32,644 (26.71)	13,329 (6.79)	75,438 (22.40)
The percentage of electronic appointments from specialists		2433 (11.57)	34,312 (21.36)	75,284 (51.93)	112,029 (28.30)	45,091 (51.71)	57,967 (47.43)	83,155 (42.36)	186,213 (47.20)

**Table 2** Comparison of referral rates to specialists, doctor visits, drug prescriptions, para-clinics, midwife care, rural insurance coverage before and during COVID-19

	Mean ± SD	Z	P-Value
Referral to specialist before COVID-19	6.54 ± 4.04	1.268	0.205
Referral to specialist during COVID-19	8.26 ± 2.71		
Visit family physicians before COVID-19	31.76 ± 7.81	4.928	< 0.001
Visit family physicians during COVID-19	18.35 ± 4.83		
Prescribing medication family physicians before COVID-19	26.59 ± 2.25	3.372	< 0.001
Prescribing medication family physicians during COVID-19	29.82 ± 2.57		
Para-clinical prescription family physicians before COVID-19	10.76 ± 2.34	3.120	0.002
Para-clinical prescription family physicians during COVID-19	21.90 ± 5.84		
Referral to midwife before COVID-19	10.85 ± 3.04	2.470	0.013
Referral to midwife during COVID-19	9.07 ± 3.81		
Insurance coverage before COVID-19	75.23 ± 7.44	2.689	0.007
Insurance coverage during COVID-19	92.50 ± 4.20		

study showed that during COVID-19, the most changes in the referral process were observed in internal medicine, surgery and cardiology specialties. In this regard, The results of a study in Iran show that the death rate of cardiovascular patients has increased during the COVID-19 pandemic [15]. which seems to be one of the reasons for the increase in the incidence of the said disease during Covid-19. In a study, Xie et al. (2022) stated that at least one year during COVID-19, the risk of heart failure increases by 72%, heart attack by 63%, and stroke by 52%

[24]. In addition, other studies in different countries have emphasized the long-term cardiac, brain, and psychological effects and complications caused by COVID-19 after infection, and suggested solutions with a self-care approach, early diagnosis, and compensatory services to prevent the development of the disease or they expressed its deterioration [9, 24]. In this regard, the establishment of heart health clinics for early diagnosis and financial support of the health care program can be helpful.

In the present study, the highest rate of referrals belonged to internal and pediatric specialists (54.8%). The reason for referral to an internal medicine includes providing a wide range of services, better access to patients and their presence in all general and specialized hospitals. In addition, one of the medical groups in referral system according to the instructions of the health vice-chancellor of the Ministry of Health, Treatment and Medical Education is "internal medicine". The increase in the number of referrals to gynecologists can be attributed to the necessary referrals for prenatal counseling or hospitalization for childbirth in addition to care services [6]. In a prior study before the COVID-19 pandemic, it is stated that referrals to infectious disease specialists were minimal, which is due to the provision of various medical services by general practitioners and other specialists [25]. Therefore, it can be concluded that a number of patients with neurological and mental diseases went to general practitioners and were treated without needing a referral, and a larger percentage did not go to a doctor at all due to lack of knowledge.

Referrals due to physician's diagnosis and target group showed increase while patient care and reverse referral

decreased compared to before the COVID-19 pandemic, but it is still a challenge for family physicians. In Lim et al.'s study, the fear of getting an infection when visiting health and treatment centers along with the restrictions created in public transportation may also reduce people's desire to receive care even in necessary cases [26]. A systematic review showed that the hospitalization rate in acute cardiovascular situations and the number of cases requiring reperfusion have decreased significantly. During the first months of the epidemic, governments in many countries tried to contain the pandemic with different approaches, including limiting the movement of the population, increasing social distance and implementing voluntary quarantine measures. Many countries, in the epidemic crisis, in order to prevent unnecessary referrals to health service centers and reduce the risk of infection, provided necessary care in person and by phone, which is unjustified and unqualified according to the structure and process of care for non-communicable diseases [27].

In various studies, the high number of reverse referrals and the waste of resources in family physician referrals were emphasized, and reverse referrals have been reported as one of the main challenges of the family physician program [7]. Palmer believes that providing free healthcare services increases the demand and wastes resources, and also the demand and insistence of the patient for referral by the family physician can also be effective in increasing the reverse referral. In another study, it was stated that the comprehensiveness of health care has been disrupted in other countries as well. It is mainly due to the limited access to the family physician and home quarantine measures, which can lead to the deterioration of the physical and mental health of the patients, as well as the lack of preventive activities [28].

During the pandemic of COVID-19, countries showed different reactions to it, which was directly related to some factors such as health infrastructure of the countries, the structure of the health system, primary financial resources and human resources [14]. The results showed that the percentage of feedback reached from level 2 to level 1 has increased significantly during COVID-19 and is still in an unfavorable situation. A prior study showed that the lack of feedback or its unfavorable is one of the common and basic problems in the referral system from the beginning of the establishment of healthcare networks in the country [28]. According to the principle of using appropriate technology from the four principles of the network system, in the current situation and with the growth and development of electronic health records and electronic referral technology, providing feedback can facilitate health and treatment affairs, time management for service recipients and service providers, and save on heavy expenses [4]. Weakness in feedback from level 2 to lower level was expressed due to the lack of knowledge of

specialists about their duties in level 2 of the referral system and the need to interact with level 1 [7].

The lack of trust of some specialists to level 1 services in cases who need to follow-up, insufficient knowledge of city officials about the family physician program and referral system, lack of legal requirement to provide feedback by specialists from level 2 to 1 and lack of awareness of level 2 services specialists performance were mentioned as unfavorable factors of the feedback performance index in the referral system [16]. A study in Thailand showed that educational programs for family physicians can increase the quality of referrals [29]. In the study of Gol-Alizadeh et al., the weak technical and health awareness of family physicians is mentioned as one of the factors affecting the referral process [30]. Non-cooperation of high-level physicians in providing feedback and accepting referred patients and even reverse referral was another issues, which were considered to be caused by lack of respect for the competence and professional activity of general practitioners and weak supervision. Non-cooperation of specialists makes it difficult to play the role of family physicians [16].

The percentage of electronic appointments from specialists for referred patients has increased during COVID-19, but it is still lower than expected. Currently, the electronic health record in the country is carried out through the SIB system, in the Mashhad University of Medical Sciences through the SINA electronic system, and in the Golestan University of Medical Sciences through the NAB system. In the referral system, health workers in the villages and health care workers and general practitioners in the cities are responsible for diagnosing and providing the necessary services and care, and if necessary, they refer the patient to a specialist level 2, in this regard, electronic appointment by a specialist practitioner. It is determined electronically and integrated at the first level in the comprehensive health service center. In a study, lack of necessary infrastructure, weakness in cultivating and informing the society about the benefits of the electronic referral system, the absence of the possibility of electronic appointments from offices and referral centers, and the lack of regular presence of physicians in comprehensive urban and rural health service centers were stated as the causes of low performance of electronic referral [28]. Managers are responsible for providing all the necessary infrastructure and emphasizing and supporting everyone on the implementation of laws. Therefore, according to their point of view, a comprehensive law should be approved in the parliament in such a way that all the requirements of the electronic referral system and the family physician are foreseen and implementable along with supervision, recommended.

The results of the study showed that the referral rate of family physicians to specialists has not changed

significantly during COVID-19, but as stated in this study, there have been changes according to the type of specialty such as internal medicine, infectious diseases, cardiology and surgery during COVID-19. It was found that many studies cited the COVID-19 pandemic and the subsequent increase in respiratory infections as well as the long-term cardiac and respiratory complications of COVID-19 as its reasons [15, 18]. A study in Saudi Arabia showed that the referral system led to a 6.6% increase in visits to health centers and a 2.2% increase in the number of referrals. It was concluded that in order to have a good referral system, there should be a strong relationship between comprehensive health service centers and public and private sectors specialists [31].

The amount of para-clinical prescription (laboratory and radiology) by family physicians showed a significant increase during COVID-19. Prevalence of COVID-19 pandemic and the increase in cases of respiratory infection and clinical symptoms of disease - which in the severe phase is associated with lung involvement - along with the fear of contracting a severe form of the disease, the amount of referrals and induced demand for chest imaging increased by family physicians. Emphasis on RT-PCR test as a certainty in diagnosis of COVID-19 by the relevant ministry, as well as the emphasis on conducting the test to confirm the illness for return to the workplace of departmental employees, conducting the mentioned test for hospitalization and surgery of patients, trips abroad and sports activities, etc., led to an increase in the demand for test and raise in burden of referrals to public and private laboratories in the country [15].

The amount of population covered by health insurance showed a significant increase during COVID-19. Universal health insurance was a plan that introduced at the beginning of the health reform plan in 2014. It was decided to establish free health insurance coverage for Iranians. Prevalence of COVID-19 and emerging of economic problems for the people, and with the approval of the National Headquarters to deal with COVID-19 in November 2020, the wide evaluation was stopped. It was decided that the public health insurance should be prepared for all people, if they refer to the government sector and Non-payment of insurance premiums. The increase of insured people from 2018 to 2019 shows the determination of the government and health insurance organization to cover universal insurance. The world's health systems should organize their programs in such a way that essential health services with appropriate quality and maximum insurance coverage are provided for a large part of the population or the entire population of the country, and financial support, along with population coverage and services, ensures justice in access to health services [19].

The present study showed that the percentage of the total population who received service once has decreased during COVID-19 -19. Also, the number of patients referring to family physicians and the number of referring midwives working in the family physician program showed a significant decrease during COVID-19. A study showed that developing countries, including Iran, face many structural, contextual and procedural obstacles that prevent the proper implementation of programs in certain conditions [1]. During the COVID-19 pandemic, there were many deficiencies in the primary health care delivery system, including disruption of routine health services due to redeployment of manpower for services related to COVID-19, inadequate supply of personal protective equipment and medicine, inadequate training of frontline health workers, and increase in absence from work due to increased stress and anxiety was observed. Family physicians can effectively treat a wide variety of medical conditions, act as a liaison between different specialties, and help reduce the burden of disease in a health care delivery system [14].

The present study showed that the amount of drug prescriptions by family physicians increased significantly during COVID-19. A research showed that the high number of prescription items compared to national and international targets can be caused by several factors, such as patients visiting physicians in the face of simple diseases, culture and the common expectation of patients from physicians to prescribe a large number of drugs, prescribing sedatives and antibiotics by physicians to satisfy the patient and low cost of visit and medicine [19].

Health systems in all countries had to be urgently reorganized to respond to the COVID-19 pandemic. Family medicine has undergone significant organizational changes that have multiple implications for patients and family physicians. The COVID-19 pandemic affects all performance indicators of family physicians and referrals. Induced demand for prescription and drug consumption by patients, lack of full recognition of the COVID-19 disease by physicians at the beginning of the COVID-19 pandemic, lack of a definitive treatment for the disease, and finally the reduction of monitoring and supervision of the performance of family physicians due to more focus on the COVID-19 care system and disease control leads to a decrease in family physician's performance indicators compared to the defined executive guidelines.

One of the limitations of the study was the incompleteness of a small number of electronic health records for analysis, which were excluded from the study. Also from other limitations of this study was the small number of articles on different dimensions of performance indicators in the health care system under the influence of the COVID-19 pandemic to achieve comprehensive results. Therefore, despite the achievement of various studies, it

is still not possible to generalize the results with certainty to the entire disease care program at the national level. Therefore, it is suggested that the Ministry of Health, in cooperation with the country's universities of medical sciences, conduct a comprehensive study regarding the various aspects of the care system in the health and treatment network in the provinces of the country.

## Conclusion

The experiences of COVID – 19 showed that Iran's health system should be ready for environmental changes and other upcoming challenges so that it can provide optimal performance in times of crises, which is necessary. The results showed that the COVID-19 pandemic had a significant impact on the trends of family physician referrals, including referrals to specialist physicians, drug prescriptions, insurance coverage, one-time service population, and patient care. The results of the current study have shown the status of performance indicators of family physician referral under the influence of the COVID-19 pandemic in Golestan province. This research showed that the effect of the COVID-19 pandemic on the trend of the performance indicators of family physician referral was expressed, which can be used to eliminate weaknesses. Strengthening the strengths of the programs being implemented in Golestan province in the face of possible pandemics is very useful and effective and can be used in the country. Finally, the results obtained from this research provide evidence to discuss the importance of the family physician's care and referral system in the face of special conditions for quality control in health policies. In the end, it is suggested that policymakers and managers of the health system, aware of the available evidence, should take action to establish and monitor the performance of the referral system so that the important goals of the health system, which are the realization of health, financing and responding to the needs of society, are realized in critical and non-critical conditions.

## Acknowledgements

This study was a research project approved with number 316586 and ethics code IR.IAU.SARI.REC.1401.239. The authors would like to express their appreciation and gratitude to the research assistant of Islamic Azad University, Sari branch, the health assistant of Golestan University of Medical Sciences and other people who helped us in the implementation of this research.

## Author contributions

Soltani SA and Fallah M were responsible for data collection, analysis, and writing of the manuscript. Mahmoudi Gh and Jahani MA oversaw the overall control of the article and provided valuable feedback and suggestions. Marvi A, Naderi M and Abedini E conducted partial data analysis and proposed writing recommendations. Together, our efforts helped to ensure the accuracy and quality of the final manuscript.

## Funding

There was no financial support in the design of the study, data collection, analysis and interpretation of the results and writing of this article.

## Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declarations

### Ethics approval and consent to participate

To observe ethical considerations, in this study, issues such as obtaining an ethics code with the number IR.IAU.SARI.REC.1401.239, freedom of interviewees to participate in the qualitative and quantitative phase (interview), obtaining informed consent, preserving the independence of interviewees in the study, obtaining permission to record the interview, and maintaining confidentiality of information at all stages were respected.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

### Author details

<sup>1</sup>Health Services Management, Islamic Azad University, Sari, Iran

<sup>2</sup>Department of Management Sciences and Health Economics, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran

<sup>3</sup>Infectious Diseases Research Center, Golestan University of Medical Sciences, Gorgan, Iran

<sup>4</sup>Health Sciences Research Center, Mazandaran University of Medical Sciences, Sari, Iran

<sup>5</sup>Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran

<sup>6</sup>Hospital Administration Research Center, Sari Branch, Islamic Azad University, Sari, Iran

Received: 23 October 2023 / Accepted: 30 July 2024

Published online: 07 August 2024

## References

1. Abedi G, Soltani Kontai SA, Marvi A, Mazidi S, Abedini E, Abbasi Chaleshtary A. SWOT analysis of Health Reform Plan on Healthcare Sector from the Stakeholder Perspective. *J Mazandaran Univ Med Sci*. 2018;28(166):199–212.
2. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. *Lancet Child Adolesc Health*. 2020;4(5):397–404. [https://doi.org/10.1016/S2352-4642\(20\)30095-X](https://doi.org/10.1016/S2352-4642(20)30095-X).
3. Abedi G, Seraji ZE, Mahmoodi G, Jahani M, Abbasi M. Evaluating the implementation of Family Physician Program in Urban and Rural areas of Mazandaran Province based on process Approach. *J Babol Univ Med Sci*. 2020;22(1).
4. Sarvestani RS, Kalyani MN, Alizadeh F, Askari A, Ronaghy H, Bahramali E. Challenges of family physician program in urban areas: a qualitative research. *Arch Iran Med*. 2017;20(7):446–51.
5. Amiri M, Raei M, Chaman R, Nasiri E. Family physician: the mutual satisfaction of physicians and health care team members. *Razi J Med Sci*. 2012;18(92):23–30.
6. Nasrollahpour Shirvani D, Ashrafiyan Amiri H, Motlagh M, Kabir M, Maleki MR, Shabestani Monfared A, et al. Evaluation of the function of referral system in family physician program in northern provinces of Iran: 2008. *J Babol Univ Med Sci*. 2010;11(6):46–52.
7. Kabir MJ, Heidari A, Honarvar MR, Khatimamani Z. Analysis of electronic referral system agenda setting based on Kingdon multiple streams framework. *Payesh (Health Monitor)*. 2022;21(1):25–33.
8. Ghorbani R. COVID-19 pandemic and family physician in Iran. *J Mar Med*. 2020;2(1):57–8.
9. Naderi M, Soltani SA, Rad AT, Mehrbakhsh Z, Sodagar S, Tahamtan A, et al. Recurrent viral RNA positivity and candidiasis findings in hospitalized patients with COVID-19. *Future Microbiol*. 2022;17(9):673–82. <https://doi.org/10.2217/fmb-2022-0041>.
10. Blumenthal D, Fowler EJ, Abrams M, Collins SR. Covid-19—implications for the health care system. *Mass Medical Soc*; 2020. pp. 1483–8. <https://doi.org/10.1056/NEJMs2021088>.



11. Drennan VM, Ross F. Global nurse shortages—the facts, the impact and action for change. *Br Med Bull.* 2019;130(1):25–37. <https://doi.org/10.1093/bmb/ldz014>.
12. Todd NJ, Jones SH, Lobban FA. Recovery in bipolar disorder: how can service users be supported through a self-management intervention? A qualitative focus group study. *J Mental Health.* 2012;21(2):114–26. <https://doi.org/10.3109/09638237.2011.621471>.
13. Abedi G, Soltani Kontai SA, Yazdani Cheratee J. Evaluation of managed health care in contagious and non-contagious diseases in Golestan province, northern Iran during 2016. *J Gorgan Univ Med Sci.* 2019;21(2):113–9.
14. Garg S, Engtipi K, Kumar R, Garg A. Role of family physicians in providing primary healthcare during COVID-19 pandemic. *J Family Med Prim Care.* 2022;11(11):6687–9. [https://doi.org/10.4103/jfmpc.jfmpc\\_2209\\_20](https://doi.org/10.4103/jfmpc.jfmpc_2209_20).
15. Zakeri MA, Dehghan M. The impact of the COVID-19 disease on the referral and admission of the non-COVID-19 patients. *Int J Health Plann Manage.* 2021;36(1):209–11. <https://doi.org/10.1002/hpm.3060>.
16. Abedi G, Marvi A, Soltani Kentaie SA, Abedini E, Asadi Aliabadi M, Safizadehe Chamokhtari K, et al. SWOT Analysis of Implementation of Urban Family Physician Plan from the perspective of beneficiaries: a qualitative study. *J Mazandaran Univ Med Sci.* 2017;27(155):79–93.
17. Safizadehe Chamokhtari K, Abedi G, Marvi A. Analysis of the patient referral system in urban family physician program, from stakeholders perspective using swot approach: a qualitative study. *J Mazandaran Univ Med Sci.* 2018;28(161):75–87.
18. Eldeeb M, Fthenou E, Elkousy N, Sheikh N, Nasr M, Affi N, et al. Common indications for Referral to the Healthcare system for COVID-19 recovered patients versus Qatar Biobank study population: a descriptive analysis. *Acta Bio Medica: Atenei Parmensis.* 2022;93(1). <https://doi.org/10.23750/abm.v93i1.11887>.
19. Salimi R, Gomar R, Heshmati B. The COVID-19 outbreak in Iran. *J Global Health.* 2020;10(1).
20. Penverne Y, Jenvrin J, Montassier E. EMS dispatch center activity during the COVID-19 containment. *Am J Emerg Med.* 2021;46:654. <https://doi.org/10.1016/j.ajem.2020.07.083>.
21. Niu S, Tian S, Lou J, Kang X, Zhang L, Lian H, et al. Clinical characteristics of older patients infected with COVID-19: a descriptive study. *Arch Gerontol Geriatr.* 2020;89:104058. <https://doi.org/10.1016/j.archger.2020.104058>.
22. Saberian P, Conovaloff JL, Vahidi E, Hasani-Sharamin P, Kolivand P-H. How the COVID-19 epidemic affected prehospital emergency medical services in Tehran, Iran. *Western J Emerg Med.* 2020;21(6):110. <https://doi.org/10.5811/westjem.2020.8.48679>.
23. Al-Wathinani A, Hertelendy AJ, Alhurishi S, Mobrad A, Alhazmi R, Altuwajiri M, et al. editors. Increased emergency calls during the COVID-19 pandemic in Saudi Arabia: a national retrospective study. *Healthcare*; 2020: MDPI. <https://doi.org/10.3390/healthcare9010014>
24. Xie Y, Xu E, Bowe B, Al-Aly Z. Long-term cardiovascular outcomes of COVID-19. *Nat Med.* 2022;28(3):583–90. <https://doi.org/10.1038/s41591-022-01689-3>.
25. Kazemian M, Kavian-Telouri F. Assessment of Access to Health Care in Family Physician Program with a Comprehensive Health Care Approach. *Health Inform Manage.* 2016;13(4):304–9.
26. Lim J, Jeon S, Shin H-Y, Kim MJ, Seong YM, Lee WJ, et al. Case of the index patient who caused tertiary transmission of coronavirus disease 2019 in Korea: the application of lopinavir/ritonavir for the treatment of COVID-19 pneumonia monitored by quantitative RT-PCR. *J Korean Med Sci.* 2020;35(6). <https://doi.org/10.3346/jkms.2020.35.e79>.
27. Raeisi A, Tabrizi JS, Khosravi A, Ataey A, Tavani ME, Gholami H, et al. General vaccination and active Prevention of COVID-19 epidemic at the Primary Health Care Level: the fifth step of the National mobilization program against COVID-19. *Depiction Health.* 2022;13(Suppl 1):101–16.
28. Kabir MJ, Heidari A, Honarvar MR, Khatirnamani Z, Rafiei N. Challenges in the implementation of an electronic referral system: a qualitative study in the Iranian context. *Int J Health Plann Manag.* 2023;38(1):69–84. <https://doi.org/10.1002/hpm.3563>.
29. Jaturapatporn D, Dellow A. Does Family Medicine training in Thailand affect patient satisfaction with primary care doctors? *BMC Fam Pract.* 2007;8:1–6. <https://doi.org/10.1186/1471-2296-8-14>.
30. Golarzadeh E, Moosazadeh M, Amiresmaili M, Ahangar N. Challenges in second level of referral system in family physician plan: a qualitative research. 2011.
31. Rouhani S, Bagher M. Experience of family physicians in rural areas regarding referral system and improving it (a qualitative study). *J Mazandaran Univ Med Sci.* 2015;25(131):1–13.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.