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Restrictors of the effectiveness of diabetes self-management education: A qualitative content analysis

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Abstract:

BACKGROUND: A key step for improving the effectiveness of diabetes self-management education (DSME) is to identify its restrictors.

OBJECTIVES: The aim of this study was to explore the restrictors of the effectiveness of DSME.

METHODS: This descriptive qualitative study was conducted in March 2016–2017. Participants were 16 DSME providers (viz., physicians, nurses, nutritionists, and psychologists) and nine DSME receivers (viz., patients and their family members) – 25 in total. Semi-structured interviews were held for data collection. Interviews were transcribed word by word and analyzed through conventional content analysis approach proposed by Graneheim and Lundman.

RESULTS: The restrictors of the effectiveness of DSME were categorized into three main categories and 11 subcategories, namely patients' limited welcoming of DSME classes (allocating limited time for participation in DSME classes, inadequate knowledge about diabetes mellitus [DM] importance, inappropriate educational environment, and financial problems), unfavorable adherence to treatments: serious challenge (inattention to educations, poor motivation for adherence to medical recommendations, and inattention to the psychological aspects of DM), and the difficulty of adult education (the difficulty of changing health-related attitudes and behaviors, mere information delivery during education, adults' physical and perceptual limitations, and diabetes educators' limited competence in adult education).

CONCLUSION: The findings of the present study provide an in-depth understanding about the restrictors of the effectiveness of DSME. DM management authorities and policymakers can use these findings to develop strategies for improving the effectiveness of DSME.

Keywords:

Content analysis, diabetes educators, diabetes mellitus, patient education, self-management

Introduction

Diabetes mellitus (DM) is a complex chronic disease which necessitates continuous blood sugar control, medical care, and risk factor management.[1] The global prevalence of DM is 8.4%. According to the statistics provided by the International Diabetes Federation, the number of adult people with DM will reach from 463 million in 2019 to 700 million by 2045.[2] In 2019, there were 5,387,000 adult people with DM in Iran.[3] This value is estimated to reach 9.2 million by 2030.[2]

Ineffective DM management can result in many different acute and chronic complications such as cardiovascular disease, cerebrovascular accidents, retinopathy, nephropathy, and neuropathy[4] and face patients with many different problems.[5] DM also imposes heavy costs on health-care systems so that the annual mean cost of DM for each afflicted person is estimated to be around 1000 dollars.[4]

Effective self-management can significantly improve the outcomes of DM management. However, studies reported poor self-management status among patients

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with DM due to many different factors such as their limited knowledge about DM, their poor adherence to treatments and dietary regimens, and their ineffective management of DM complications.[6-13] Diabetes self-management education (DSME) is one of the strategies for improving DM self-management. DSME is critical for patient empowerment, glycemic management, and DM complication prevention.[1,14] The main goals of DSME are to obtain better clinical outcomes and improve health and well-being.[15]

In Iran, since about two decades ago, based on the national program for the follow-up and control of diabetes in all public and private diabetes centers and clinics, diabetes education for patients has been done.[16] Over the years, Iranian researchers, like researchers in other parts of the world, have measured the impact of diverse models of patient education on patients' knowledge, attitudes, and performance, and have published the results of their studies as a reference to medical staff in patient education.[17-23] However, numerous studies in Iran show that patients have insufficient knowledge about the care and control of diabetes.[24-28] Nonetheless, there is limited data about the factors affecting the effectiveness of DSME. Therefore, the present study was conducted to explore the restrictors of the effectiveness of DSME.

Methods

This descriptive qualitative study was conducted from March 2016 to September 2017 by using a conventional content analysis approach. Participants were 25 patients with DM, family members, nurses, endocrinologists, general physicians, psychiatrists, psychologists, and nutritionists. They were purposively selected from an endocrinology and metabolism center and public, private, and charity DM clinics in Isfahan, Iran. Inclusion criteria for patients were a history of affliction by DM (either Type I or Type II) for at least 2 years, no comorbid chronic condition or physical disability, ability to share personal experiences, and agreement for participation in the study. Inclusion criteria for family members were a history of caregiving to a family member with DM for at least 2 years and agreement for participation. Inclusion criterion for nurses, nutritionists, and psychologists was a history of DM education for at least 3 years, and inclusion criterion for physicians was a history of DM treatment for at least 3 years. The only exclusion criterion for all participants was voluntary withdrawal from the study.

Data were collected by the first and the second authors through semi-structured interviews. Before the interviews, the goals and reasons for doing the research were explained to the participants. Interviews were started using a broad question: "May you please talk about your experiences of DM education?" Then, specific questions were used to continue the interviews. Examples of specific questions for education providers were, "What are the restrictions of DSME?" "How do these restrictions affect DSME?" Examples of specific questions for DSME receivers were, "What restrictions did you face in receiving DSME?" "What factors prevented you from receiving DSME?" The interviews were held in a private room at DM care centers and lasted 30–45 min. Data collection was continued up to data saturation, i.e., when the interviews provided no new data about the study aim. All interviews were audio-recorded and transcribed word by word.

The five-step conventional content analysis approach proposed by Graneheim and Lundman was used for data analysis.[23] Initially, each interview transcript was read for several times to arrive at a general understanding about its manifest and latent content. Then, meaning units were determined and coded, and the codes were grouped according to their similarities into subcategories and main categories.

Credibility of the data was ensured through data immersion, peer checking, data source triangulation, providing representative quotations, and member checking by five participants. To ensure dependability, the first two authors independently analyzed excerpts of the data, compared their findings, and made necessary revisions to reach agreement. Transferability was ensured through sampling with maximum variation among health-care providers and receivers with different experiences and characteristics.

Ethics

This study has the approval of the Ethics Committee of Isfahan University of Medical Sciences, Isfahan, Iran (code: IR.MUI.REC.1396.3.215). All participants were verbally informed of the study aims and methods and ensured of confidential data management and voluntary participation in and withdrawal from the study. Written informed consent was obtained from all participants. One of the participants did not consent for audio-recording of her interview and hence, her interview was documented through written notes.

Results

In total, 25 patients, family members, and health-care providers participated in the present study. Table 1 shows their characteristics. The restrictors of the effectiveness of DSME were grouped into three main categories, namely patients' limited welcoming of DSME classes, unfavorable adherence to treatments: serious challenge, and the difficulty of adult education [Table 2].

Table 1: Participants' characteristics

Participants	Gender		Age (years)	Experience in DM education (years)
	Female	Male		
Nutritionist (bachelor's degree)	2	1	40-60	10-16
Nurse (Bachelor's degree)	7	0	32-57	3-8
Endocrinology specialist	1	0	36	6
Endocrinology subspecialist	1	0	42	6
General physician	1	0	57	4
Internal medicine resident	0	1	24	4
Psychiatrist	1	0	46	13
Clinical psychologist (bachelor's degree)	1	0	30	3
Patients (illiterate to university education)	5	1	12-64	-
Family members (illiterate to university education)	2	1	25-60	-

DM=Diabetes mellitus

Table 2: The categories and subcategories of the restrictors of the effectiveness of diabetes self-management education

Main categories	Subcategories
Patients' limited welcoming of DSME classes	Allocating limited time for participation in DSME classes
	Inadequate knowledge about DM importance
	Inappropriate educational environment
	Financial problems
Unfavorable adherence to treatments: serious challenge	Inattention to educations
	Poor motivation for adherence to medical recommendations
	Inattention to the psychological aspects of DM
The difficulty of adult education	The difficulty of changing health-related attitudes and behaviors
	Mere information delivery during education
	Adults' physical and perceptual limitations
	Diabetes educators' limited competence in adult education

DSME=Diabetes self-management education, DM=Diabetes mellitus

First category Patients' limited welcoming of diabetes self-management education classes

Patients' limited welcoming of DSME classes and their nonattendance at DM care centers were among the most important restrictors of DSME effectiveness. The four subcategories of this category were allocating limited time for participation in DSME classes, inadequate knowledge about DM importance, inappropriate educational environment, and financial problems.

Allocating limited time for participation in diabetes self-management education classes

Participating patients allocated limited time for participation in DSME classes due to the necessity of going a long distance from their homes to the classes. Accordingly, despite health-care providers' announcements about DSME classes for patients and family members through telephone contact or text message, patients avoided attending these classes and did not allocate adequate time for them. The daughter of an elderly patient said,

> *They hold sport classes and inform us about them through text messages. However, we can't attend these classes because our home is far from the DM center (F1).*

Childbearing-related and household activities also prevented patients and family members from attending DSME classes. Some patients had participated in some DSME classes just to receive the necessary certificates for completing their medical records. The mother of a patient said,

> *I had no time to attend classes because I had many childbearing-related and household activities. I just attended one of the classes as a requirement for my child's medical records (F3).*

Besides, factors such as occupational activities and having no leave during office hours prevented some patients from attending DSME classes. A nurse said,

> *Most patients are employed and say that they can't attend our educational classes because their employers don't give them leave (N5).*

Inadequate knowledge about diabetes mellitus importance

Patients' and family members' inadequate knowledge about the importance, characteristics, complications, and treatments of DM was associated with their disinterest in attending DSME classes. A nurse said,

> *It seems that patients and their significant others have limited knowledge about DM. They infrequently refer to*

DM center probably because they don't have an accurate understanding of DM complications (N2).

Inappropriate educational environment

Lack of a calm, private, and standard environment and standard facilities for DSME was a major barrier to patients' participation in DSME classes. A nurse noted,

The educational environment is not standard and is very noisy. In such environment, patients easily get tired and hence, they infrequently attend DSME classes (N2).

The inappropriate physical design and structure of DSME classes were also among diabetes educators' problems in providing effective individual or group DSME. An internal medicine resident said,

We need educational halls specifically designed for patients with DM, where we can provide necessary educations to these patients (S1).

Moreover, small, tiresome, and uncomfortable DSME environment made patients disinterested in attending DSME classes. A patient highlighted,

Although they have tried to create an interesting environment through floral design in the yard, rooms designed for healthcare service provision are small, pokey, and poorly ventilated and hence, you barely can breathe there. They need to develop this center in order to increase our motivation for attending here (P6).

Financial problems

Financial problems, unemployment, limited insurance coverage, and the high costs of medications and diagnostic and therapeutic procedures were among the serious barriers to patients' participation in DSME classes. The daughter of an elderly patient said,

We cannot frequently refer to this center due to our financial problems. We don't have enough money and the prescriptions are expensive. We also cannot afford the high costs of transportation (F1).

Financial problems also acted as a barrier to patients' adherence to educations. A nutritionist said,

Most patients who refer to this center are under financial strain. They even can't afford the costs of buying alternative foods and hence, rarely refer to us for receiving educations about nutrition (D3).

Second category Unfavorable adherence to treatments Serious challenge

Treatment adherence refers to self-care activities and focuses on the agreement between patients and health-care providers. In other words, it shows the degree to which patients perform behaviors related to accurate medication use, healthy eating, and lifestyle modifications recommended by health-care providers. Unfavorable adherence to treatments and poor self-management can increase the burden of DM. The three subcategories of this category were inattention to educations, poor motivation for adherence to medical recommendations, and inattention to the psychological aspects of DM.

Inattention to educations

Participants' experiences showed that some patients disregard health-care providers' educations and recommendations and attached limited importance to educations and treatments. A patient noted,

I didn't want others to know I have DM. My doctor had told me to take two pills a day; but I became my own doctor and just took one pill. I also used sugar-lowering teas recommended on the internet. Therefore, I'm now hospitalized for high blood sugar (P2).

Moreover, some patients avoided doing even simple care-related activities despite the repetition of recommendations by different health-care providers. Some of them did not accept to change their unhealthy daily habits and lifestyle behaviors despite experiencing frequent hypoglycemic events. Habits had turned into routine behaviors for patients and were unintentionally repeated. Breaking habits was among the most difficult tasks for patients, which needed adequate time and absolute determination. A nutritionist said,

Patients with type II DM who have received educations for five or ten times still don't perform simple recommendations such as taking snacks. They still experience hypoglycemia but say that they haven't been accustomed to taking snacks (D1).

Poor motivation for adherence to medical recommendations

DM affects all aspects of personal, familial, occupational, and social life and thereby, negatively affects the morale of patients and their motivation for treatment adherence. Patients' or their family members' beliefs about DM, its outcomes, and the necessity to engage in the treatment and care programs significantly affected patients' motivation for treatment adherence. The mother of a patient noted,

We don't have a good life. My husband is unemployed and my daughter suffers from this untreatable disease since childhood. She has fainted several times so far. We referred to several clinics in two large cities and they taught me how to inject insulin for her. It isn't clear how long this condition will continue. This is God's will (F3).

Inattention to the psychological aspects of diabetes mellitus

Some participating patients and their family members reported a series of psychological problems such as

stress, anxiety, depression, anger, frustration, and negative emotions. Inattention to the psychological aspects of DM was considered by participants as a barrier to treatment adherence. A nurse said,

> *In my opinion, the psychological aspect of health is the most commonly disregarded aspect by nurses, physicians, and patients' family members (N6).*

Patients and their family members needed psychological counseling for these problems in order to access appropriate strategies for maintaining their mental health and adopting a healthy lifestyle. A clinical psychologist said,

> *Most these patients have personal, sexual, familial, psychological, emotional, and financial problems and suffer from depression. Therefore, psychological counseling is provided to them to inform them about strategies for healthy living (R1).*

Third category The difficulty of adult education

Adult education includes systematic educational processes which result in behavioral modification. The effectiveness of adult education largely depends on learners' experiences. According to the participants, behavioral modification among adults is difficult because they have extensive experiences and strong presumptions. This main category had four subcategories, namely the difficulty of changing health-related attitudes and behaviors, mere information delivery during education, adults' physical and perceptual limitations, and diabetes educators' limited competence in adult education.

The difficulty of changing health-related attitudes and behaviors

Attitude determines viewpoints, decisions, and behaviors. Participating patients and family members needed help respecting their learning-related habits, beliefs, and attitudes. Their negative attitudes and beliefs were determined as a barrier to attain educational goals. Yet, changing their attitudes was difficult and necessitated continuous education and appropriate context and culture. A nurse said,

> *Most patients have misconceptions which affect education. For instance, some of them believe that they can control their blood sugar using opium or opiates. We cannot change their attitudes with such limited time we have for education. Education should be provided at macro level (N2).*

Moreover, the participants noted that health-related behavioral modification was difficult and time-consuming and necessitated adequate time. Complex treatment regimen and psychological problems such as depression also acted as barriers to behavior modification. Therefore, friendly relationship between health-care providers and patients and active engagement of patients in decision-making based on their preferences were considered necessary for effective behavioral modification.

> *Behavior modification among adults is difficult and necessitates time, strong friendly relationships between patients and physicians or nurses, adequate support by families and peers, and involvement of patients in decision making (N7).*

Mere information delivery during education

Participants' experiences showed that some diabetes educators provided information merely through lecture in individual or group education sessions and did not consider patients' and family members' understanding of the provided educational materials. In other words, they recommended some strategies to patients and family members without seeking their feedback about educations. Therefore, patients did not find their recommended strategies useful. Besides, they did not take into account barriers to learning such as age and did not perform follow-up assessments for patients' ability to adhere to recommendations. A 60-year-old male patient noted,

> *Sometimes, they provide us with a series of information through rote repetition, some of which are not useful, some are not understandable, and some are not easily applicable (P6).*

Adults' physical and perceptual limitations

Participants considered low literacy level together with age-related changes such as forgetfulness and memory, motor, and audiovisual impairments as barriers to effective DSME. Moreover, they noted that adults are cautious about new information and critically evaluate it based on their past experiences. Other factors such as tiredness or sociocultural and financial backgrounds also affected their understanding about DSME materials. A nurse said,

> *Patients forget educational materials due to their old age. They need regular education using simple sentences. They are also cautious about recommendations. Patients from the suburb do not easily accept our sayings and hence, we need to spend a great deal of time talking to them (N5).*

Participants also believed that low literacy level among most patients with DM reduces their learning ability. According to them, providing education to patients who have limited literacy is very difficult and necessitates frequent repetition, greater amount of time, and family members' collaboration. A nurse said,

> *We need to talk a lot with patients who have low literacy level. Modifying the lifestyle of these individuals is very difficult. Family members' collaboration can greatly facilitate their learning (N5).*

Diabetes educators' limited competence in adult education

Diabetes educators need to have great knowledge and skills respecting DM care. However, the participants noted that some diabetes educators have limited competence because they do not receive necessary educations, do not have updated DM-related information, and provide DSME based on their own personal experiences. A nurse noted,

> *We have limited number of diabetes educators. I haven't recently received new education and my educations to patients are solely based on personal experience (N3).*

Discussion

This study explored the restrictors of the effectiveness of DSME. The findings showed patients' limited welcoming of DSME classes, their unfavorable adherence to treatments, and the difficulty of adult education as the main restrictors of the effectiveness of DSME.

Patients' limited welcoming of diabetes self-management education classes

Structured education is the key component of effective DM management.[29] Nonetheless, our findings showed patients' limited welcoming of DSME classes as a main category of the factors affecting the effectiveness of DSME. Some former studies also reported patients' limited participation in DSME classes.[30-34] In 2019, the prevalence of DM in Iran increased by 9.4% and the number of patients with DM reached 5,387,000.[3] Patients' limited welcoming of and participation in DSME classes denote that the prevalence of DM-related complications may considerably increase in the next years. A meta-analysis study in Iran estimated that the prevalence rates of diabetic foot, cardiovascular disease, retinopathy, neuropathy, and nephropathy among patients with DM were 3%, 33%, 36%, 38%, and 43%, respectively.[4] The increase in the rates of DM complications will definitely increase the annual costs of DM management and face patients with many financial problems.

One of the reasons for such limited welcoming of DSME classes was the allocation of limited time for participation in classes. A study showed that almost 98% of DM-related care is performed by patients.[6] Therefore, they need to allocate adequate time to attend DSME centers to learn the principles of DM self-management. However, our findings showed that patients with DM allocated limited time for participation in DSME classes due to having limited time for these classes, occupational problems, and problems in childbearing and household activities. Three earlier studies also reported the same finding.[29,31,35] Studies in Europe, Asia, America, Canada, and Australia showed that barriers to effective DSME delivery (such as patients' nonattendance at DSME centers) are an international problem which is mostly related to the characteristics of DM such as its gradual progression.[30,36] The wide prevalence of patients' nonattendance at DSME centers highlights the importance of developing strategies for its management. Examples of these strategies are improving referral systems, making appointment with patients, allocating adequate resources to DSME, increasing the flexibility of DSME time and place, improving patients' insurance status, and using health volunteers for DSME.

We also found that patients' and family members' inadequate knowledge about DM importance had significant effects on their welcoming of DSME classes. Early diagnosis and response to DM symptoms, management of acute phases of DM, lifestyle modification, and adherence to complex treatment regimen of DM depend on patients' and family members' adequate knowledge about the importance of DM and its consequences. A study showed that inadequate knowledge about DM and its complications can be associated with poor health-related outcomes.[37]

Inappropriate educational environment was another factor affecting patients' limited welcoming of DSME classes. A former study also reported the same finding.[29] International DM education standards highlight that easily accessible quality educational resources and appropriate physical or electronic learning environment are determining factors affecting the effectiveness of education and the fulfillment of patients' educational needs.[35] Designing health-care centers based on the latest standards can make these centers more interesting, facilitate quality service delivery, enhance staff and patient satisfaction, and reduce the costs related to building and maintaining these centers.[31]

Patients' financial problems were the last main reason for their limited welcoming of DSME classes. It was associated with their nonadherence to medical recommendations and discontinuation of some medications and care services. This is in line with the findings of two former studies.[30,31]

Unfavorable adherence to treatments Serious challenge

The second main category of the study was unfavorable adherence to treatment: serious challenge. In order to attain the goals of DSME and improve patients'

self-management ability, educations should result in closer treatment adherence. However, our study showed unfavorable adherence to treatments as a serious challenge in DSME. One of the reasons for patients' unfavorable adherence to treatment was their inattention to educations. This is in line with the findings of a former study.[38] Patients' knowledge, beliefs, prejudices, emotions, behaviors, and problems in behavioral modification should be assessed in order to determine the reasons for their unfavorable adherence to treatments and their inattention to educations.

Another reason for patients' unfavorable adherence to treatment was their poor motivation for adherence. In other words, poor adherence to medical recommendation can be due to the patient's beliefs, attitudes, and expectations that affect patients' motivation to begin and continue the treatment regimen. This may happen when patients and health-care providers have miscommunication about therapeutic plans. In addition, capacities and resource limitations can reduce patients' motivation to implement their decisions to follow medical recommendations (e.g., problems of accessing prescriptions and costs) and sometimes involve individual restriction (e.g., problem of remembering doses and numerical calculations). Two former studies reported that poor motivation for treatment adherence can be due to DM-associated problems and strains, patients' sociodemographic characteristics, quality of interactions between diabetes educators and patients, and type of health-care system.[30,39]

Our findings also showed inattention to the psychological aspects of DM as another reason for patients' unfavorable adherence to treatments. We found that some diabetes educators were aware of patients' psychological problems but were unable to assess and manage them. Therefore, integration of mental health specialists in DM management teams is necessary for the better management of patients' psychological problems and the improvement of their treatment adherence.[40,41] In addition to focusing on increasing the knowledge of patients with diabetes, psychosocial factors are also important in achieving sustained behavioral change and glycemic control. Psychological issues can affect the self-management of diabetes. Most patients with diabetes suffer from diabetes-related distress symptoms and need psychological care. Issues that are particularly stressful in diabetes self-management include diet, physical activity, adherence to medical recommendations, emotional distress related to glycemic control, and coping with social situations. Diabetes-related distress assessment can be helpful in identifying and overcoming barriers to diabetes self-management. Psychosocial interventions are planned to improve the mental and physical health of patients with diabetes. Therefore, educational interventions that can improve both self-management skills and psychological performance will have an overall two-fold benefit for the patient, improve self-management behaviors, and reduce anxiety.

Furthermore, if we look more closely at the concept of adherence challenge, the reason for the lack of motivation and disregard of education should be sought in how to design and implement self-management education. If DSME has a scientific and logical structure and the client-centered training process, it can guide the patient towards adherence.[42] Abazari *et al*.'s studies show serious problems with insufficient investment in educating patients about diabetes self-management, including that there is no specific curriculum for training qualified nurses to educate patients with diabetes.[34,43] When patients show poor self-management outcomes due to their unfavorable adherence to treatments, diabetes educators need to establish close relationships with them in order to evaluate and overcome barriers to close adherence and effective self-management and improve their engagement in DM-related decision-making.[43] Together with strong support for patients, such relationships can increase patients' motivation for adherence and result in the identification and fulfillment of their psychological needs.

The difficulty of adult education

The third main category of the restrictors of DSME effectiveness was the difficulty of adult education. Adult education is an organized process for improving adults' knowledge and skills, facilitating their progression toward evolution and transcendence, and helping them develop their abilities.[44] Our findings showed that there were different barriers to quality adult education, one of which was the difficulty of changing health-related attitudes and behaviors. Patients in the present study needed interventions to change their DM-related attitude and improve their self-efficacy for self-management. This is in line with the findings of a former study.[45] Some studies also reported that patients' personal perceptions and attitudes toward self-care are determining factors in their behavioral intention.[46,47]

We also found that mere information delivery during education was a major problem in DSME for adult patients. Evidence shows that most nurses in Iran do not receive necessary educations for DM care, provide DSME to patients with DM mainly based on their daily experiences, and hence, patient education is confined to the simple provision of some information.[48,49] Improving diabetes educators' knowledge about learning theories can help those select better teaching methods and thereby increase the effectiveness of their DSME for adult patients.[50]

Another factor contributing to the difficulty of adult education in the present study was adults' physical and perceptual limitations. The findings showed that age-related changes such as altered physical, perceptual, reading, and mathematical abilities can create difficulties in adult education for patients with DM. A former study also found the same finding.[51] Effective DM management among elderly people necessitates regular functional, psychological, and social assessments and hence, DSME provision to them requires adequate time and workforce, patience, repetition, and home-based individualized education. Low literacy level among older patients also reduces their motivation for learning health-related educational materials and therefore, these patients are at greater risk for health problems. Contrarily, a former study on 23,400 adult patients with DM in South Korea showed educational level and family income as factors negatively affecting their regular participation in DSME. That study attributed this finding to inequities in DSME programs and insurance payments.[52]

Diabetes educators' limited competence in adult education was another restrictor of the effectiveness of DSME for adult patients. Our findings showed that diabetes educators acted mainly based on their personal experiences and without having adequate knowledge about learning theories. Therefore, having professional teaching license for DSME seems to be an essential requirement for diabetes educators. Such license guarantees that diabetes educators have necessary knowledge, skills, and abilities for providing DM-related care at any level of DM management.[53] A former review study showed that diabetes educators should have teaching and clinical skills, cultural competence, and knowledge about DM pathophysiology and epidemiology.[54] Therefore, they should receive updated information about DSME through in-service education programs.[50]

In Iran, several studies have investigated the level of knowledge, attitude, and practice of patients with diabetes, and most findings have confirmed the poor knowledge and practice of patients, however few studies have described the factors influencing this problem. On the other hand, the present study with triangulation in data collection sources attempted to address the factors involved in the inadequacy of DSME by describing the lived experiences of various stakeholders in DSME. This study may for the first time in Iran, instead of addressing patients' lack of knowledge and its consequences such as poor control of blood sugar and the incidence or exacerbation of diabetes complications, attempted to describe how the challenges of the DSME process were formed.

Conclusion

This study showed that many different personal, organizational, and social factors can restrict the effectiveness of DSME. DSME is a complex clinical measure which necessitates fundamental planning at macro level, competent workforce, and physical and socioeconomic infrastructures. Competent diabetes educators can improve patients' self-management knowledge and skills and thereby empower them for lifestyle modification and effective DM management. The findings of the present study provide an in-depth understanding about the restrictors of the effectiveness of DSME. DM management authorities and policymakers can use these findings to develop strategies for improving the quality and the effectiveness of DSME educations and care services for patients with DM.

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Conflicts of interest

There are no conflicts of interest.

References

1. American Diabetes Association. Standards of medical care in diabetes 2020. Diabetes Care 2020;43:S1. Available from: https://care.diabetesjournals.org/content/diacare/suppl/2019/12/20/43.Supplement_1.DC1/Standards_of_Care_2020.pdf. [Last accessed on 2020 Oct 14].
2. Cho NH, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, Ohlrogge AW, *et al*. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Res Clin Pract 2018;138:271-81.
3. International Diabetes Federation (IDF). Diabetes Atlas. Brussels, Belgium: International Diabetes Federation; 2019. Available from: https://www.diabetesatlas.org/upload/resources/material/20200302_133351_IDFATLAS9e-final-web.pdf. [Last accessed on 2020 Oct 14].
4. Fasil A, Biadgo B, Abebe M. Glycemic control and diabetes complications among diabetes mellitus patients attending at University of Gondar Hospital, Northwest Ethiopia. Diabetes Metab Syndr Obes 2019;12:75-83.
5. Duncan I, Ahmed T, Li QE, Stetson B, Ruggiero L, Burton K, *et al*. Assessing the value of the diabetes educator. Diabetes Educ 2011;37:638-57.
6. Taghipour A, Moshki M, Mirzaei N. Determination of effective factors on self-care behaviors in women with diabetes referring to Mashhad health centers. Iran J Health Educ Health Promot 2017;5:328-35.
7. Reisi M, Mostafavi F, Javadzade H, Mahaki B, Tavassoli E, Sharifirad G. Impact of health literacy, self-efficacy, and outcome expectations on adherence to self-care behaviors in Iranians with type 2 diabetes. Oman Med J 2016;31:52-9.

8. Didarloo A, Shojaeizadeh D, Asl RG, Habibzadeh H, Niknami S, Pourali R. Prediction of self-management behavior among Iranian women with type 2 diabetes: Application of the theory of reasoned action along with self-efficacy (ETRA). Iran Red Crescent Med J 2012;14:86.
9. Pourverdi S, Mohammadi Shahboulaghi F, Kashaninia Z, Rezasoltani P. Effects of self-management program on glycemic control in patients with type 2 diabetes and glycosylated hemoglobin. J Holistic Nurs Midwifery 2015;25:19-28.
10. Ghannadi S, Amouzegar A, Amiri P, Karbalaeifar R, Tahmasebinejad Z, Kazempour-Ardebili S. Evaluating the effect of knowledge, attitude, and practice on self-management in type 2 diabetic patients on dialysis. J Diabetes Res 2016;2016:1-7.
11. Niknami M, Mirbalouchzehi A, Zareban I, Kalkalinia E, Rikhtgarha G, Hosseinzadeh H. Association of health literacy with type 2 diabetes mellitus self-management and clinical outcomes within the primary care setting of Iran. Aust J Prim Health 2018;24:162-70.
12. Madmoli M, Abbaszade Aliabad M, Madmoli M, Khodadadi M, Papi Ahmadi F. The effect of some factors on self-care in diabetic patients: A systematic review. J Genetics Genetic Eng 2019;3:21-5.
13. Moayed MS, Amoozadeh B, Parandeh A. Assessing health-care needs of patients with diabetes in Iran's health-care system: A modified Delphi method study. J Educ Health Promot 2020;9:42.
14. Tang PY, Fisher EB. Enhancing Peer Support Interventions in Diabetes Care. Behavioral Diabetes. 1rd ed.: Springer Nature. 2020. p417-37. Available from: https://link.springer.com/chapter/10.1007/978-3-030-33286-0_27. [Last accessed on 2020 Oct 14].
15. American Diabetes Association. Facilitating behavior change and well-being to improve health outcomes: Standards of medical care in diabetes-2020. Diabetes Care 2020;43:S48-65.
16. Larijani B. The Epidemic of Diabetes in Iran: Salamatnews; 2015. Available from: http://www.salamatnews.com/news/168404. [Last accessed on 2020 Aug 02].
17. Farmahini Farahani M, Purfarzad Z, Ghorbani M, Ghamari Zare Z, Ghorbani F. The impact of multimedia software support on the knowledge and self-care behaviors of patients with type 2 diabetes: A randomized clinical trial. J Caring Sci 2016;5:111-20.
18. Mohebbi B, Sadeghi R, Tol A, Mahmoudi Majdabadi M. The Effect of educational intervention on barriers of living with diabetes in awareness and belief, lifestyle, adaptation, and support dimensions among patients with type 2 diabetes mellitus: Application of the basnef model. Iran J Diab Metab 2016;16:49-62.
19. Solhi M, Hazrati S, Shabani M, Nejaddadgar N. Use of PRECEDE model for self-care educational need assessment among diabetic patients. J Diab Nurs 2017;5:295-306.
20. Sadeghi R, Rezaeian M, Khanjani N, Iranpour A. The applied of health belief model in knowledge, attitude and practice in people referred for diabetes screening program: An educational trial. J Rafsanjan Univ Med Sci 2015;13:1061-72.
21. Moshki M, Dehnoalian A, Alami A. Effect of precede-proceed model on preventive behaviors for type 2 diabetes mellitus in high-risk individuals. Clin Nurs Res 2017;26:241-53.
22. Alavi NM, Ahmadi F, Ghofranipour F, Babaei G, Rajab A. Design and study of the effect of implementation of result-oriented care and treatment pattern in patients with Diabetes mellitus. Feiz 2000;28:1-10.
23. Alirezaei Shahraki R, Sahaf R, Abolfathi Momtaz Y. Effects of nationwide program for prevention and control of diabetes initiated by the ministry of health on elderly diabetic patients' knowledge, attitude and practice in Isfahan. Iran J Ageing 2019;14:84-95.
24. Mostofizadeh N, TavalaeiZavareh MS. Evaluation of knowledge, attitude, and practice of diabetic adolescents aged 10-14 years who referred to diabetes clinic in Imam Hossein Hospital, Isfahan, Iran. J Diabetes Nurs 2020; 8:1011-16.
25. Akhoundan M, Shadman Z, Soleymanzadeh M, Khoshniat Nikoo M, Larijani B. Designing a questionnaire to evaluate diabetic patients' knowledge of Ramadan fasting and its determinant factors. Iran J Diabetes Metab 2014;13:331-9.
26. Salehi F, Ahmadian L, Ansari R, Sabahi A. The role of information resources used by diabetic patients on the management of their disease. Med J Mashhad Univ Med Sci 2016;59:17-25.
27. Khozeimeh F, Tahani B, Saberi Z, Gholi A. Evaluation of knowledge, attitudes and oral health-related nutritional performance of diabetic patients referred to the diabetes research center in Isfahan-Iran, 2016. Open Dent J 2019;13.
28. Khanpaye A, Madmoli Y, Riahipour B, Mohebifar M, Madmoli M, Mahmoodi R, *et al*. Evaluation of knowledge, attitude and performance regarding gestational diabetes mellitus among women. J Res Med Dent Sci 2019;7:122-5.
29. Lawal M, Woodman A, Fanghanel J, Ohl M. Barriers to attendance at diabetes education centres: Perceptions of education providers. J Diab Nurs 2017;21:61-6.
30. Pamungkas RA, Chamroonsawasdi K, Vatanasomboon P, Charupoonphol P. Barriers to effective diabetes mellitus self-management (DMSM) practice for glycemic uncontrolled type 2 diabetes mellitus (T2DM): A socio cultural context of Indonesian communities in West Sulawesi. Europ J Investig Health Psychol Educ 2020;10:250-61.
31. Poduval S, Marston L, Hamilton F, Stevenson F, Murray E. Feasibility, acceptability, and impact of a web-based structured education program for type 2 diabetes: Real-world study. JMIR Diabetes 2020;5:e15744.
32. Mirzaei-Alavijeh M, Jalilian F, Karami-Matin B, Hosseini S, Jouybari T, Mahboubi M, *et al*. Patient education in nursing: Investigation the role of individual and organizational barriers. Res J Appl Sci 2016;11:704-8.
33. Horigan G, Davies M, Findlay-White F, Chaney D, Coates V. Reasons why patients referred to diabetes education programmes choose not to attend: A systematic review. Diab Med 2017;34:14-26.
34. Abazari P, Vanaki Z, Mohammadi E, Amini M. Inadequate investment on management of diabetes education. J Res Med Sci 2012;17:792-8.
35. Mc Laughlin S, Chaney D, Belton A, Garst J. International standards for education of diabetes health professionals. 1rd ed. International Diabetes Federation. Brussels. 2015, pp. 7-14.
36. Adu MD, Malabu UH, Malau-Aduli AE, Malau-Aduli BS. Enablers and barriers to effective diabetes self-management: A multi-national investigation. PLoS One 2019;14:1-22.
37. Obirikorang Y, Obirikorang C, Anto EO, Acheampong E, Batu EN, Stella AD, *et al*. Knowledge of complications of diabetes mellitus among patients visiting the diabetes clinic at Sampa Government Hospital, Ghana: A descriptive study. BMC Public Health 2016;16:637.
38. Schäfer I, Pawels M, Küver C, Pohontsch NJ, Scherer M, van den Bussche H, *et al*. Strategies for improving participation in diabetes education. A qualitative study. PloS One 2014;9:1-7.
39. Hadi N, Rostami GN, Jafari P. study on the determining factors for compliance to prescribed medication by patients with high blood pressure. Jundishapur Scientific Medical Journal 2005;4:223-9.
40. Nazar CM, Bojerenu MM, Safdar M, Marwat J. Effectiveness of diabetes education and awareness of diabetes mellitus in combating diabetes in the United Kingdom; a literature review. J Nephropharmacol 2016;5:110.
41. Davies M. Psychological aspects of diabetes management. Medicine 2019;47:131-4.
42. American Diabetes Association. Standards of medical care in diabetes-2020 abridged for primary care providers. Clin Diabetes 2020;38:10-38.
43. Abazari P, Vanaki Z, Mohammadi E, Amini M. Challenges of training diabetes nurse educator in Iran. Iran J N Midwifery Res 2012;17:187.

44. International Standard Classification of Education: ISCED. Adult Education Definition 2011; UNESCO-UIS 2012. Available from: http://uis.unesco.org/sites/default/files/documentts/international-standard-classification-of-education-isced-2011-en.pdf. [Last accessed on 2020 Oct 14].
45. Kueh YC, Morris T, Ismail AA. The effect of diabetes knowledge and attitudes on self-management and quality of life among people with type 2 diabetes. Psychol Health Med 2017;22:138-44.
46. Choudhry NK, Denberg TD, Qaseem A, Clinical Guidelines Committee of American College of Physicians. Improving adherence to therapy and clinical outcomes while containing costs: Opportunities from the greater use of generic medications: Best practice advice from the clinical guidelines committee of the American College of Physicians. Ann Intern Med 2016;164:41-9.
47. Karimy M, Koohestani HR, Araban M. The association between attitude, self-efficacy, and social support and adherence to diabetes self-care behavior. Diabetol Metab Syndrome 2018;10:86.
48. Burke SD, Sherr D, Lipman RD. Partnering with diabetes educators to improve patient outcomes. Diabetes, metabolic syndrome and obesity: Targets and therapy. Diabetes Metab Syndr Obes 2014;7:45-53.
49. Abazari P, Vanaki Z, Mohammadi E, Amini MM. Barriers to effective diabetes self-management education. Iran J Med Educ 2013;13:221-32.
50. Bordonaro K. Adult learning theories and autoethnography: Informing the practice of information literacy. IFLA J 2019;46:163-71.
51. Vandenbosch J, van den Broucke S, Schinckus L, Schwarz P, Doyle G, Pelikan J, *et al*. The impact of health literacy on diabetes self-management education. Health Educ J 2018;18:62-349.
52. Lee YH. Sociodemographic factors associated with participation in diabetes education among community-dwelling adults with diabetes. Yonsei Med J 2020;61:169-78.
53. American Association of Diabetes Educators. Competencies for Diabetes Educators and Diabetes Paraprofessionals; 2016. Available from: https://www.diabeteseducator.org/docs/default-source/practice/practice-resources/comp003.pdf. [Last accessed on 2020 Jul 09].
54. Alharbi T, Thomacos N, McLelland G. Core competencies for diabetes educators: A scoping review. Diab Metab Syndrome 2019;13:2671-82.