The Challenges of Iran's Type 2 Diabetes Prevention and Control Program

Abstract

Background: Incidence and prevalence of type 2 diabetes are one of the major challenges of Iran health system. Despite policies on diabetes prevention and control, Iran is faced with many problems in prevention and control of this disease at the executive level. This study seeks to identify the problems of Type 2 diabetes prevention and control program in Iran. **Methods:** In this qualitative study, 17 participants were interviewed purposefully. The semi-structured interview guide was designed based on literature review and four initial in-depth interviews. Framework analysis method was used for the analysis of qualitative data. **Results:** Six themes and 29 subthemes explaining the problems of type 2 diabetes prevention and control program were identified: Referral system, human resources, infrastructure, cultural problems, access, and intersectoral coordination issues. **Conclusions:** Despite the well-developed policy of type 2 diabetes prevention and control, the implementation is faced with some problems which endangers the effectiveness of the plan. Any attempt to improve the successful implementation of the type 2 diabetes prevention and control program requires effective measures, deep understanding of the problems and solving them.

Keywords: *Diabetes mellitus, health plan implementation, prevention and control, type 2*

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Introduction

Type 2 diabetes is a metabolic disorder in which, beta cells cannot adjust themselves with body's increase requirement for insulin. Without enough insulin, excess glucose builds up in the bloodstream, leading to diabetes, prediabetes, and other serious health disorder, the body is progressively resistant to insulin which results in the destruction of pancreatic beta cells and in serious defects in insulin production.[1] Various factors cause a person to suffer from diabetes including lifestyle, genetic, and eating habits.[2,3] In 2011, there were about 366 million people with diabetes around the world, which is expected to reach 552 million in 2030. Most people with diabetes live in low- and middle-income countries, which is expected to have the greatest increase in the next 19 years.[4] The World Health Organization (WHO) estimates 200–300 million people worldwide will have type 2 diabetes by 2025.[5]

Diabetes imposes an additional economic burden on the national health care systems all over the world. The global total costs for diabetes was at least 376 billion dollars in 2010 which will reach to 490 billion dollars in 2030. Globally, 12% of total health expenses was spent on diabetes in 2010.[6]

According to the International Diabetes Federation in 2013, the prevalence of diabetes was 8.43% in the population aged 20–79, i.e., 4.4 million Iranian people aged 20–79 had diabetes.[7]

Every year huge amount of money is spent on the control of diabetes and its complications.[8] Disease management programs have sharply increased over the past decade. Many studies have shown that these programs have had an effect on reducing these negative consequences.[9] However, all of these programs have not been effective. Therefore, there are some controversies over long-term benefits of these programs in both the medical community and insurance organizations.[10-12] Diabetes Mellitus requires ongoing medical care and continuous education and support for patients to prevent acute complications and to reduce the risk of long-term complications. Diabetes care is complex and requires multifactorial strategies to reduce its risk.[13]

The most important policy about diabetes management in Iran is the National Diabetes Prevention and Control Program (NDPCP). The aim of this policy

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is to prevent and control diabetes and its complications; its specific objectives include primary prevention to reduce the incidence and prevalence of type 2 diabetes among prediabetics, secondary prevention to prevent, reduce and delay the short- and long-term complications of type 2 diabetes and tertiary prevention to reduce and delay the onset of disability and death from the complications of diabetes and to reduce the life years loss of patients with type 2 diabetes.[14]

National diabetes prevention and control program in Iran

NDPCP has been integrated in the health network with three levels of health care available. With the first level served by health houses and health posts in rural and urban areas respectively, responsible for evaluating at-risk men and women, respectively. The first level in cities consists of general practitioners and laboratory facilities to treat and control all patients based on protocols. Patients are then referred for screening to the second level, which is located in a hospital where a specialist, a full-time educational nurse and a part-time dietician staff the diabetes unit. Patients who require more specialty services are then guided to the third level, which is located in a teaching hospital and has a specialist or subspecialist (if available) and a full-time educational nurse and a part-time dietician who form the diabetes team in the center. The second and third levels are responsible for the detection and management of the complications of diabetes according to predetermined protocols.[15]

Despite the well-developed NDPCP, it seems the implementation is faced with some challenge in Iran, and the program is not able to recruit the majority of at-risk population. As an example, in Kerman, one of the Iran' major cities, according to the prevalence rate of 6.5%–10.6%, we expect to have 20,085–32,754 registered diabetic patients, but only 11,770 people have been registered in NDPCP in 2011.[14] It seems the system is underutilized; so, this study aimed to investigate the problems of type 2 diabetes prevention and control program to explore the underlying reasons of underutilization.

Methods

Interviewees

We interviewed a purposive sample of 17 participants (85% response rate) based on the inclusion criteria and reaching to saturation. Seven of whom were diabetes experts working in (three in the first level and four in the second) diabetes centers, treatment deputy and health departments, and specialists and subspecialists. They had a complete understanding of the treatment process as well as the problems of the current status of implementation of the type 2 program. Other participants were 10 diabetic patients who referred to public and private centers and were interested to participate in the study. Participants were identified in consultation with two local authorities, one former authority, and interviewees.

The participants were invited by phone calls and letters explaining the objectives of the study and introducing the investigators. Seventeen interviewees (8 females) participated in the study. The criteria for choosing participants were extended experience in planning and providing type two diabetes preventive services.

Interviews

Seventeen face-to-face interviews were conducted in 2017, tape-recorded and transcribed, each interview lasting 30–50 min. One author (R. V) conducted all the interviews using the interview guide which was developed by literature review.[15-19] The interview questions were designed so that they captured opinions and beliefs of the participants regarding challenges of type 2 diabetes program in Iran. To have a good considerate of the context, first-four interviews conducted in depth. These helped us to prepare better questions for semi-structured interviews.

Analysis

We transcribed all interviews by listening to them and simultaneously checking with the notes taken during interview. A transcriptions were read while listening to the audio-tape to check the accuracy of transcription. After that, Persian transcripts were translated into English by one of the authors (M. A). However, some portions of the Persian transcripts were translated separately by other authors and to check linguistic reliability and precision in translation, some were back translated.

Framework method consisting of five steps of familiarization, identifying a thematic framework, indexing, charting and mapping, and interpretation was used for analysis.[20] We developed a contact and content summary form for each interview during familiarization. An initial thematic framework was developed using interviews and prior thoughts. A draft framework was established and then argued in a series of sessions between the researchers then the thematic framework was checked against the interviews through repeating the familiarization process, then sections of data was indexed with one or more codes where necessary appropriate, then the coded text was discussed with other authors, and coding was changed where necessary, this process was done several times for all the interviews. We formed one table for each theme and gave rows to subthemes and columns to interviewees, then data were moved on to the tables to form analysis chart. We compared the views of each interviewee across different subthemes (looking across the columns) and the views of different interviewees about each subtheme (looking across rows). The relationships between subthemes and themes were also explored. We checked the transcribed interviews and added extracts to chart wherever required. The interpretation of the themes followed a process similar to what explained for the indexing. The draft framework had six themes which did not change but subthemes

changed several times during the analysis, verbal consent from the participants was asked and no incentives were offered to participants.

Results

We identified six themes and 29 subthemes regarding the challenges of implementing Iran's national type 2 diabetes prevention and control program [Table 1].

Theme 1: Infrastructural problems

One of the problems of Iran's National Diabetes Program is the infrastructural problems including noncompliance

Table 1: Challenges of the type 2 diabetes prevention and control in Iran

Themes	Subthemes
Infrastructural problems	Incompliance of health network with noncommunicable diseases
	Physical separation of first and second level health centers
	Information system failure
	Lack of integrated education system
	Insufficient laboratory services for the second level patients
	Insufficient equipment
	Lack of centers for diabetic foot management
Referral problems	Passive patients referral to second level
	Lack of coordination in referral
	Referral chain cut
	Failure to follow the second level referred patients
Human resources problems	Human resources deficiency
	Low motivation of first level physicians
	High turnover of first level physicians
	Personnels low knowledge
	Weak performance evaluation
Cultural problems	Insufficient awareness of public diabetes centers
	Low knowledge on diabetes
	Patients low motivation
	In compliance to treatment and diet
	Low trust to general practitioners
	Wrong beliefs about insulin, medicines, and traditional remedies
Access problems	Difficulties receiving service from public centers
	Elderlies difficulties to come for follow-ups
	Centers unsuitable working hours
	Unaffordability of some medicines
Intra sectoral coordination issues	Insurance coverage of first level services
	Low cooperation of other service providers
	Weak organization and performance of NGOs

NGOs=Nongovernmental organization

of the health network system with noncommunicable diseases, delays in starting the noncommunicable diseases control programs, physical separation of the first and second level of health network referral system, fatigue of the existing health center buildings, and amortization of equipment in these centers. One of the participants believed that "the system designed for Iran network system is based on infectious diseases" (Provider. 2). Moreover, the absence of an appropriate registration system to follow-up the disease process during diagnosis and treatment, incoordination with other centers in case of immigration of patients. In this regard, one of the interviewees believed that "we don't have a system to record the patient's conditions to monitor the conditions of a patient after 4 years of follow-up to understand he/she is better or worse" (Provider. 1). In addition, the absence of centers for diabetic feet in this program causes patients not to use these centers due to scattered services in the city and difficult access to services. As a result, more legs will be amputated in patients. An interviewee stated that "Following the diagnosis of the diabetic foot infection or ulcer, the patient does not know where to go or where to be referred to" (Provider. 3). Interviewees believed that limited access to public centers due to shortage of these centers, shortage of laboratories affiliated to health centers and problems (delays) in transferring test results from the laboratory to the health centers cause patients' dissatisfaction. One of the interviewees mentioned that "there are only a limited number of diabetes. Owing to overcrowding, patients have to wait for long hours, so people are very dissatisfied" (Provider. 4).

Theme 2: Referral problems

Improper implementation of the referral system due to infrastructural problems such as absence of a registry system, paying no attention to the follow-ups, inactive screening, insufficient personnel to visit patients at different levels, busy centers, delays in visiting patients and their dissatisfaction with the waiting time, and absence of a mandatory system for patients to follow the referral system are some problems of referral system identified in this study. An interview stated that "patients referred back from level 2 to level 1 are not practically followed up due to absence of nurses and nutrition experts and busy physicians" (Provider. 1). Another participant mentioned that "patients, from the very beginning, prefer to refer to a specialist due to slight differences between the cost of referring to a general practitioner and specialists" (Provider. 5).

Theme 3: Problems related to human resources

Human resources problems are another issue identified in this study. Lack of dietician, a nurse familiar with diabetes to provide necessary information and no diabetes physicians are some problems mentioned. Physicians are asked to visit diabetic patients besides their routines and without any

incentives. As a result, they refer them to the second level without examining them precisely. In fact, diabetic patients are not prioritized by physicians or level 1 centers; these make patients just view the first level as a mean for referral to the second level. As a result, the first level is practically removed, and the second level must do the activities of the first level. It causes chaos in the second level. One of the participants said that "during the program, we held some educational classes for the physicians, but they still did not accept and said that they did not have any experience in diabetes. Some insisted that the extra fee must be paid to them, but it was not paid. As a result, they were not motivated to follow-up patients" (Provider. 4). Moreover, level 1 physicians' turnover due to different reasons such as education or transferring to other centers has a negative effect on providing effective services in the first level.

Owing to overcrowding, physicians were forced to visit a greater number of patients; as a result, visits are not effective and diabetes complications are not diagnosed precisely. Thus, patients are referred to the second level after an incomplete examination. At the first level, the patient is not followed up due to the shortage of personnel, busy physicians, and paying no attention to patients, and thus, the efforts of the second level are practically in vain. An interviewee mentioned that "level 1 cannot do its main task which is controlling disease due to lack of nurses and nutrition specialists and busy physicians" (Provider. 1). Another interviewee also noted that "in level 2, patients are dissatisfied with absence of a plan to admit referral and nonreferral patients, crowded centers, and delayed visits due to shortage of specialists and other personnel" (Provider. 6).

Shortage of specialists in level 3 also affects the treatment process. For example, shortage of retina subspecialist, a large number of patients, subspecialists' busy schedule (teaching at universities and educational and research work, etc.), and employing ophthalmologists who do not have enough expertise to treat retinopathy result in the development of complications of this disease and finally blindness. Owing to high costs of treatment in the private sector, most people cannot refer to this sector. An interviewee believed that "due to shortage of retina specialists and employing ophthalmologists who do not work properly at this field, this disease is not diagnosed properly, or when the patients refer for laser therapy, their eyes are not treated properly which causes patients to lose their eyesight" (Provider. 3).

Employees' low awareness and control of diabetes treatment procedure, the poor system of evaluating the performance of medical staff at all health and treatment levels and nonaccountability of physicians and medical staff to their performance results lead to, in many cases, treatment failure, people's distrust, and additional costs imposed to people and health system. A participant believed "Since those who work improperly aren't going to be changed or to be fired when something goes wrong, not all patients are treated properly, and they are not willing to improve" (Provider. 5).

Theme 4: Patients' cultural problems

Low trust in level 1 physicians, false beliefs about insulin therapy, are some cultural problems identified in this study. One interviewee said that "the patient believes that when the general practitioners are not allowed to prescribe insulin, they do not have enough expertise in treating this disease" (Provider. 1). Another participant stated that "the physicians ask us what our problems are and seal our prescriptions according to what we tell them. Then, they refer us to the specialists, and they do not pay attention to us at all. I think they know nothing" (Client. 7). False beliefs about insulin (e.g., insulin causes addiction, obesity, disease deterioration, or death), fear of injection, being tired of repeated injections, being embarrassed of injection due to its bad social aspects and thus delays in starting insulin therapy aggravate the complications. In addition, having leech therapy, bloodletting, using herbal drugs without consulting the doctors, refraining from taking prescribed drugs, simultaneous use of herbal medicines and prescribed drugs, smoking opium which makes the patients diabetic addicted people and eating high-calorie foods in religious ceremonies for healing all exacerbate the complications. A participant mentioned that "behaviors resulted from the false beliefs appear mostly because of quotations and affect the treatment process" (Provider. 3). An interviewee stated that "one of my relatives died after using insulin for a short time" (Client. 2). Another participant said that "smoking opium delays complications and improves the disease" (Client. 4). "Injecting insulin results in insulin dependence, obesity, and deterioration of disease" (Client. 8). Another interviewee said that "I first started self-treatment using herbal drugs, and when my disease got worse I visited the doctor" (Client. 6).

Concerning adherence to treatment, the disease and side effects are aggravated due to disease chronicity, the need for long-term care, the high number of pills to be taken, expensive pills, expensive blood sugar control tools such as glucometer strips, noncoverage of some medicines by insurance companies, patients' inability to properly follow the given advice due to aging and forgetfulness, financial inability to access and to do the recommendations, especially with regard to nutrition which results in failure to adhere to the diet and lack of support of some families. In this regard, a participant said that "I cannot take many pills because I have other diseases and I must take some pills for them too" (Client. 2). Another patient mentioned that "I forget to take my pills on time and I do not have anyone to help me." The other patient stated that "I do not have enough money to afford my pills and tests" (Client. 5). An interviewee said that "I eat with my family, and I cannot

cook for myself because I get bored with cooking and don't have money" (Client. 1).

People's unawareness of public services for diabetes, inadequate awareness of diabetes and its complications, lack of permanent sensitivity to diabetes in the society and people's distrust are all very important in people's unwillingness for screening. A participant who went to the private center mentioned that "I went to the doctor for another medical condition, and I was diagnosed with diabetes. I know nothing about the public diabetes centers" (Client. 4). Another participant said that "I first went to the public sector, but it was very crowded. Thus, I preferred to go to a specialist in the private sector" (Client. 9).

Theme 5: Problems related to accessibility

Other challenges of NDPCP include difficulty in receiving services from the public sector due to infrastructural problems, expensive drugs and blood sugar control tools, absence of public diabetes centers in the evening and night shifts, inappropriateness of health centers for elderly patients due to many steps and difficulty of old patients who come to these centers alone, participation in educational classes and financial inability to access and follow the given advice, especially with regard to diet. A participant stated that "patients prefer to enter a quiet place and be respected. The queue system must work well because they do not want to wait for a long time. They also want the doctors to spend enough time to examine them. However, it is not the case" (Provider. 6). Another participant mentioned that "people working in the morning shifts cannot uses the services. Moreover, many old people complain about the stairs which they cannot climb" (Provider. 1).

Theme 6: Intersectoral coordination problems

Lack of support of insurance companies of some diabetes medications and diabetes control tools, lack of insurance support of level 1, rejecting general practitioners' prescriptions, and thus, patients' difficulties in having access to the necessary drugs and patients' distrust of general practitioners because they are not allowed to prescribe insulin, patients' monthly referral to level 1 and then level 2 to receive insulin which cause patients to be dissatisfied, to cut the referral chain and to quit treatment.

The absence of intersectoral cooperation for screening, controlling, and treating diabetes, especially in organizations which have autonomous health and treatment centers such as Armed Forces and Social Security Organization, poor cooperation between the media and organizations influential in the control and prevention of diabetes and poor performance of NGOs working on diabetes are other problems. One of the interviewees believed that "there is no good interaction with other organizations, the potential of health centers in different organizations is not used to

control and prevent diabetes and the media does not work enough on diabetes control programs" (Provider. 5).

Discussion and Conclusions

Findings of this study provided a list of problems of NDPCP; these findings were extracted through interviews with the most knowledgeable people involved in the program as well as diabetic patients referring to the diabetes centers.

Numerous factors affected the successful implementation of NDPCP. These chain factors bring about several effects or are reciprocally the cause and effect of each other. Infrastructural problems identified in this study were confirmed by many other previous studies. In their study, Grumbach and Sommers showed that the health service provision system had not been designed for chronic diseases such as diabetes that required accessible, comprehensive, long-term, and coordinated care to achieve therapeutic purposes. They also mentioned that in the current health-care systems some providers were exhausted physically and mentally and almost all of them were immersed in old programs, inefficient working environments, and administrative paperwork.[21,22] In another study, Zhang *et al*. also pointed to the lack of access to expert advice and results of diagnostic and laboratory tests completed in other doctors' offices or in different systems to thwart disease management.[23] Funnel. pointed to the central computer systems to give service providers some feedback and to remind them of issues related to managing their patients which can be very valuable.[17]

Inability of the system to provide good foot care was a main problem mentioned in the present study. Several studies reported that diabetic foot infections required careful attention and coordinated management. Risk factors in the health-care system for diabetic foot infections and ulcers included inadequate training given to patients, poor blood sugar control, and poor foot care.[24-27]

The referral system plays an important role in reducing costs and providing on-time access to more specialized services. However, this system has some problems which have also been mentioned in the previous studies. In his study, Palmer showed that the low-quality levels of basic services, shortage of skilled personnel, lack of appropriate transport and referral facilities, lack of supervision and monitoring on the first level of services, difficulties in providing the required medications of the centers, and the price of services was the major obstacles to achieve the referral system.[28] Van Uden *et al*. showed that self-referral led to overcrowding in emergency departments and hospitals.[29]

Participants put too much emphasis on the role of human resources in proper implementation of the program. In a study by Anand and Bärnighausen, it was stated that adequate, well-trained, and good health workforce was

essential for the effective implementation of the program.[30] However, evidence suggested that in many low-income and middle-income countries, people with chronic diseases often failed to get adequate care due to poor access and low quality of health services.[31-33] Unawareness of the latest developments in the treatment of patients, especially among health-care providers, caused a large number of patients with type 2 diabetes not to be treated.[34,35] In their study, George *et al*. concluded that there was a significant difference in diagnosing the diabetes between physicians who had received specialized training in the field of diabetes and those who had not received that course. Inadequate training of general physicians on diabetes field is a common problem in both developing and developed countries.[36] In a study by Haque *et al*., specialists' shortage and discontinuity of care were considered the most important systemic obstacles to start insulin therapy.[37] Failure to use trained physicians to visit and treat diabetic patients caused skilled physicians to be replaced with inexperienced ones following repeated displacements which caused some problems in having good interpersonal communications between doctors and patients and thus overshadowed patients' appropriate care and treatment. Concerning fixed doctors taking care of diabetic patients, Dearinger *et al*. concluded that continuous care of diabetic patients by fixed doctors was associated with a significant reduction in hemoglobin A1c.[38] Serneels *et al*. reported that turnover of staff working in diabetes centers resulted from failures to educate staff, absence of proper organizations, and finally poor supervision of educational systems.[39] In this regard, the WHO considers health employees the most important factors of stimulation and leaders of changes and believes that countries must seriously invest in strengthening and improving the education of health personnel including physicians.[40] In his study, Marrero stated that doctors were often reluctant to initiate insulin therapy unless all other options failed. Therefore, patients were treated with insulin when the disease deteriorated.[41]

Negative attitudes and cultural weaknesses which stemmed from various factors caused some problems in the control and prevention of type 2 diabetes. Other challenges of this program were factors that directly and indirectly affected therapeutic behaviors of diabetic patients. Some of these factors included biological, psychological, economic, and sociocultural factors and health-care systems of the society which have been mentioned in previous studies.[42] Moreover, the fear of needles and injection pain, the number of injections, and social embarrassment associated with injection in public were the barriers to adhere to the treatment for some patients. In addition, the absence of a private injection place caused some patients to refuse injection, resulting in negative consequences for the control of blood sugar. It was also reported that patients might believe that initiation of insulin therapy would worsen the disease.[43-46] In a study conducted by Wens *et al*., it was reported that primary care providers felt that they had less power compared to the experts because experts were allowed to prescribe insulin.[47] This lack of authority caused distrust in patients referring to level 1.[48,49] Results of the present study showed similar results.

Accessibility was another area identified in this research which is surely a very important factor in controlling and preventing type 2 diabetes. Karter *et al*. reported that diabetic people with the highest copayments had fewer tests for blood sugar levels than those who had never paid.[50] Simmons *et al*. also reported that 49% of the participants had not participated in blood sugar self-control programs due to high out-of-pocket payments.[51] Baxter pointed out that the limitation of centers providing services and providing services at the wrong time with nonoptimal ways were the obstacles to control blood sugar.[52] Long waits at service providing centers due to overcrowding was another disease management obstacle.[53] Many factors including the health service organizations and access to care affected the way people adhered to treatment, but studies showed that the cost of Treatment was the major obstacle to adhere to and to continue treatment in chronic diseases.[54]

Intersectoral collaboration is known as relationship between parts of the health sector and other sectors established to take some steps to obtain the final results or outcomes of the health system; this collaboration is more effective, efficient, and stable than the performance of health sector.[55] Intersectoral collaboration and public participation are two main strategies in establishing justice in health.[56] In type 2 diabetes prevention and control program, the intersectoral relationship was of great importance due to the nature of the program and the effects that these relationships had on this program. In a report released in 2007 by the Canadian Ministry of Health, challenges that affected intersectoral collaboration and features for intersectoral collaboration included establishing public participation, educating the public, raising awareness about the health determinants, guarantying political support, creating appropriate horizontal communications in all sectors, and vertical communications inside the sectors and emphasizing the common goals and interests.[57] Problems related to intersectoral collaboration for successful implementation of the type 2 diabetes prevention and control program was completely obvious in the present study.

Conclusions

Several factors affected successful implementation of the type 2 diabetes prevention and control program. To achieve the objectives of this program, considering the role of each factor is necessary. Issues mentioned in this study should also be considered in planning and implementing the program. To implement every program, preparing and improving infrastructures is of great importance. Paying special attention to human resources quantitatively and qualitatively and training personnel appropriately in relation

to referral objectives are very important and vital and can have important effects on the successful implementation of a program. In addition, efforts to improve cultural problems related to patients and to provide infrastructures along with increased intersectoral coordination to increase patients and people's access to type 2 diabetes prevention and control services are inevitable.

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Conflicts of interest

There are no conflicts of interest.

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