

Website: www.jehp.net

DOI:

10.4103/jehp.jehp_157_23

¹Department of Public Health, Epidemiology and Community Medicine, Laboratory of Biosciences and Health, Faculty of Medicine and Pharmacy, Cadi Ayyad University, Marrakesh, Morocco, ²Clinical Research Service, Mohammed VI University Hospital Centre, Marrakesh, Morocco, 3Faculty of Medicine and Pharmacy, University Cadi Ayyad, Marrakesh, Morocco, ⁴Biosciences and Health Laboratory, Faculty of Medicine and Pharmacy. Cadi Ayyad University, Marrakesh, Morocco. ⁵Unit of Development and Research in Medical Education (UDREM), Faculty of Medicine, University of Geneva, Geneva, Switzerland

Address for correspondence:

Dr. Ouassim Mansoury,
Department of Public
Health, Epidemiology
and Community
Medicine, Laboratory of
Biosciences and Health,
Faculty of Medicine and
Pharmacy, Cadi Ayyad
University, Marrakesh,
Clinical Research
Service, Mohammed VI
University Hospital Centre,
Marrakesh, Morocco.
E-mail: mansouryouassim
@gmail.com

Received: 03-02-2023 Accepted: 02-09-2023 Published: 28-03-2024

The views of general practitioners in Morocco about health promotion at the primary health care services: Qualitative study

Ouassim Mansoury^{1,2}, Hamza Kachkhouch³, Samira Essoli^{1,2}, Adil Mansouri^{1,2}, Murtada Jabbar⁴, Latifa Adarmouch^{1,2}, Mohamed Amine^{1,2}, Majda Sebbani^{1,2,5}

Abstract:

BACKGROUND: Health promotion (HP) is one of the key skills that every general practitioner (GP) should have, according to The World Organization of Family Doctors, but for several reasons, his practice remains insufficient. However, a gap would exist between the GPs' knowledge and their practices about HP. The aims of our study were to explore GPs' perceptions, knowledge, and practices in Morocco about HP and identify their barriers and needs to best practice HP actions.

MATERIALS AND METHODS: A qualitative case study was conducted among GPs, via semi-structured interviews following an interview guide. Purposive and snowball sampling were used to select our sample. It contained four themes, perceptions, practices, barriers and needs, and proposals for improvement. The interviews were recorded and then transcribed. Thematic content data analysis was done manually. Favorable ethical approval was obtained from the local ethics committee.

RESULTS: Fourteen GPs participated in this study. The sex ratio was at one. GPs' practices were focused on the biomedical model with wide confusion of HP with prevention and therapeutic education. Their roles in HP were considered paramount. The number of patients during consultations, structures' care, and knowledge were the main barriers. The main cited needs were material resources and HP training.

CONCLUSION: Our study has made it possible to make an inventory of the practice of HP in Morocco. Participants' practices were based on the curative aspect. There is a crucial need to implement continuing and contextualized training for general practitioners to strengthen their skills in HP. This training will help to succeed in the health-promoting hospital's strategy.

Keywords:

General practitioners, health promotion, Morocco, primary health care services

Background

The "white paper" was made in 1973, and was the first to discuss the improvement of health state by changing the lifestyle or the physical and social environment. Afterward, the international conference of Alma-Ata on primary health care highlighted social conditions as a determinant of health status.^[1,2]

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

Later, in 1986, the Ottawa Charter, known as an official document for health promotion which has defined it as "the process of enabling people to increase control over, and to improve, their health, to reach a state of complete physical mental and social wellbeing, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment." It indicates the effective beginning of a new

How to cite this article: Mansoury O, Kachkhouch H, Essoli S, Mansouri A, Jabbar M, Adarmouch L, et al. The views of general practitioners in Morocco about health promotion at the primary health care services: Qualitative study. J Edu Health Promot 2024;13:82.

approach that goes against the biomedical model and individualistic ideology. The Ottawa Charter identified five priority action areas: to build healthy public policy; create supportive environments for health; strengthen community action for health; develop personal skills; and re-orient health services.^[3]

Several amendments in continuity with this charter have emerged before the release of the Geneva Charter for well-being, equity, and development in 2021. [4,5] The common point between these reports and declarations is to achieve health as a resource, not as an objective for all populations, by acting on the social determinants. Health promotion does not include only actions aimed at strengthening skills and individual capacities. However, it is a process that enables individuals and communities to increase control over these determinants and improve their health. The social determinants of health are "the conditions in which people are born, grow, are educated, live, work and age; and the societal influences on these conditions." [3,4,6]

Primary health care is an essential level in the health system. Because it allows general practitioners (GPs) to have regular contact with their communities and to administer health promotion programs and actions. The general practitioner's role is particularly complex because it involves the confrontation of different social categories of the population, to create a good relationship doctor-patient based on trust. Also, to satisfy the people's needs according to their personal resources (economic, psychological, and cultural).^[7,8]

Thus, GPs have to be engaged in advocacy for action on those conditions that are responsible for maintaining inequalities. [9] Michel Marmotte has identified five actions to act on these determinants, which have to be done by health professionals including: (1) education and training; (2) seeing the patient in a broader perspective; (3) the health service as an employer; (4) working in partnership; and (5) advocacy. [10]

Considering these five actions, a reorientation of the health service is crucial to reinforce the health professionals' training. Developing competent professionals in health promotion is a key element of building capacity for the future and is essential to realize this vision, values, and commitment of health promotion. [11,12]

According to The World Organization of Family Doctors (WONCA), promoting the health and well-being of the population through appropriate and effective interventions is part of the roles of GPs and is one of these key skills. [13] Nevertheless, The GPs devote most of their time to clinical care, moreover, they seek to improve themselves in technical gestures and clinical expertise, and on the other hand, they grant less interest in health promotion. [14]

However, a new reform of medical studies has been implemented in Morocco since 2015, which integrates the holistic vision into the initial training of GPs, to face the challenges and constraints due to the modernization and evolution of concepts and approaches. Namely, for example, the integration of artificial intelligence and the digitalization of care in a world in full technological evolution. ^[15,16] The Moroccan health system focuses more on curative care adopting a biomedical and not a biopsychosocial approach. ^[17,18] Consequently, a gap would exist between the GPs' knowledge and their practices about health promotion. ^[19]

Therefore, this study will make an inventory of the practice of health promotion in Morocco and identify the obstacles that GPs encounter, which will make it possible to issue recommendations adapted to the local context.

For all these reasons, our study aims was to explore GPs' perceptions, knowledge, and practices in Morocco about health promotion and identify their barriers and needs to best practice health promotion actions.

Materials and Methods

Study design and setting

A qualitative case study via individual interviews was conducted among GPs in Morocco.

Study participants and sampling

The target population was GPs who are professionally active and exercising in Morocco at the primary health care services either in the public or in the private sector. Purposive and snowball sampling were used to select our sample.

Data collection tool and technique

A semi-structured interview guide was prepared based on the initial literature review. It has been updated according to the emerging sub-themes. It covered four themes: (1) GPs' perceptions about health promotion (concept, usefulness, and role of physicians). (2) Their practices are related to health promotion, in particular the development and exploration of the various practices. (3) The barriers to the dispensation of health promotion action and the needs. (4) The proposals for improvement, which consist of collecting a set of recommendations related by the participants, aimed to improve the practice of health promotion. The participants' social characteristics were also collected at the beginning of the interview.

Data collection was done between February 1st, 2022, and March 3rd, 2022. The interviews were conducted using the ZOOM® platform and were recorded after the oral consent of the participants.

Data analysis

All interviews were recorded and transcribed word by word. A thematic content analysis was done manually. The analysis was performed by two authors using qualitative content analysis. The interviews were conducted until a theoretical saturation had been reached.

Ethical consideration

The study protocol was performed, reviewed, and approved by the local ethics committee. The study was conducted according to the guidelines of the Declaration of Helsinki. All participants were informed about the study objectives. Voluntary oral consent was obtained from participants. Confidentiality and anonymity were respected during this study.

Results

Participants' social demographic characteristics Fourteen GPs participated. Table 1 describes the participants' social characteristics. The sex ratio was at 1, with a median age of 52 years (31–61 years). More than two-thirds of participants exercised in the public sector (64.3%) and in an urban area (64.3%). The half-Moroccan regions were represented.

General practitioners' perceptions of health promotion

a) Health promotion: A confusing concept

Health promotion was confused with other concepts, such as prevention, in its three levels: primary, secondary, and tertiary levels. This intervention targeted people at risk of developing certain pathologies. Health promotion and therapeutic education were confused, especially for chronic diseases.

"Promoting health means involving our patients, it means providing therapeutic education to our patients, it means increasing or I would say focusing on prevention."

b) General practitioners' role in health promotion

Improving health is one of the most important objectives raised by two doctors. One physician declared that health promotion aimed at equity by reducing social inequalities in health. According to four physicians, social and economic barriers limit patients, and health cannot be improved by focusing only on care. GPs considered their role in health promotion as paramount and certainly recognized it as a duty.

"We have to reduce inequalities between people, we cannot have good health when there is a gap in inequalities, there is no equity between the people of our country, there is really a big gap, and there is an imbalance in the distribution of wealth. That creates a lot of health issues ..."

Table 1: General characteristics of participants (n=14)

	Effect (n)	Percentage (%)	
Gender			
- Female	7	50.0	
- Male	7	50.0	
Sector of activity			
- Public sector	9	9 64.3	
- Private sector	5	35.7	
Area of activity			
- Urban	9	64.3	
- Semi-urban	2	14.3	
- Rural	3	21.4	
Exercises' region			
- Casablanca-Settat	5	36.0	
- Marrakesh-Safi	4	28.5	
- Tanger-Tetouan-al Hoceima	2	14.3	
- Rabat-Sale-Kenitra	1	07.0	
- Fez-Meknes	1	05.8	
- Oriental	1	07.0	
Age (Years)	52 (31–61)*		
Seniority of practice (Years)	22	! (04–33)*	

*Median (minimum-maximum)

According to the majority of GPs, health is neither health professionals' matter nor the Health Ministry. However, it had to be a priority for all sectors responsible for the implementation of policies and programs, namely sanitation, water, and transport.

"That we must set goals together and involve all partners because health is everywhere so it concerns everyone"

c) Health promotion action means

The acquisition of developing personal skills and creating supportive environments were the main health promotion actions raised by half of the participants. Concerning the acquisition of developing personal skills, the patient has to acquire sufficient skills to manage his diseases and to have a healthy lifestyle, including exercising and following a balanced diet. These imply mainly patients with chronic diseases. Creating supportive environments was raised during the interview with a physician. It involved professional and physical environments. Moreover, the community must be involved by achieving a good level of health for the entire population, and this requires its involvement in a participatory approach, according to five doctors.

"He is not going to do everything, but he has going to be involved with the doctor to take care of these pathologies and his lifestyle."

"So the environment must be adapted to better help people and doctors to do their work, so safety, spaces, and the favorable environment for doing physical activities for example."

GPs' practices in health promotion

The GPs' practices were mainly concentrated on the biomedical model, including the organ and pathology in consultation and outside (school health program). Besides the biomedical model, their vision was expanded to include also unhealthy lifestyles and behaviors. This practice is referred to as the healthy behavior model. While the social environmental model was the least found, social and economic aspects were rarely declared and discussed with patients.

"Health promotion is also done at the school level, meaning that we have school hygiene activities, that is to say, that we have health promotion, which is the most common disease at the school level, dental caries."

"There are always dietary guidelines, lifestyle guidelines, especially for chronic diseases"

"We know a little bit about the social context of the family, so we are a little more advanced on the advice we will give."

During their consultations, half of the participants declared that health education was considered as a discussion about behaviors and lifestyles with patients. Risk factors were discussed with patients even if they were asymptomatic or consulting for another reason.

"For example, a woman over the age of 45, I will talk about breast cancer screening, I will talk about other things besides her reason for consultation, even in men for prostate cancer [...], and for women who come after childbirth for control [...] advice is given automatically on breastfeeding, dietary diversification to children."

Five GPs declared that the patient should not be passive concerning his health and disease management. The patient had to be involved in the choice of treatment and lifestyle change.

"We try to encourage patients to learn a lifestyle that could contribute to the balance of their pathology by adopting a balanced diet by encouraging them to exercise, for example, of course, according to their physical and financial capacity."

GPs' barriers and needs to practicing health promotion

During their practices, participants declared various difficulties. At the logistical level, a high number of patients in consultations. At the organizational level, the care structure and lack of appointment system. Some interviewees mentioned numerous barriers related to the lack of knowledge, especially in health promotion training, which was declared inaccessible. Half of the participants also declared literacy level as a barrier.

Hence, GPs need to reinforce their skills in health promotion through training and material resources. The community has to be aware and involved as well in health promotion. Table 2 describes various difficulties and needs declared by GPs.

General practitioners' strategies and proposals for improvement

First, health promotion training is mandatory to develop their skills, as well, as it must be adapted to the GPs' needs. Secondly, the health ministry has to be involved in health promotion intervention and the involvement of the state, in particular the ministries of health and education, in all approaches (theoretical plan, organization, application, etc.) by being key actors in health promotion and the community. Thirdly, the organization of the workplace, which involves space, the digital system, and human resources. Finally, self-learning. Figure 1 shows the different quotes from physicians regarding their suggestions for improvement.

Discussion

Regarding the GPs' perceptions about health promotion, they confused health promotion with prevention and therapeutic education. Their roles in health promotion were considered as paramount. Health promotion was a responsibility involving other partners, namely the state and other departmental sectors. Their practices focused on a biomedical model and focused more on health education during consultations. The organizational, logistical, and lack of health promotion training were the most cited barriers.

Prevention implies the biomedical reductionist model, focusing on risk groups and early disease detection and treatment. While health promotion is a positive concept with a holistic vision of health aimed at empowerment, it takes into account the individual in its context and considers the socio-political conditions responsible for health inequalities.[20,21] These two concepts seem to overlap and are often confused.^[22] In practice, health promotion is not clearly distinguished from prevention and health education, according to two studies conducted in Sweden and Iran among health professionals.[14,23] Concerning the GPs' practice, the socio-environmental side was rarely discussed, which is in line with a study conducted in Australia, and they have suggested a gap in the training of doctors; therefore, skills development has to be established.[24]

The Moroccan general practitioner considers their roles as crucial to health promotion, which was also found in a study in the United Kingdom. [25] According to two studies in Sweden, health promotion is an important aspect of their practice, and used it as a crucial tool to

Table 2: General practitioner's barriers and needs

rable 2: General practiti	Oller S Dai	ners and needs	
General practitioners barrie	rs to practic	e health promotion	
Organizational barriers	Number=10	O "We must at least equip the health center well. There must be air conditioning, plenty of rooms, well-equipped rooms for the good of the patients and for the health professionals to do their job correctly"	
Related to the patient/ community	Number=7	"The main thing is that the lack of culture of the population is a brake on the correct care of patients"	
Lack of time and workload	Number=6	"I think the big problem is the number of patients per consultation. we can't manage the number of patients, it's always beyond our capacities"	
Knowledge gaps	Number=3	3 "They always need ongoing training and the problem with public health is that we are looking for this training; we make them ourselves! That is to say there are trainings but they are very rare! So that's all I have to add"	
Related to intrinsic motivation	Number=1	"It's not just the doctor. You cannot promote health alone"	
Social inequalities in health	Number=1	"We must reduce inequalities between people. we cannot have good health when there are gaps in inequalities there is no equity between the people of our country, there are really a lot of gaps"	
General practitioners need t	o best pract	ice health promotion	
Health promotion training	Number=11	"We must at least provide training for general practitioners to better understand what health promotion is. Moreover, what is the role? what is needed to better exercise this role"	
Resources	Number=5	"I also need everything that is audiovisual. we don't have a television, we don't have a connection, even the network is really very weak"	
Community engagement and patient involvement	Number=2	"health promotion should be done in groups in my opinion, it is not individual, it is more effective as a group than individually"	
Raise the general practitioners' awareness	Number=1	"First become aware of your mission. Set goals; ensure the same training for everyone on these most frequent pathologies, share experiences, study []"	

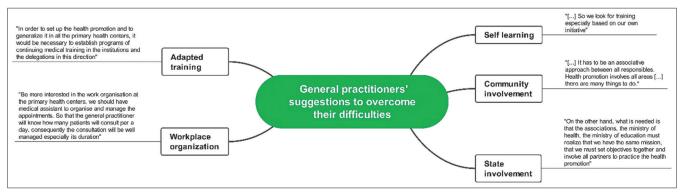


Figure 1: Suggestions for overcoming difficulties

promote the general population's health. Also, the GPs perceived their roles in health promotion as valuable and meaningful by GPs. [23,26]

Among the obstacles to the exemption of health promotion action found in our study are excessive workload and patient flow, which is consistent with a study conducted in Spain. [27] This same finding was found in a study of GPs in a multicentric study in Europe. [28] A study in Australia identified the level of health literacy as a factor preventing behavior adoption, which was also found in our study. These factors are barriers to health promotion practice. They are often beyond the control of physicians and depend primarily on the organization, which implies more organizational commitment from the health directorate that provides resources and support. [29] A Labor regulation of health workers is also necessary, which will lead to an improvement in the efficiency and development of the health system. [30]

The initial and continuous medical education of GPs is focused on clinical skills. Moreover, the Moroccan health care système is centered on curative and preventive care. Therefore, there is a lack of health promotion training. The GPs are unable to practice health promotion at the primary health care services. They perceived that it is not their major mission as well as there are plenty of institutions that have been involved in health promotion activities. Many barriers have been identified in this study, but the GP's main barrier is the lack of knowledge and competencies.

To our knowledge, this is the first study conducted in Morocco on health promotion from the point of view of GPs at primary health care services. It provided an overview of health promotion practices and made recommendations based on the participants' proposals. The qualitative perspective in health promotion is an approach that allows us to understand a rather

complex concept in a particular context – that is, ours. The reasoned choice sampling allowed us to include diverse profiles.

Limitation and recommendation

There is a crucial need to implement continuing and contextualized training for GPs. This training will help to succeed in the health-promoting hospital's strategy. The individual medical prescription is insufficient. We also recommend that social prescribing emphasizes the holistic model of health by connecting patients to sources of support within the community. The interviews did not allow us to have coverage of all regions of Morocco, which constitutes a limit for our study.

Conclusions

The GPs' perceptions were confusing health promotion with prevention and therapeutic education. Their practices were mainly based on the biomedical model. Many barriers and needs have been explored through this study. A well-structured program on the role of these primary care physicians adapted to the Moroccan context should be established and evaluated in subsequent studies.

Acknowledgements

The authors would like to thank all the GPs for their participation in this study.

Financial support and sponsorship Nil.

Conflicts of interest

There are no conflicts of interest.

References

- The health foundation. National Health Service Reorganisation Act 1973 Chapter 32. Available from: https://navigator.health. org.uk/theme/nhs-reorganisation-act-1973. [Last accessed on 2022 May 11].
- Organisation mondiale de la santé. Déclaration d'Alma-Ata. p. 3. Available from: https://www.euro.who.int/_data/assets/pdf_file/0005/113882/E93945.pdf. [Last accessed on 2022 May 11].
- World Health Organization. Ottawa charter for health promotion. 1986. Available from: https://www.who.int/publications-detail-redirect/ottawa-charter-for-health-promotion" [Last accessed on 2022 May 11].
- Promosanté. Chartes et Déclarations: De la Charte d'Ottawa (1986) à la déclaration de Shanghai (2016). In: PromoSanté. Available from: http://promosante.org/promotion-de-la-sante-en-bref/ chartes-et-declarations/"http://promosante.org/promotionde-la-sante-en-bref/chartes-et-declarations/. [Last accessed date 2022 May 11].
- 5. World Health Organization. (2010). Action on the social determinants of health: learning from previous experiences. World Health Organization. https://apps.who.int/iris/handle/10665/44488
- 6. Association médicale mondiale. Déclaration d'Oslo de L'AMM

- sur les détérminants sociaux de la santé. Available from: https://www.wma.net/fr/policies-post/declaration-doslo-de-lamm-sur-les-determinants-sociaux-de-la-sante/"https://www.wma.net/fr/policies-post/declaration-doslo-de-lamm-sur-les-determinants-sociaux-de-la-sante/. [Last accrssed on 2022 May 10].
- Vanmeerbeek M. Les généralistes, la prévention et la promotion de la santé. Etat des lieux, attitudes actuelles et voies d'avenir.:195. https://orbi.uliege.be/bitstream/2268/183997/1/ Theseversionfinale.pdf
- Soklaridis S, Bernard C, Ferguson G, Andermann L, Fefergrad M, Fung K, et al. Understanding health advocacy in family medicine and psychiatry curricula and practice: A qualitative study. PLoS One 2018;13:e0197590.
- Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. Lancet 2010;376:1923-58.
- 10. Marmot M. The health gap: Doctors and the social determinants of health. Scand J Public Health 2017;45:686-93.
- 11. Cherbonnier A, Bontemps R, Lahaye T, Tourtier L, Trefois P. Agir en promotion de la santé: Un peu de méthode. https://www.cbps.be/storage/app/media/uploaded-files/agir%20en%20 promotion%20de%20la%20sant%C3%A9%20un%20peu%20 de%20m%C3%A9thode.pdf
- 12. Battel-Kirk B, Barry MM. Implementation of health promotion competencies in Ireland and Italy—A case study. Int J Environ Res Public Health 2019;16:4992.
- Definition of General Practice/Family Medicine | WONCA Europe. Available from: https://www.woncaeurope.org/page/ definition-of-general-practice-family-medicine". [Last accessed on 2023 14 Jul 2023].
- 14. Afshari A, Ghahnaviyeh LA, Khezeli M, Daniali SS. Health promotion perception among health-care providers working in educational hospitals of Isfahan, Iran: A Qualitative study. J Educ Health Promot 2019;8:144.
- 15. Chikhaoui E, Alajmi A, Larabi-Marie-Sainte S. Artificial intelligence applications in healthcare sector: Ethical and legal challenges. Emerg Sci J 2022;6:717-38.
- 16. Planel-Ratna C, Juwaheer TD. Assessing the impact of digitalization and technology on patient compliance in healthcare services. HighTech Innov J 2021;2:216-23.
- Faculté de Médecine et de Pharmacie de Marrakech. Projet de "Médecine de famille" à la Faculté de Médecine et de Pharmacie de Marrakech.
- Mansoury, O., & Sebbani, M. (2023). Réflexion sur le Système de Santé du Maroc dans la Perspective de la Promotion de la Santé. The Maghreb Review, 48(3), 317-321.
- Toosi TD, Azizian A, Roushan N, Khasaeipur Z, Soleimanzadeh M. The views of general practitioners in Iran about prevention and health promotion and related obstacles in clinical practice. Acta Med Indones 2009;41:115-20.
- Tengland PA. Health promotion or disease prevention: A real difference for public health practice? Health Care Anal 2010;18:203-21.
- Tengland PA. Health promotion and disease prevention: Logically different conceptions? Health Care Anal 2010;18:323-41.
- 22. Hays R. Including health promotion and illness prevention in medical education: A progress report. Med Educ 2018;52:68-77.
- Johansson, H., Weinehall, L. and Emmelin, M. "It depends on what you mean": a qualitative study of Swedish health professionals' views on health and health promotion. *BMC Health Serv Res* 9, 191 (2009). https://doi.org/10.1186/1472-6963-9-191.
- 24. Peckham S, Hann A, Boyce T. Health promotion and ill-health prevention: the role of general practice. Qual Prim Care.

- 2011;19(5):317-23. PMID: 22186174.
- Johansson H, Weinehall L, Emmelin M. "If we only got a chance."
 Barriers to and possibilities for a more health-promoting health service. J Multidiscip Healthc 2009;3:1-9.
- Kloppe P, Brotons C, Anton JJ, Ciurana R, Iglesias M, Piñeiro R, et al. [Preventive care and health promotion in primary care: Comparison between the views of Spanish and European doctors]. Aten Primaria 2005;36:144-51.
- 27. Brotons C, Björkelund C, Bulc M, Ciurana R, Godycki-Cwirko M, Jurgova E, *et al.* Prevention and health promotion in clinical practice: The views of general practitioners in Europe. Prev Med
- 2005;40:595-601.
- McLean S. Building Health Promotion Capacity: Action for Learning, Learning from Action. Vancouver: UBC Press; 2005. 152 p.
- Galiakbarova GG, Nurgaliyeva YN, Omarova EB, Zharkenova SB, Khassenov MK. Ensuring healthcare efficiency in the context of the medical and pharmaceutical staff regulation. Emerg Sci J 2022;6:1290-314.
- Pescheny J, Randhawa G, Pappas Y. Patient uptake and adherence to social prescribing: A qualitative study. BJGP Open 2018;2:bjgpopen18X101598.