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Personalization of health information prescription in diabetes clinical setting: A qualitative study

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Abstract:

BACKGROUND: The prevalence of diabetes makes considerable costs for health-care organizations. The increase of patient's self-care abilities by use of personalizing health information prescription can reduce these costs. This study was conducted to explore the benefits and challenges related to personalizing health information prescription in diabetes clinical settings.

MATERIALS AND METHODS: The samples included diabetes education officials working in specialized diabetes clinics and Diabetes Research Centre managers of Iran and Tehran Universities of Medical Sciences. They were 21 cases and selected through purposeful sampling method. Semi-structured interview and focus discussion groups were used to collect the viewpoints of specialists. Interview guide, based on literature review and the documents of diabetes, was used in interviews and focus groups. Their validity was affirmed by specialists. The interview texts were coded in MAXQDA10 software and analyzed through content analysis method.

RESULTS: The most important benefits of personalizing health information prescription were classified into five themes as follows: medical services improvement, facilitation of consumers to information resources, improvement in patients' knowledge and awareness, increase in self-care ability and disease management, reinforcing the relation between physician and patient and keeping physician in the information prescription cycle. The challenges of personalizing of health information prescription were revealed as follows: Recognition of patients' personal characteristics at the turn of entering the system, systems' functional modifiers especially bilateral interaction and relation to patient's health file, content recognition, and creating suitable protocol.

CONCLUSION: This study showed that diabetes clinical settings face different organizational and process challenges for establishing the personalization of health information prescription. The most important challenges which should be considered in designing information prescription in diabetes clinical environments are as follows: reinforcing physicians' recognition of information prescription benefits, lack of integrative electronic health information system, and patient primary assessment in the first stage of entering the patient into the system in respect of clinical and personal aspects in information needs of consumer.

Keywords:

Consumer health information, diabetes mellitus, patient education, qualitative research

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Introduction

In recent years, health information prescription is known as the source of providing awareness for changing behavioral care patterns and patients' self-care. Furthermore, the change of diabetic

patients' needs to health information is affected by different factors and their own interests. This leads to focusing on personalizing information in health information systems. On the other hand, 1.5 million deaths are caused by diabetes annually, based on the WHO's reports. They also announce that diabetes is the fourth factor of death in the world. Diabetes,

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cancers, cardiovascular, and respiratory diseases are the main agents of 85% of deaths in the world which have been caused by noncommunicable diseases.^[1-3] Furthermore, the prevalence of diabetes has been two times in comparison with 1998. In 2,014,422 million people suffered from diabetes. On the other side, 80% of casualties caused by diabetes has been reported from low income countries or the countries with average level of economic status.^[4]

Global vision of fighting against mortality made by noncommunicable diseases can be classified into three groups including disease management, care system, and prevention. Therefore, a comprehensive information prescription with personalization approach can provide patients' needed information through enhancing diabetes patients' awareness in diagnosis, treatment, and self-care issues.^[5]

Information prescription includes selecting suitable content for a person to supplying his care and health requirements. This can be fulfilled through information prescription services provided by a special health institute or in the form of a series of text or printed materials. The exclusive characteristics of information prescription approach are the consciously and personalizing the content instead of giving a guiding handbook or a standard information package.^[6,7]

Some researchers recognize information prescription as the medical information provision for a special person and in suitable time based on evidence. This is supposed to be helpful if this information can guide the patient in his decision-making or changing his behaviors. In other words, information prescription is to provide suitable information for the targeted person in the appropriate time to making health-related decisions by the patient.^[8-11] Personalizing information in scientific texts is defined as providing or sending information based on preferences, needs, and consumer's contextual conditions.^[11]

The literature review showed that need assessment and focusing on present references such as patient's chart have been used to recognize the contributing factors impacting personalization. Personalizing web information has been regarded effective for patients use through the connection between medical data of patients with personal knowledge base, combining semantic concepts for enriching search, and word simplification in clinical centers' information system.^[12]

The results of generalization of personal information prescription model have shown that patients' knowledge about diabetes has been enhanced considerably by supplying training materials based on their health literacy level and interests related to learning.^[13]

Godman *et al.* have found the challenges and contributing factors impacting personalization in different consumer groups.^[14] Kulzer *et al.*'s study illustrated some personalizing suggestions related to healthy lifestyle for reducing person's susceptibility to cardiovascular diseases. The result of study entitled "the impact of personalizing diabetes management program and its ProValue on controlling blood sugar in diabetes patients" showed that diagnostic data lead to controlling blood sugar more efficiently, increased patients participation, and also patients and physicians satisfactions of provided cares.^[15]

In the present study, a qualitative research based on the thematic analysis was conducted to recognize the viewpoints of diabetes specialists with regard to health information prescription in clinical setting. This investigation clarified challenges or barriers for establishing health information personalizing approach used by diabetes patients. The findings of study facilitated the alternatives related to use health information personalization of diabetic patients in clinical settings and also controlled selection of health information as a part of determinants of diabetes health information prescription system.

Materials and Methods

The present study was a qualitative research based on thematic analysis conducted in 2020. Qualitative content analysis is a suitable method for achieving different and reliable results from data. It is used to present the facts and cues to actions. The goal of this style is to intensify the description of a phenomenon and express the concepts or the descriptive concepts of that phenomenon.^[16]

The sample study included diabetes education officials working in specialized diabetes clinics and Diabetes Research Centre managers of Iran and Tehran Universities of Medical Sciences. They were selected by snowball and purposeful sampling methods. The research team tried to select the samples with the maximum amount of variability in respect of some characteristics such as age, education level, occupation place, and working history.

After conducting 19 interviews, the researchers reached to saturation of data. Nevertheless, two further interviews were done to assure the validation of achieved data. Semi-structured interviews through interview guiding were designed based on the following sources: literature review, further documents, in-depth face-to-face interviews and also supplementary interview data such as memo writing and field notes [Appendix 1].

Prior to interview, the researcher clarified the benefits of project. Different questions based on interview guide

were designed in according to the study's goals. After receiving the permission of participants, their voices were recorded by cellphone. Every interview last between 45 and 110 min. Credibility, dependability, transferability, and conformability suggested by Goba and Lincolen were used to assuring the validity and reliability of the study.

The credibility of data was guaranteed by long-term involvement with data and referring them to the participants, reviewing them by external observers and continuous comparison of data with themselves. Dependability of data was stabilized by member check style and use of consultants' supplementary viewpoints. Moreover, the data were presented to an endocrinologist and an information specialist in order to fulfill the conformability of findings transferability of data also was affirmed by enriched describing of data.

Data analysis was done through inductive approach and use of continuous style. This was done by transcribing the recorded texts in MAXQDA¹ (Version 10) and determining the meaningful units including statements and the words related to health information personalization. Then, coding and categorizing of meaningful units code, reviewing codes according to the main transcripts of interviews and achieved information related to other resources and also comparing the codes were done. The process of analysis through combining the similar codes, categorizing and developing the categories, based on their similarities, were conducted.

The present study was conducted by the permission of Research Council of Iran University of Medical Sciences and the following ethical code: IR.IUMS.REC 1396.9321623002. Prior to conducting interviews, the goals of investigation, data confidentiality, and reserving and also anonymity of the participants were assured. The consent of participants for involving in the study was taken verbally. For blinding participants' statements, a code number was given to every single interview.

Results

In the present investigation, the following subjects were studied: major themes and subthemes related to personalization of health information prescription and health information provision based on diabetic patients' needs and interests and also their impacts on specialists' and officials' activities and performance in diabetic education in Iran University of Medical Sciences.

In the first phase, the impacts of health information prescription on staff's activities were provided [Table 1]. Moreover, the challenges related to personalizing of

health information prescription were categorized into four main themes and 22 subthemes. The main challenges included considering patient's personal characteristics and their interests, primary essentialities of information prescription system, necessary measures of organization, and information content provision for preventing from health information accumulation. Every one of them is explained individually for describing the challenges comprehensively. These themes and subthemes were achieved through coding interviews transcripts, extracting and abstracting them and also analyzing and categorizing the statements [Table 2].

Performance impact of information prescription system in diabetic clinical environment from diabetes specialist viewpoint

Prior to question, consumers were asked to express their viewpoints with regard to personalizing of health information prescription and its impact on professional activities and patients' care processes. Specialists' statements showed the following impacts of health information prescription: medical services improvement and their suitable provision, consumers' access to health information sources, awareness improvement, and knowledge of patients, enhancing self-care abilities and disease management, reinforcing the communication between patient and physician and keeping physician in health information prescription cycle [Table 1].

Performance impact of information prescription system on staff professional activities in diabetic clinical setting

In the first phase, specialist's viewpoints about impacting of health information prescription on their activities and performances were studied.

Medical services improvement and suitable provision of health services

Health information prescription in diabetic centers can improve medical services improvement and suitable provision of health services. The statements of the participants confirmed this concept: "If the patient comes here with awareness, our work facilitates to some extent. Well, we should take care of his foot wound and if he has information, we can work better rather than the patient has poor foot condition with infection in its end stages within debridement level" (Participant 5).

Facilitation of consumer access to health information sources

Health information prescription system can facilitate the access of diabetic patients to health information according to health specialists. One of the participants said: It can be very effective. In the present system, as I say, information prescription is intercepted. Diabetic

1 - MAXQDA10.VERBI Software CO. Berlin, Germany.

Table 1: Performance impact of information prescription system in diabetes clinical environment

Themes	Subthemes
Medical services improvement and their suitable provision	Preventing from medical errors, time saving, efficient medical care, enhancing productivity cost, increasing patient's satisfaction, making extra value
Facilitation of Consumers' access to health information sources	Patients access to revised information, access to high wrong resources and community-based resources, providing information to diabetic patients, information quality guaranteed and its dimension, patient's access to credible information resources recommended by physician
Improvement of patient's awareness and knowledge	Increasing patients' specific knowledge, increasing patient's awareness and perception about disease, reinforcing concept reception and hard events
Enhancing self-care abilities and disease management	Increasing self-care ability, self-management of non-communicable diseases, behavior change in treatment and health behavior, reinforcing of health goals, enhancing self-management skill, empowering patient-physician relations
Keeping physician in health information prescription cycle	Keeping physician and diabetes education specialist in information cycle, asking questions from physician by patients, changing physician attitude in using information prescription

Table 2: challenges of personalizing health information prescription

Themes	Subthemes
Considering patient's personal characteristics and preferences	Demographic issues (age and sexuality) Diabetes type Activities Education level Occupational Situation Patient's BMI Duration of incidence to diabetes Socioeconomic condition and living place zone Cigarette use
Primary essentialities of information prescription	Possibility of reciprocal connection between system and patient Primary assessment before entering the system and receiving personal information Relevance of information content of information prescription system with consumer's needs Flexibility of the present substructures Question making and alert system for referring to physician Making integrative system of patient's electronic file
Essential organizational measures	Making suitable protocol for personalizing health information Primary need assessment of patients for perceiving their necessary information Reinforcing communicative cycle between physician and patient Forming patient's electronic health record for analysis
Provision of informational content for preventing from health information accumulation	Information content about tests results Information content about specific complication Information content about insulin use Source of documented health information

BMI=Body mass index

patients have few access to his needed information whenever he wants, though he may find something in internet, but they are not reliable. However, through this consumer system, he can have access to reliable information whenever he wants (Participant 1).

Another participant said that personalizing of information can prevent from facing patients with huge amount of information: "If we personalize information prescription which is very effective, because, for example, diabetes affects all or many organs. If we provide high amount of information for patient, he mixes up to some extent. And, he says I'm not sick and if his problems are not serious, so, as much as you ask him to do check-ups, it is not important for him" (Participant 9).

Improvement of patient's awareness and knowledge

Health information prescription system leads to enhance the awareness of the following items: disease condition, treatment and diagnosis stages, and the information of the nearest health centers. This has an important role in accelerating treatment process. The viewpoints of participants about health information prescription can improve the patient's awareness and knowledge and also their active involvement in treatment process related to self-care. One of the participants said:

"When patient knows disease complication, treatment process and self-control issue, he involves in referral system. In addition, his own involvement in doing tests and doctor referrals increases. If our doctor finds,

it necessary to refer to higher stages of care, patient's cooperation goes up, when he has health information about diabetes" (participant 2).

Nevertheless, another participant emphasizes the sufficiency of health information. He noticed its redundancy as a factor which makes challenge between physician and patient:

"Well, information prescription is necessary to some extent, but its extravagance makes challenge in the connection between patient and physician. For example, when we prescribe a medicine for patients, most of them search its side effects and do not take it due to those side effects, whereas when a doctor prescribes a medicine, he knows its side effects but patient refuses taking medicine just because he searches its side effects and this is really challengeable. Hence, information is necessary, but its redundancy is not good (participant 3).

Increase patient ability in self-care and disease self-management

Reinforcing patients' awareness and knowledge with regard to more qualified disease management is one of the advantages in establishing information prescription: "Regarding diabetic patient's condition, if we can give them more complete information, they can help them more, for controlling his disease (participant 8).

Another participant stated: "This is seen in education of controlling this disease and you cannot ignore it or justify that it is not effective. And that one is this point that increasing patients' awareness and knowledge of diabetic patients about their disease control is absolutely effective. So, this system is surely important" (participant 7).

A participant said: "I believe that diabetes is a disease which is so related to the patient. Of course, all diseases are associated to the patients but in diabetes, the patient has an important role I cares and information transcription can be very useful for patient, especially if it is as much as the patient's knowledge and public culture and it is simple for them" (participant 5).

Another specialist expressed his viewpoints as follows: "Information prescription affects surely the relation between patient and doctors. When patient as more information, he knows that what things he should tell the doctor and his relation with doctor is closer. And when he know that someone follows his affairs, he can share his issues more" (participant 6).

Keeping the physician in information prescription process

Information prescription cycle includes message exchange and a number of questions asked by the

patient. Reserving of this relation needs to increase awareness and knowledge of his health information. Hence, the patient is referred to the sources which are compatible to his characteristics. This is done based on health information personalization. The participants believed that using health information prescription is an important factor in keeping the physician in information prescription cycle. One of the specialists said: "Information prescription can affect our professional activities. Of course, if we improve our knowledge continuously, it affects our professional activities surely and directly. And, its effect is positive and that bilateral trust between patient and us, is formed" (participant 5).

In the second phase, the specialists were asked to state their viewpoints about personalization of health information prescription in diabetes clinical setting. The results are shown in Table 2. They were classified into four themes and 23 sub-themes [Table 2].

Considering patient's personal characteristics and preferences

Since the information needs of diabetic patients are different, their recognition is important for personalizing the information. The interviewees stated that patients' characteristics should be considered. They consisted of demographic information (age, gender), diabetes type, person's activities, education level, occupational situation, patient's body mass index (BMI), duration of Incidence to diabetes, socioeconomic condition, living place zone, and cigarette use.

One of the participants stated his belief about this issue as follows: "Perhaps, we can say that 60% of basic information which diabetic patients should have is the same. But, that 40% depends on the patients. A diabetic patient is fat and another one is thin. So, personalization has to be done. But, when I say as far as the patient's question is more specialized, the physician has to be get involved more so that the patient does not have to be forced to gather information from general sources" (participant 3).

Based on specialist points of view, disease progress and incidence duration are the minor stated issues: "After some time, he refers to us, when he is a diabetic patient as a new case. Well, in this situation, we have some recommendations and then we try to see that how much time the patient has in a way that we can work on his lifestyle and its modification. So, based on his diabetes progress, we have different programs and consult" (Participant 8).

Another participant said his viewpoints with regard to information prescription as follows: "In my opinion,

age, diabetes type, daily activities, physical activities and the person's activities are very important. Actually, they give us an alarm about what impact of self-care this person shows. These are the items for information personalization" (participant 5)

Education level was one of the personal characteristics impacting information prescription as one of specialists said: "I personally feel that we ask them their education level. Because as much as it is higher, he is more alert about his disease and his awareness and attitude. And also his age and his diabetes type and this point that if someone is in his family to help him, are all important. For example, some of them are not concern enough but their children are very aware. They know that when they should be followed-up and this point that if someone is in family that support them or not" (participant 6).

A specialist stated socioeconomic level of patients as a contributing factor in health information personalization is a characteristic which the health information should be provided for patients on the basis of this factor: "It is possible a series of subjects which are general and used for all diabetic patients and some questions and some education materials and they are individualized and they should be categorized. They have to be given to the patients with qualified education. Those ones who have higher socioeconomic level, they have to be given some higher education. They have surely higher wills and abilities" (participant 7).

According to the viewpoints of participants, the occupational situation of patients should be considered in health information personalization. One of the participants said: "Patients' job should be regarded, because many patients especially male ones cannot come to clinics at all because of their jobs. If you design an application which can help them and give them some information, it is very valuable" (participant 7).

Primary essentialities of information prescription

In order to successful performance of personalized health information prescription, the samples in the present investigation stated that system should have primary essentialities as follows: the possibility of bilateral interaction between system and patient, primary assessment of patient at the turn of entering into the system and also receiving personal information, the relevance of information content related to information prescription system with the consumer's need, flexibility of the present substructures, creating questions, and alert system for referring to physician and integrative structure of health electronic file.

Flexibility and multi-function are two specifications of functional capabilities of information prescription

system. The participants stated their importance in successfulness of personalized information prescription as follows: "Your sub-structures have to be flexible very much. I mean, even as its name declares, information personalization should be in a way that sub-structures would be very strong. In my opinion, he should assess the guy firstly, as you said and achieves information and asks some questions and gives some answers according to them, for example he asks his education level" (Participant 1).

In addition, the interaction between patient and information prescription system can be known as a factor in succeeding of information prescription in diabetes clinic and developing suitable system based on specialist's viewpoint: In fact, you should relate to patient bilaterally, one-sided relation is useless or they may leave your system. Your system should connect to patient bilaterally and your system provides everything the patient wants. This should be the secret of your system success" (Participant 1).

Essential organizational measures

The specialists stated the process or instructions needed to the development of information prescription so that it can recognize their different angles such as stages provision of standard content, staff education by information prescription and other primary essentialities. An interviewee said: "Well, organization should provide some instruments for this action based on patient information and the protocol which should be provided by organization, for personalization, we should consider it" (Participant 20).

The specialists noticed episodic assessment of patients' health information seeking behavior conducted by staff in order to recognize more requirements of health information prescription system. Patients segmentation, based on different concepts were also noted: "The best action to do is use of questionnaire and we ask them and you, for example, segment them with different age brackets, what thing makes you and different goals. You ask him what you want to know, you are a diabetic patient. What thing makes you worried and you like to know more" (Participant 20).

Provision of informational content for preventing from health information accumulation

One of the major modifiers of health information prescription includes producing suitable information content. The participants of present investigation believed that health information can be consisted of minor subjects, information content with regard to tests results or particular complication, the method of taking insulin and also documented health information resource.

One participant stated the factor causing the lack of patient attention to informational packages and the necessity of using personalized information prescription as follows: "You know, the most important reason which informational packages given to patient, are not regarded is that they feel that they don't need them. We have a patient hospitalized in hospital and we described to him, he does not pay attention, because his mentality is bewildered by other affairs" (Participant 9).

This participant noticed personalized information prescription as the solution of this problem: "Its alternative is that we personalize and focus on the person himself. We find his problems and prioritize based on the problem which he gets involved, we give him the suitable package" (Participant 9).

Another participant emphasized that content is divided into general information and the information relevant to the persons' condition: "There are some problems which are general and is generalized for all conditions, but some of them become private. There is a person with especial BMI or has very special mental status like stress and anxiety. So, education depends on the person. But some information is about disease process and the events which happen and the person becomes diabetic and some factors impact them. They can be described for all of them" (Participant 21).

The participants considered the content of documented health information source so important. One of these participants said: "informational resources which the patients achieve their information... because, a person with high education level, reads original scientific book or he may achieve this information from the relatives and this point that information resources are very important" (Participant 21).

Discussion

In the first phase of project, functional impacts of information prescription on the activities of specialists and facilitation of management measures were emphasized. Increasing patient ability in self-care and self-management, reinforcing patients' awareness, and knowledge for managing the disease more efficiently are some of the benefits of establishing information prescription. The results of the similar studies showed that the assessment of patients' empowering score and its contributing factors are the reason of providing and having access to the diabetes goals as the most important agent in self-empowering of patients. They also declared that patients have empowering potential for management disease, whereas health information and education are given to them actively.^[17]

Personalizing in health information systems are required to establish them based on internal conditions and consumers' needs. The present investigation determined to modify some dimensions of health information prescription systems using specialists' viewpoints. The achieved results showed that self-care measures can be promoted using patients' personal characteristics and their interests in personalized health information prescription.

The results of similar investigation illustrated that personalizing approach should be patient-centered and based on patients' interests. Hence, it should not be considered just according to any specific standards. In addition, they regarded the best form of personalized care as the receiving of the management program being adjusted by the patient's characteristics. Their findings also emphasized that treatment strategies are known as the consideration of patients' interests with special risks and patient's pathophysiology.^[18,19]

The assessment of behavioral intervention and self-controlling based on web showed that the participants should enter into the system in order to register their daily or weekly measured blood compartments. Then, their uploaded information has been studied and necessary medical recommendations were provided by physician.^[20-22]

The development of personalized information prescription requires a multi-disciplinary approach in clinical settings. It has faced different organizational, systemic, and process challenges. Establishing personalized information prescription has applies two approaches including specialty-based approach (the research conducted by medical specialists) and use of artificial intelligence in order to simulate laboratory systems.^[23,24]

In the present study, the provision of suitable protocol for personalized information prescription was stated systematically by participants.

The results of the similar investigation showed that the future vision of diabetic foot wound depends on paradigmatic changes in categorized health care toward personalized medicine. This study expresses that different therapeutic alternatives should be in access which have to be presented by an integrative, subjective, qualitative, and evidence-based approach.

In order to change the paradigm towards medicine with regard to prevention and taking care of diabetic foot, comprehensive cooperation among different stakeholders is necessary. This is consistent with the present study. The specialists stated that one of the

organizational measures for succeeding of health information prescription is to make suitable protocol in order to personalizing the information in which various processes for information prescription and the situation of system's consumer should be regarded.^[25]

The content of information prescription is a part of health information prescription system and includes disease description, complication recognition, medicines use routes, physical activities, and physicians' recommendations. The results of present study with regard to personalized health information prescription showed the importance of using efficient and suitable health information content.

In another study, this factor was stated as a modifier in designing personalized systems in the form of subject's library. This also includes consumer's identification and personalizing motor or communicative algorithm of the patient profile with the suitable segments of subject library.^[26]

The recognition of patient personal characteristics by officials is known as an important challenge in the process of personalizing health information. The results of the similar studies showed that self-management intervention based on theory causes to accept healthy lifestyle and also reinforcing of patients' self-efficacy. They stated that intervention should be based on the basic needs of pregnant women and the targeted group.^[27,28]

In another investigation, it was emphasized the design of instrument for recognition of the patients favorite framework to receiving information prescription in the form of visual, written/textual, verbal and also for content provision based on their needs. They also stated that patients' data should be used to create the interactively practical program based on Web for information prescription. This study came to this conclusion that the evaluation of patient's awareness related to disease condition requires strong instruments in order to measure the changes in knowledge level.^[13]

The following concepts were stated by the participants in the present investigation: the interaction of system, the content of documented information based on consumer needs, creating questions, and informing system for referring to physicians and also reinforcing patient's knowledge background.

The need assessment of the information required by consumers is the inseparable part of health prescription system for noncommunicable disease especially diabetes in order to recognize the personal differences and interests of the patients.^[29] Endocrinologists expressed the

use of periodic assessment of health information seeking behavior among diabetic patients and segmenting them based on different concepts.

In the British Information Prescription system, different scenario is existed for perceiving the referent to the system and various options were used to determine the relation type by which the patient connects to diabetes. This leads low educated people or older diabetic patients can use the system with high level of participation of themselves and their families in order to control and manage the disease.^[30]

One of the challenges expressed by specialists was primary essentialities of information prescription system in diabetic clinics. In fact, the system should have this flexibility for making bilateral interaction between system and patient so that consumer can present his own needs and receives suitable content.

The similar studies showed that succeeding electronic interventions with regard to diabetes depends on different factors as follows: the persistency of contacts among the studied participants and physician, interactive and personally active approach, online group discussion, weekly therapeutic changes, education about the use of website, and also integration of medical data.^[31,32]

Strengths and weaknesses of research

The strong points of this investigation consisted of using qualitative approach and interview as the study instrument, enabling diabetic patients, providing documented health information, and references for patients in proper time through personalizing of health information prescription process and also recognition of the major challenges with regard to specialists' viewpoints by qualitative approach. The weak points included lacking access to experiences of specialists acting in diabetes education in other regions of the country.

Innovation in study

The studies conducted in this field have shown that they have worked on assessing electronic interventions based on web and with the focus on the importance of information therapy and its definition and also characteristics. However, the recognition of challenges related to using information prescription with qualitative analysis approach and doing survey from specialists in diabetes-related issues have not been conducted as expected. In order to successful performance of health information prescription in diabetes clinic, it needs to recognize its sub-structures and prerequisites. Therefore, the results of present investigation can be utilized in performing the personalization of health information

prescription in glands and metabolism centers, diabetes clinics and therapeutic settings designed for diabetes.

Conclusion

The assessment of specialists' viewpoints with regard to personalizing health information prescription in clinical environments showed that personalized health information prescription can provide the background of medical services improvement, facilitation of consumers access to information resources, improvement in patients' knowledge and awareness, increase in self-care ability and disease management, reinforcing the relation between physician and patient, and keeping physician in the information prescription cycle.

The challenges related to establishing health information prescription system in clinical settings included as follows: personal differences and various interests of people such as variety society health information literacy level, patient's unwillingness for receiving information from physician, person inability in filtering unsuitable information and physician unwillingness for adding information prescription as a professional compartment.

The suggestions for solving this problem included using the personalization of health information prescription process so that information program can be adjusted to consumer tendency in every dimension of issue, content, the method of presentation and the style of information provision. This leads to empower the patients. The main challenges of personalizing health information prescription included considering patient's personal characteristics, determining primary essentialities of health information prescription, conducting organizational measures and providing protocols, establishing enriched information content for preventing from accumulation of health information. They can be focused in developing health information prescription in clinic and providing the cares based on patient's needs. The findings of investigation can be used in providing of health information prescription program and also educational intervention of diabetic patients to enhance patient's participation in care processes.

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Conflicts of interest

There are no conflicts of interest.

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Appendix

Appendix 1: Research question

1. Please introduce yourself and let us know how many years have you had working history in diabetes field?
2. Have you had any experiences about health information prescription?
3. What is your general viewpoint about health information prescription for diabetic patients? (its impact on professional activities and functional measures and on patients)
4. How is the current process of providing health information in diabetic clinics for patients?
5. What are the most important challenges for establishing personalized health information prescription? (barriers, challenges, problems,...)
6. Do you have any suggestion or criticism about performing efficiently the health information prescription in diabetic clinics which can help to recognize the issue more and better?