Quality of Diabetes Management in Saudi Arabia: A Review of Existing Barriers

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Abstract

Background: Diabetes mellitus is a complex disorder that requires continuous management and medical care. The purpose of this review is to identify and summarize the barriers that affect diabetes management in Saudi Arabia.

Methods: Studies that have examined the quality of diabetes management in Saudi Arabia were identified through online and manual literature searches. Two researchers independently searched and assessed for inclusion/exclusion criteria. All studies were screened by a specialist for the significance of the review. Studies that were included were evaluated for relevance, methodological rigor, and credibility by giving a quality score based on Russell and Gregory's criteria.

Results: This review presents an overview of the quality of diabetes management and issues and barriers concerning the improvement of diabetes care in Saudi Arabia. The online literature search yielded 11 studies which met the inclusion criteria. Factors affecting the quality of diabetes care can be categorized into patient factors (such as adherence, compliance, attitudes, beliefs, knowledge, financial resources and co-morbidities) and healthcare providers' factors (including beliefs, attitudes and knowledge, patient – provider interaction and communication).

Conclusion: The identified barriers, both from patients and healthcare providers, will help healthcare authorities to improve diabetes management in Saudi Arabia. Improvement of health awareness about disease and disease management should be tailored through continuous patient education. Continuous training and seminars will also expand providers' knowledge that will ensure quality and effective diabetes management.

Keywords: Diabetes management, diabetes mellitus, Saudi Arabia, type 2 diabetes

Introduction

Diabetes mellitus is the most common chronic non-communicable diseases that is considered a public health concern worldwide. The World Health Organization (WHO) indicates that the prevalence of diabetes in Saudi Arabia will rise from 890 000 to 2 523 000 by 2030.[1] If the prevalence of diabetes will continue, increasing healthcare expenditure will also be imposed. According to a study on Global Healthcare Expenditure on diabetes, health care expenditures will upsurge from US$376 billion in 2010 to US$490 billion in 2030 for diabetes mellitus type 2 (DMT2) alone.[2] DMT2 is one of the major public health problems in Saudi Arabia.[3–5] A large cohort study from 1995 to 2000 revealed that one out of five adult Saudi had DMT2. Recent studies show that the prevalence of DMT2 in Saudi Arabia is still in higher percentages (23%).[6]

Substantial efforts should draw from patients and healthcare providers to diminish this growing global problem. Evidence based guidelines were stimulated for an effective measure for surveillance, prevention and control of diabetes and its complications. The American Diabetes Association (ADA) recommended achieving optimal levels of glycemic control with hemoglobin A1c (HbA1c) of <7%.[7] The World Health Organization also builds global epidemic awareness on diabetes, provides scientific guidelines for diabetes prevention, develops norms and standards for diabetes diagnosis and care, and conducts surveillance of diabetes and its relevant risk factors.[8] Thus, these guidelines will help health care providers to offer standards of care in diabetes management.

Diabetes mellitus is a complex disorder that requires continuous management and medical care in which persons with type 2 diabetes need to perform self-monitoring of blood-glucose; adherence to prescribed medication; physical activity and exercise; healthy diet; foot examinations at regular intervals, and other self-management activities on a regular basis.[9,10] Hence, it is important to identify the barriers that affect diabetes management from the perspectives of both patients' self-management and healthcare provider interventions to ensure adherence to diabetes standards of care. Identifying these barriers will also improve diabetes management by providing an outlook for clinicians and healthcare authorities on the current quality of diabetes care in Saudi Arabia.

Materials and Methods

Search strategy

Studies that have examined the quality of diabetes management in Saudi Arabia were identified through online and manual literature searches using the following electronic databases: ISI Web of Knowledge, Science Direct, PubMed and Cochrane. The search terms used were: (diabetes mellitus OR type 2 diabetes) AND (Saudi Arabia) AND (barriers OR management OR adherence

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OR treatment OR guidelines). Reference lists of included articles were scanned to increase sensitivity and to select more studies. No restrictions were made by language or year of publication. The electronic search was completed in consultation with several experts and supplemented by several databases.

Inclusion and exclusion criteria

Studies met the inclusion criteria if they fulfilled all the following criteria: (1) focus on the development of quality of diabetes management in Saudi Arabia, (2) focus on areas of concern and issues on both patient and healthcare providers' barriers for diabetes management, and (3) studies that used different methods of analysis that were directly relevant to the themes of this review. Studies not carried out in Saudi Arabia were excluded from the study.

Data extraction

Following the literature search, abstracts were extracted from each database independently by two researchers and assessed for the inclusion/exclusion criteria. Titles and abstracts were screened for potential duplication and significance by a specialist. After the preliminary screening, details of the authors of the study, location of the study, sample and major findings were extracted from each of the studies that met the inclusion criteria.

Quality Appraisal

After extraction of all included articles, each of the studies was reviewed and appraised by the authors for relevance, methodological rigor, and credibility using the Russell and Gregory criteria.[11] A quality score was given in each study ranging from 1–5 (5 being the highest) based on whether the article answered each of the following questions: 1) is the research question clear and adequately substantiated?; 2) is the design appropriate for the research question?; 3) was the sampling method appropriate for the research question and design?; 4) were data collected and managed systematically?; and 5) were the data analyzed appropriately?

Results

The online literature search yielded 78 results, of which 42 met our selection criteria. Ten further studies were identified through scanning the reference list of the 42 selected articles. In total, 52 articles went for more detailed evaluation regarding the formal inclusion/exclusion. After extensive evaluation, only 11 studies met the inclusion criteria. Details of the quality assessment of all articles included in the study are shown in Table 1.

Table 2 presents an overview of findings that identified the quality of diabetes management and issues and barriers concerning the improvement of diabetes care in the Saudi Arabia.

Patient factors
Adherence and compliance

Six of the reviewed studies showed the patients' adherence and compliance towards diabetes management. Two studies conducted in Al Manah and Riyadh showed good adherence and compliance rating to keep appointments and taking their medications.[12,13] One study showed different compliant results among diabetic patients based on age, gender and race. In a study by Abdul Salam, *et al.,* younger patients (age < 40) were more compliant with all aspects of treatment regimens except their medication. Female diabetic patients were more compliant with exercise, while the

male were more compliant with keeping appointments. Saudi patients were significantly compliant with medication, while non-Saudis were more compliant with exercise.[14] The study conducted in the Al Hasa region showed a significant association with non-compliance to the irregularity of follow up (OR = 8.41, CI = 4.90–11.92), non-adherence to drug prescription (OR = 4.55, CI = 3.54–5.56), non-adherence to instruction on exercise (OR = 5.55, CI = 4.2 66.86), insulin (OR = 1.29, CI =.71–1.87), and insulin with oral antidiabetic (OR = 1.20, CI = .65–1.75).[15] In a study by Al-Haeyek on 147 diabetic patients in Riyadh, uncontrolled glycemic level was found in patients' adherence to diet and lifestyle plan.[16] Meanwhile, diabetes education program shows a significant improvement in medication regimen ($P = 0.007$) and patients' glycemic control ($P = 0.04$) in a study conducted in a tertiary hospital in Riyadh.[17]

Attitudes and beliefs

Two studies revealed the type and pattern of misconceptions of diabetic patients with their treatment. Patients' misconceptions were mostly related to medications and diet. The first study revealed that diabetic patients thought that medications should be stopped in case of absence of symptoms of diabetes, and that one could eat what he or she liked as long as the medications were taken.[18]

The results of the second study showed that most patients (68.7%) had a high dietary misconception. About half of the sample thought that carbohydrates were to be completely removed from the diet followed by the idea that bitter food items were to be consumed to neutralize hyperglycemia. Other misconceptions were the notions that dried bread was good for diabetes; that snacks were to be avoided by diabetic patients; and that honey (35%) and "dates" (17%) were good food items for diabetic patients.[19]

Knowledge

Findings from a survey of 91 diabetic teachers in Al Khobar showed that understanding of diabetes was low, especially about the symptoms of hypoglycemia. It was also found that herbs such as *Lupinus Albus*, Papilionaceae (Termis) and *Allium sativum*, Liliaceae (Fresh Garlic), Aloe Vera, Liliaceae (Saber), 23.1% *Nigella Sativa*, Ranunculaceae (Habba Sawda), were being used individually or in a mixture even though there is no evidence of their efficacy.[20]

Financial Resources

In a written report by Al Howaish, *et al.*, it was shown that people diagnosed with diabetes, had ten times higher, on an average level ($3,686 vs. $380) medical health care expenditures than patients without diabetes. The majority of the medical healthcare expenditures attributed to diabetes are incurred by persons of Saudi nationality.[21] Although most of the expenditure is covered by the Ministry of Health, in the long term negative impacts on MOH's ability to pay may be observed, as the prevalence of DMT2 increases.

Co-morbidities

A study by Kinsara, *et al*. presented the characteristic risk profile and points of concern in the management of elderly patients with Acute Coronary Syndrome. The study found that there was marked underutilization of medication (i.e., glycoprotein inhibi-

Table 1. Quality assessment reviewed studies.

	Research Study	Is the research question clear and adequately substantiated?	Is the design appropriate for the research question?	Was the sampling method appropriate for the research question and design?	Were data collected and managed systematically?	Were the data analyzed appropriately?	Quality score
1	Compliance and control of diabetes in a family practice setting, Saudi Arabia.[12]	Yes	Yes	Yes	Yes	Yes	5
2	Patients' satisfaction with diabetes medications in one hospital, Saudi Arabia. Patient Prefer Adherence.[13]	Yes	Yes	No	Yes	Yes	4
3	Socio-demographic Determinants of Compliance among Type 2 Diabetic Patients in Abha, Saudi Arabia.[14]	Yes	Yes	No	Yes	Yes	4
4	Factors contributing to non-compliance among diabetics attending primary health centers in the Al Hasa district of Saudi Arabia.[15]	Yes	Yes	Yes	Yes	Yes	5
5	Association between diabetes self-care, medication adherence, anxiety, depression, and glycemic control in type 2 diabetes.[16]	Yes	Yes	No	Yes	Yes	4
6	Impact of an education program on patient anxiety, depression, glycemic control, and adherence to self-care and medication in Type 2 diabetes.[17]	Yes	Yes	No	Yes	Yes	4
7	Treatment-related misconceptions among diabetic patients in Western Saudi Arabia.[18]	Yes	Yes	Yes	Yes	Yes	5
8	Dietary Misconceptions among Diabetic Patients in Makkah City, Saudi Arabia.[19]	Yes	Yes	Yes	Yes	Yes	5
9	Diabetes knowledge among self-reported diabetic female teachers: Al-khobar, Saudi Arabia.[20]	Yes	Yes	Yes	Yes	Yes	5
10	Economic costs of diabetes in Saudi Arabia[21]	Yes	Yes	Yes	Yes	Yes	5
11	The management of elderly diabetic Saudi patients with acute coronary syndrome.[22]	Yes	Yes	Yes	Yes	Yes	5

Table 2. Summary of included studies.

Barriers	Findings	Literature sources
Patient factors		
Adherence and Compliance	The results showed that good compliance with diet was significantly higher among males ($P = 0.01$) and those with good diabetic control ($P = 0.01$), while good compliance with appointment systems was significantly associated with type II diabetes ($P < 0.01$) and good care ($P < 0.01$). Satisfied patients were more adherent in taking their medications, changing their dietary habits, performing physical activities, and attending their follow-up visits Younger patients (age < 40) were more compliant with all aspects of treatment regimens except for their medication. Female diabetic patients were more compliant with exercise, while the male was more compliant with keeping appointments. Saudi patients were significantly compliant with medication, while non-Saudis were more compliant with exercise A significant association with non-compliance to the irregularity of follow up (OR = 8.41, CI = 4.90-11.92), non- adherence to drug prescription (OR = 4.55, CI = 3.54-5.56), non -adherence to instruction on exercise (OR = 5.55, CI = 4.2 66.86), insulin (OR = 1.29, CI =.71-1.87), insulin with oral antidiabetic (OR = 1.20, CI = .65-1.75) The uncontrolled glycemic level was found in patients' adherence to diet and lifestyle plan Diabetes education program shows a significant improvement in medication regimen (P = 0.007) and patients' glycemic control (P = 0.04)	12-17
Attitudes and beliefs	Diabetic patients thought that medications should be stopped in case of absence of symptoms of diabetes, and that one could eat what he or she liked as long as the medications were taken About half of the sample thought that carbohydrates were to be completely removed from the diet followed by bitter food items were to be consumed to neutralize hyperglycemia. Other misconceptions were dried bread was good for diabetes; that snacks were to be avoided by diabetic patients; honey (35%) and deaths (17%) were good food items for diabetic patients	18,19
Knowledge	91 diabetic teachers in Al Khobar show that understanding of diabetes was low especially on symptoms of hypoglycemia. It was also found that herbs such as Lupinus Albus, Papilionaceae (Termis) and Allium sativum, Liliaceae (Fresh Garlic), Aloe Vera, Liliaceae (Saber), 23.1% Nigella Sativa, Ranunculaceae (Habba Sawda), were being used individually or in a mixture even though there is no evidenced of their efficacy	20
Financial Resources	People whose diagnosed with diabetes, have ten times higher, on an average level, ($3,686 vs. $380) medical health care expenditures than patient without diabetes.	21
Co-morbidities	There was marked underutilization of medication (i.e. glycoprotein inhibitors) in those patients with Acute Coronary Syndrome aged over 65 years old from 22.5% to 12.7% (Odds ratio 0.56). In addition, the percentage of early coronary angiography approach found in the study was less than the international data to further decrease of the percentage (from 49.3% to 25.5% with Odds ratio 0.52)	22
Health care provider factors		
Beliefs, attitudes and knowledge	They found most providers (n = 78, 78.8%) were not aware of the prevalence of diabetes mellitus in Saudi Arabia. The analysis also showed there was a difference between physicians' knowledge about treatment with oral hypoglycemic, 18% of the physician agreed that it should be started immediately in newly diagnosed type 2 diabetic patients' while 82.8% disagreed Only 23.2% of physician reported that they are professionally well prepared to manage Type 2 diabetes on a diagnosis for the initiation of therapy.	23
Patient – provider interaction and communication	The results show that the majority of the patients were satisfied with their physicians' skills such as prescribing proper treatment, taking a good medical history, requesting lab investigation and proper explanation of disease and treatments. Meanwhile, only half of the patients were satisfied about diabetes education and the periodic physical examination such as retinal and foot exam.	24

tors) in patients aged over 65 years from 22.5% to 12.7% (Odds ratio 0.56) in comparison to those <65 years old (OR 0.56). In addition, the percentage of early coronary angiography approach found in the study was less than the international data to further decrease of the percentage (from 49.3% to 25.5% with Odds ratio 0.52).[22]

Health care provider factors
Beliefs, attitudes and knowledge

A recent cross-sectional study assessed the knowledge, attitude and practice (KAP) of Ministry of Heath Primary Health Care physician in the Al Hasa district towards the management of type 2 diabetes mellitus. They found that most providers (n = 78, 78.8%) were not aware of the prevalence of diabetes mellitus in Saudi Arabia. The analysis also showed a difference between physicians' knowledge about treatment with oral hypoglycemic: 18% of the physicians agreed that it should be started immediately in newly diagnosed type 2 diabetic patients while 82.8% disagreed.[23]

Considering the primary physicians' attitude towards diabetic patients and their management, only 23.2% of physicians reported that they are professionally well prepared to manage Type 2 diabetes on a diagnosis for the initiation of therapy. The study also reported that the majority of the physicians (58.6%; n = 58) did not have a copy of Clinical practice guideline (CPG) in their clinic; which CPG in their clinic found to be helpful in the management and follow-up of diabetic patients and believed that it should be used in daily practice.[23]

Patient – provider interaction and communication

A total of 195 type 2 diabetic patients assess mainly the clinical competence and communication skills of the physician. The results showed that the majority of the patients were satisfied with their physicians' skills such as prescribing proper treatment, taking a good medical history, requesting lab investigation and proper explanation of disease and treatments. Meanwhile, only half of the patients were satisfied with diabetes education and the periodic physical examination such as retinal and foot exam.[24]

Discussion

This study provides insight into the quality of diabetes care and the barriers that influence both patients and healthcare providers in Saudi Arabia. Several patient factors should be considered that may contribute to DMT2 management, such as adherence, compliance attitudes, beliefs, knowledge, financial resources and co-morbidities.

Six studies found factors that influenced the adherence and compliance to self-management. The findings indicated that there is wide variation in compliance and adherence among diabetic patients' age, gender and race. Similar findings were observed from other studies having variations in older age, male sex, and illiteracy.[24] The majority of the studies also showed poor adherence to diet and lifestyle. Although poor adherence was observed, one study showed a significant improvement through education programs and seminars. Misperceptions and difference in patients' understanding of the disease and its complication were attributed to poor adherence among type 2 diabetes patients.[25] Other findings from patient factors are the knowledge of the disease and type and pattern of misconception of diabetic patients' about their treatment. The results showed that patients' misconception

was mostly related to medication and diet. Effective patient and clinician communication will improve patients' poor adherence regarding the disease and disease management. A continuous patient education intervention should be also provided to increase their knowledge and improve patients' adherence, compliance and attitude to treatment.[26]

Co-morbidities may be recognized as a barrier to self-management due to multiple treatment regimens. Medication, in particular, is treatment barrier in individuals with diabetes and cardiovascular disease; specifically in elderly diabetes patients with cardiovascular disease, the treatment plan will be more complicated due to fear of bleeding.[22] Therefore, more attention should be considered for patients with both diabetes and cardiovascular diseases.

Healthcare providers' barriers to diabetes management include beliefs, attitudes and knowledge, patient – provider interaction and communication. The findings showed that the majority of primary health care physicians were not aware of the prevalence of diabetes in Saudi Arabia. Differences between primary health physicians' knowledge about treatment with oral hypoglycemic were seen. According to the American Diabetes Association, a trial of diet and exercise within the first three-months is the first line of treatment and when the level of glycemic in uncontrolled, pharmacologic treatment will be required.[27] Furthermore, initiation of pharmacologic therapy will be made jointly by patients and physicians.

The present study also found that most of the primary health physician was not equipped with appropriate tools such as a copy of the Clinical practice guideline that will be helpful in the management of diabetes. This may explain the difference between providers' knowledge about courses of treatment. Training and seminars should also be provided to healthcare providers in order to expand their knowledge of diabetes and influence their attitude and beliefs towards effective diabetes management.[28–30] As the prevalence of DMT2 continues to increase, primarily health care physicians' role will also have an increasing demand. Identifying the barriers to diabetes management may not be adequate for improving without support of the system.

The study is limited in terms of the sample of the studies included; the number of samples cannot determine or represent the whole Kingdom, which may result in bias. Secondly, with the limited number of studies that reported each indicator, this review may not capture the quality and all the barriers of patients' and healthcare providers' factors. Although this study has some limitations, the evidence and results of this literature search highlight significant findings that are considered as barriers of diabetes care. Hence, it will be a great start to address these issues that hinder diabetes management in Saudi Arabia. Furthermore, addressing these barriers will continue to reduce and manage the growing health threat of diabetes in Saudi Arabia.

In conclusion, the identified barriers, both from patients and healthcare providers, will help healthcare authorities to improve diabetes management in Saudi Arabia. As a result of these unaddressed issues, such as adherence, compliance, attitudes, beliefs, knowledge, financial resources and co-morbidities and health care providers' knowledge, attitudes and patient – provider interaction and communication, the patients' health may be at risk and the burden of diabetes in Saudi Arabia may continue to rise. Improvement of health awareness about disease and disease management should be tailored through continuous patient education. The reviewed studies suggest that continuous training and seminar will

also expand providers' knowledge that will ensure quality and effective diabetes management. Moreover, in order to monitor the quality of diabetes care for patients and professionals, it is necessary to assess the quality of services based on both national and international standards.

Conflict of interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

Acknowledgments

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