

# The impact of education on economic cost of diabetes



Diabetes mellitus is undeniably a global epidemic. Development of drugs and other health care tools for the treatment of diabetes patients are in full swing all over the world, yet, little attention is given to the education of the diabetes patient. The availability of literature related to diabetes education in Saudi Arabia is very limited. Most literature and studies have focused on the prevalence of diabetes throughout the region. Diabetes education is of significant concern because of the detrimental effects of diabetes to the lives of the diabetic patients, especially in the economic and social aspects. Diabetes self-management education (DSME), if properly implemented and evaluated, can help improve glycemic control, self-care and emotional well-being and reduce the cost of care (Izquierdo, 2003). According to the International Diabetes Federation (IDF) (2009), some of the long-term goals of diabetes education are to decrease the burden for those at risk for or living with diabetes and their families; and to reduce the economic burden of diabetes at individual and societal levels. The government and health care sector plays a very important role in the proper guidance of the Saudi people. This paper explores the effects of health care education on the cost of diabetes mellitus treatment in Saudi Arabia.

## **Research Statement**

Diabetes mellitus has already become the most common non-communicable disease in the world (Alwakeel et al., 2008). According to recent epidemiological data, the incidence of diabetes mellitus in many Arab countries is particularly high; the information about the prevalence of diabetes in Saudi Arabia is rather limited, but it is clear that diabetes remains one of the most serious health issues in Saudi Arabia (Alwakeel et

al., 2008). The current state of research shows that a multi-disciplinary approach to diabetes is a viable solution to the existing diabetes issues in Saudi Arabia (Udezue et al., 2005).

Unfortunately, little or no information is provided about what diabetes is; how it works, and whether it can be cured and prevented. Al-Saeedi, Al-Dawood and Elzubier (2002) wrote that hundreds of diabetic incidents in Saudi Arabia are uncontrolled because they hold numerous misconceptions about diabetes and its treatment. These misconceptions have a detrimental impact on their treatment outcomes (Al-Dawood et al., 2002). This research is important because education could be a significant factor on diabetes prevention and management issues, and may play a role in finding a solution to the problem. Education may provide individuals with better awareness of preventive measures to avoid or control diabetes, and therefore also contribute to reducing the economic costs of diabetes mellitus treatment in Saudi Arabia. In addition, diabetes patients who have low income will be able to benefit from the more comprehensive education programs, and in effect improve their financial status (Izquierdo, 2003).

Given the seriousness and extent of the diabetes situation in Saudi Arabia and the existing gap in literature, there is an urgent need to explore the positive economic effects of diabetes education in Saudi Arabia. This research will also aim to prove the efficiency of diabetes education as a form of preventive health mechanism. The researcher expects that the results will lay the foundation for the development of sound medical educational policies in Saudi Arabia.

## **Justification**

In 2010, Saudi Arabia ranks third in the global prevalence of Type 2 diabetes and second highest in terms of percentage of national healthcare expenditure on diabetes (Kalyani, 2010). According to Al-Dawood et al. (2002), the rate of treatment-related misconceptions in Western Saudi Arabia is high, which implies that there is a need for one-on-one level education to encourage better knowledge. In other countries, proper diabetes education has reduced the incidences of lower-extremity amputation, decreased medication costs and hospitalisation. Izquierdo et al (2003) compared diabetes education through telemedicine and that with in-person education. The study showed that both tools were accepted by the diabetes patients but the technology provided by telemedicine suggests that more diabetes patients can be educated when using this tool (Izquierdo, 2003). These literatures provide an overview of the current situation for Saudi Arabia with regards to diabetes treatment. There may be some parts of Saudi Arabia where the diabetes patients do not have the transportation to go to the Primary Health Care Centers (PHCCs). This proves that diabetes education must be a priority in health care in Saudi Arabia to decrease the prevalence of diabetes in the country and to decrease the treatment costs for diabetes.

## **Research Objectives**

This research aims to:

- Determine the cost of diabetes treatment in Primary Health Care Centres (PHCC)
- Determine the impact of the cost of diabetes treatment to the patients

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- Determine the effects of the economic impact on the immediate family of the patients
- Determine the methods being used in diabetes education in PHCC
- Determine the efficiency of diabetes education in PHCC as a form of preventive health mechanism
- Search for other possible tools that can be used to provide a better comprehensive diabetes education

## **Methodology**

The research methodology done by Azab (2001) and Udezue (2005) in diabetic patients will be adapted and modified. Three Primary Health Care Centres (PHCCs) in one of the cities (Riyadh) of Saudi Arabia will be studied and the population of the diabetic patients in each PHCC will be recorded. The selected PHCC will be representative of the current situation of the diabetes treatment in that locality, but not necessarily the national situation. Therefore, increasing the number of PHCC under study in future researches will provide a more accurate situation of diabetes education in Saudi Arabia.

This study will involve diabetic patients undergoing treatment in their respective PHCC as well as their families. The diabetic patient will be required to visit the PHCC for two consecutive months on a monthly regular appointment system and provided with diabetes education. During these visits, the fasting blood sugar (FBS) of the diabetic patients will be monitored and recorded. The diabetic patient and his family will be inquired with series of questions about their economic situation, family medical history, cost of medication and treatment, the type of diabetes education provided to them, the efficiency of the diabetes education and the changes they have made or

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observed during the course of the study. The diabetic patients will be classified according to gender and age group. The data of the patients will be obtained from the selected PHCC. Obtaining a stratified population, it is expected that the age group to where diabetes education has to be centered will be estimated. The interviews and questionnaires will also provide information on the economic effect of diabetes to the patient and to the family the patient belongs to. The economic effects will focus on the losses they have acquired due to the onset of diabetes, and the delineation of the diabetes patient's income from the basic everyday needs to the needed treatment and other medications.

## **Sampling Frame**

The Primary Health Care Centre will be selected through systematic random sampling. A list of all the PHCC in Riyadh will be made and random selection of the three PHCCs will be done. This number will be used to select the representative PHCC.

All the diabetic patients in the three selected PHCC will be considered as the representative samples for the diabetic population for Riyadh. Based on the study by Al-Nuaim (1997), prevalence of diabetes in the rural areas is lower than that of the urban areas. This suggests that the population being considered is a representative of the diabetic patients situated in the urban areas of Saudi Arabia.

## **Method**

The study will obtain data by interviewing diabetic patients and their families and giving them a set of prepared questionnaires designed to provide the

over-all economic situation of the household with a diabetic patient. Medical information and medical history of the diabetic patient will be obtained through the PHCC where they are registered. The fasting blood glucose level of the patient will be taken and recorded during the set appointment to evaluate the efficiency of the diabetes education which will be given to them.

On the first month, the diabetic patients, and their families will be provided with diabetes education through one-on-one level of education, counseling and by using other types of media such as magazines, books and audio-visual presentations. The questionnaires will be handed out to them and data consolidated for evaluation.

On the second month, which is the follow-up appointment, the fasting blood glucose level of the diabetic patient will again be taken and another set of questionnaires will be given.

Interviews with diabetic patients and their families are necessary because this information provides a more realistic picture in the lives of the diabetic patient and their families. Although it may be difficult to obtain data in this manner since the patients will divulge aspects of their personal lives, the questionnaires will be able to suggest their lifestyle and their insights about the occurrence of diabetes in their home.

The data for the cost of the treatment for diabetes will be obtained from the selected PHCC and the decrease or increase in the cost of treatment will be obtained through the questionnaires handed out to them.

## **Ethical Issues**

The goals of diabetes education are to optimize blood glucose control, prevent chronic and potentially life-threatening complications, and optimize quality of life, while keeping costs within acceptable limits (Ozcan, 2007).

Most of the cost studies were done in the healthcare sector and very few on the individual or their families.

Ozcan (2007) found out that short term diabetes education has shown efficiency, and diminishes with long term diabetes education. This shows that diabetes education has to extend from the health care sector to the diabetic patient and to the families of the patients to guarantee a continuous treatment. Ozcan (2007) also pointed out the influence of the environment to the diabetic patient. This is indicative that the support of the people around the patient is significant to the welfare of a diabetic patient.

In 2005, the system cost of haemodialysis in Saudi Arabia is SAR 1700 and most diabetic patients need this at least thrice per week (Udezue et al., 2005). Thus, the cost required by a single diabetic patient for haemodialysis alone, is about SAR 265, 200 per year. This does not include any costs needed for treatment of other complications of diabetes such as blindness, amputations and hypertension. According to Udezue et al. (2005), the greater acceptability and effectiveness of one-on-one teaching versus group teaching may be cultural.

The treatment misconceptions cited by Al-Dawood (2002) must also be corrected, if not eradicated. Therefore, diabetes educators should be highly skilled in the organisation of effective educational programmes. They should



follow the literature and apply the latest information in their daily practice (Ozcan, 2007). The IDF has set guidelines for the health care sector to follow in order to provide a comprehensive and effective diabetes education for the patients (IDF, 2009). Areas which have limited access to or resources for diabetes education may opt to use telemedicine in order to help the diabetic patients, as suggested in the study by Izquierdo (2003).

The Ramadan is a Muslim tradition which requires fasting. Although studies have shown that fasting reduces blood glucose levels, the complications due to diabetes may occur such as retinal vein occlusion (Elhadd et al., 2007).

This has to be considered for diabetes education. Proper information dissemination and full understanding of the diabetic patient and their families is needed to make the treatment successful, and consequently reduce the cost needed for medication.

## **Data Analysis**

Data analysis will have to determine the relationship between diabetes education, change in the blood glucose level of the diabetic patient and the estimated changes in the cost of the treatment. A two-month comparison of the blood glucose level and the cost needed for purchasing medicine will suggest the efficiency of the diabetes education. The level of glycemic control will be calculated using the criteria of The Scientific Committee of Quality Assurance in Primary Health Care as done by Azab (2001).

The data of the stratified population will provide a statistics of the age group that requires the most education. In addition, the efficiency of the educators will also be estimated. This will provide a baseline for the quality of diabetes

education being given to the diabetic patients. The evaluation of the educators will also determine the need for proper training of the educators, as well as an upgrading or improvement of the tools that the PHCCs have. This study will require the student's t-test to determine if certain outlier data will have to be considered.

## **Timeline for the Research**

This research study requires preparation of the venue and participants for the study, which includes formal letters to the possible PHCCs and permission from the diabetic patients. Proper orientation of the diabetes educators will also be considered. The materials for the determination of blood glucose level also have to be prepared and the resources have to be properly allocated. Time for the actual conduct of the method, data gathering and evaluation, and report generation will also be considered.

Table 1 shows the timeline for this research.

## **The Type of Community Participation**

This study will focus on the diabetic patient, the immediate family of the diabetic patient and the people involved in the selected Primary Health Care Centre. Thus, this study does not necessarily require community participation.

The family members of the diabetic patient will be the only people involved in the study. Secondary data may also be taken to verify and supplement information. However, this does not require the participation of the community that they belong to. All the participants will be considered to represent the urban community of Saudi Arabia.

This study will require the participation of the different health professionals in the selected PHCCs. The multi-disciplinary approach done by Udezue (2005) will be adapted for the role assignments of the people who will participate in diabetes education. The study conducted aimed to optimize diabetic control by teaching about diet, exercise, medications and other practical diabetic management issues (Udezue et al., 2005). The team for diabetes education will be led by a consultant physician; and its members will be a group of health professionals with knowledge and interest in proper diabetes self-management. The diabetes educators of the selected Primary Health Care Centre will play a very important role to the success of this research. The knowledge or information they will provide will determine the changes in the lifestyles of the diabetic patients. Re-training and re-evaluation of the diabetes educators may be necessary to provide a more standardized diabetes education at the time of the study. This will minimize variations in the information being disseminated to the diabetes patients and their families.

Diabetes nurse educators will provide general teaching, insulin injection technique and hypoglycemia recognition and treatment, and exercise. Social workers will assess family life, schooling and cultural and socio-economic barriers; dietitians will provide education on practical diet, food availability and preferences and exercise; nurses will provide patient registration and screening and the consultant physician will give general directions and guidance as overall coordinator. Focus of the diabetes education will be on exercise, diet and medication, as these three factors are the most affected by an individual's lifestyle.

All participants, namely: the diabetic patient, family members and the diabetes educators will have to be properly oriented of their roles on this research before the conduct of the study.

## **Importance of the Research**

In the study by Al-Ajlan (2007), he defined diabetes mellitus as a group of metabolic disorders with multiple etiologies characterized by chronic hyperglycemia with disturbance of carbohydrate and fat, resulting from insulin defect in secretion or action.

Education has always been a fundamental need in our everyday lives. This does not count out the need for diabetes education. Diabetes education should determine the target population, assess educational needs according to ethnic background of the community and education level of the target group and identify the resources to tailor the appropriate program (Al-Ajlan, 2007). The economic burden of diabetes does not only affect the individual patients and their families but the state and health services as a whole. Saudi Arabia is estimated to spend between 620 and 1, 142 million ID; and according to WHO records, almost one Saudi diabetes mellitus person is costing the government about \$800 per month. The annual cost of treating diabetes in Saudi Arabia is about \$9. 6 billion (Al-Ajlan, 2007).

The International Diabetes Federation (IDF) emphasizes that diabetes-specific education is required for diabetic patients and the healthcare personnel. The proper training of the healthcare personnel is essential to improve the outcome of the treatment for the diabetic patient.

At present, diabetes self-management education has become an integral and critical part of the lives of the diabetic patient (Ozcan, 2007). Some studies presented major barriers to diabetes management such as low resources and the receptivity of the patients due to cultural differences (Elhadd et al., 2007). These matters can be addressed properly if the government provides enough resources, specifically on the training of diabetes educators.

Other countries have already tried to use technology as a means to improve diabetes education for the treatment of diabetes patients. An example of this is the use of telemedicine. Some studies have shown that using telemedicine to provide diabetes education through counseling resulted in brief and effective interventions that supported lifestyle behavioral changes (Hayes et al., 2001). In the study done by Klonoff (2009), the use of telemedicine as a tool for diabetes education helped the health care providers communicate better with their patients and lower the cost needed for health care of the diabetic patient. Through this technology, the diabetes patient does not have to burden the cost of transportation just to get to the PHCC. The diabetes educator, on the other hand, will be able to accommodate more patients since the use of telephone will provide access to areas which may be underserved (Izquierdo, 2003). Hence, telemedicine may provide a brief yet comprehensive diabetes education to the diabetic patients of Saudi Arabia.

The prevalence of diabetes in Saudi Arabia, and consequently, the cost of diabetes treatment, can be reduced by proper education of the people about diabetes. This does not only involve the diabetic patient, but also the people who influence the lifestyle of a diabetic patient (Ozcan, 2007). People with diabetes tend to be less productive in their lives due to the cost of their

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medications and complications of the disease. Therefore, proper guidance, through diabetes education is the best tool to improve their productivity. This undertaking requires both the health care sector and the intervention of the government to be able to guarantee its success. The government's initiative to improve the services provided by the health care sector will provide benefit to more diabetic patients in Saudi Arabia. A decrease in the prevalence of diabetes in Saudi Arabia, and those that require diabetes treatment will improve both the individual and national economic status.