Introduction

Diabetes Mellitus is growing dramatically worldwide during the last few decades. Its prevalence during 2019 was estimated to be about 9.3%, while by 2030, the total number of diabetics will exceed 578 million and 700 million by 2045. Saudi Arabia is one of the middle east countries of high prevalence of diabetes mellitus. According to national studies, the prevalence rate of type 2 diabetes was around 25%. Good DM metabolic control was (28%), HTN control (71%) and lipid control (54%), good compliance with appointment was 85%. The most common documented complications were retinopathy (14%), nephropathy (4.5%) and CHD (4%).

Conclusion and Recommendations: This audit revealed that using of CBAHI standards for DM care at PHCC is simple and practical and could help to identify the weak areas that needs improvement. The present care of DM in our PHCC has acceptable infrastructures except for health education program, laboratory and referral system which should be scaled up to improve the processes and outcomes. DM control is still a big challenge and needs more collaborative effort between health care providers and patients.

Methodology

After taking official permission from the Department of Research and Studies in General Directorate of Health Affairs, Aseer region, Saudi Arabia under the number of RES-2-8 on 18-4-2018, this audit was conducted by the investigators at Al-Manhal Family Practice Center, Aseer Region, KSA.

Abstract

Objective: The objectives of this study is to assess the quality of diabetic care at Al-Manhal PHCC based on CBAHI standards. Methods: This audit was conducted during 2018 at Al-Manhal PHCC through assessment all aspects of DM care (structures, processes and outcomes) using CBAHI standards. Data entry and analysis were managed used SPSS. Results: Most of DM structures were available at the PHCC, however, health educational program, lab relevant facilities were partially met the standards. Records of 429 patients were assessed for process of care which were satisfactory except for laboratory investigations and eye examination which were partially met. Good DM metabolic control was (28%), HTN control (71%) and lipid control (54%), good compliance with appointment was 85%. The most common documented complications were retinopathy (14%), nephropathy (4.5%) and CHD (4%).

Conclusion and Recommendations: This audit revealed that using of CBAHI standards for DM care at PHCC is simple and practical and could help to identify the weak areas that needs improvement. The present care of DM in our PHCC has acceptable infrastructures except for health education program, laboratory and referral system which should be scaled up to improve the processes and outcomes. DM control is still a big challenge and needs more collaborative effort between health care providers and patients.

Keywords: Aseer Region, CBAHI, Diabetes care, Family Practice, Quality, Saudi Arabia
Al‑Manhal PHCC. This PHCC is one of the ten PHCCs in Abha city and serves about 20000 inhabitants. Diabetic care is provided by three family physicians and two trained nurses. The structures, process, and outcome of DM care were assessed by 2018 using CBAHI standards of chronic diseases. During CBAHI scoring guidelines were the following:

Each EC is scored on a four-point scale: 3 (Fully met when ≥75% compliance with the EC for 4 months prior to the initial survey or one year for the triennial survey), 2 (Partially met when ≥50 to <75% compliance with the EC or compliance for 3 months prior to the initial survey or 9 months for the triennial survey), 1 (Minimally met when ≥25 to <50% compliance with the EC or compliance for 2 months prior to the initial survey or 6 months for the triennial survey), 0 (Not met when <25% compliance with the EC or compliance is less than 2 months to the initial survey or less than 3 months for the triennial survey), and Not Applicable indicates that the standard/EC does not apply to the PHC.

The assessment was conducted by one of the investigators who has experience in this regard. The standards for structure were availability of DM manual, teamwork, medical instruments, essential drugs, health education program, DM program, health information system, effective referral system, equipped laboratory, and follow-up system. Standards for procedures were as follows: Recording of demographics, recording of smoking status, and checking (weight-BMI, blood pressure, blood sugar, HbA1C, lipid profile, renal function, eye examination, and ECG).

Standards of outcomes were annual rate of visits, prevalence of obesity, diabetic control, blood pressure control, lipid control, rates of complications, rate of defaulters, and rate of smoking quitting. A master sheet was used to collect the above-mentioned data. Data coding, entry, and analysis were carried out using SPSS version 16.

## Results

### Structures

The standards and their score are shown in Table 1. It was found that most of standards of structures scored full points except, availability of medical instruments, health education program, were partially met, while referral system scored one point.

### Procedures

Table 2 shows the points for each standard given for assessment of procedures, 50% of the relevant standards were fully met and the other partially met (HbA1C, lipid profile, renal function test, fundoscopy and ECG).

A total of 429 health records were assessed. The mean of age was 59 year, more than half of patients were males, less than one-third were illiterate, and 85% were married [Table 3]. Procedure is shown in Table 4. Measuring weight, blood pressures, and fasting glucose was done for all patients, checking for HbA1C at least once was carried out for 70%, ECG (68%), fundoscopy (69%), lipid testing (75%), and checking for creatinine (73%).

Regarding therapy, 141 (33%) were on oral hypoglycemic agents and insulin, 41 (56%) were on OHA, 45 (10%) were on insulin.
were on insulin only, while 2 patients were on diet. More than 2/3 (66%) of patient were on aspirin, and 61% used lipid-lowering agents.

**Outcomes**

Relevant outcomes showed that 57% have obesity, 28% have good diabetic control, 71% have good HTN control, and less than 60% have good lipid control while rates of complications ranged from 1% to 14% [Table 4].

**Discussion**

**Structures**

In the last two decades, many audits were conducted in KSA using different tools and standards. In the present audit, the CBAHI standards were first used. It is obvious that most of standards for infrastructures (7 standards) were fully met except for the availability of well-structured education plan for the patients and family, effective referral system with feedback, and well-equipped laboratory, which were partially met the standards and scored 2 points for each. In this regard, previous studies reported that such items were very deficient. In order to overcome such defects and to fill these important gaps, the high authorities in the public health department in the general directorate should have urgent executive plan.

**Procedures**

Patients’ records were assessed for the process of diabetic care. It was found that recording of all bio-data and vital signs was documented in all files, which was better than reported in the previous studies from Aseer, Qassim, and Riyadh but less than conducted in UK. The defects in laboratory and referral system were reflected on the relevant items of process particularly annual investigations (kidney function test, lipid profile, HbA1C, ECG, and fundoscopy), which were not done for about 1/3 of patients. However, the findings of this audit showed improvement as compared to that reported from the same center in 2009 in which kidney function tests, lipid profile, and eye examination were conducted for 40%, 39%, and 38%, respectively. In Qassim region, kidney function test was done for all diabetics, lipid profile was done for 92%, while eye examination was conducted for 17.6%. In a study conducted by Al-arfaj in armed forces hospital in southern region, lipid profile was done for the majority of patient (72%) while renal function test and fundoscopy were done for 29% and 35%, respectively.

In Dammam city, Ba-Essa et al. assessed the processes of diabetic care for 792 individuals in 2012 and 2016 and reported excellent processes of care as KFT, lipid profile, and eye examination were done for more than 97% of the diabetic patients. In Bahrain, Al-Baharna et al. conducted a study and included 287 diabetic patients in military hospitals and they found that lipid profile, KFT, and eye examination were done for 95.5%, 97%, and 42%, respectively.

**Outcomes**

Aims of the DM program are to have good metabolic control, minimizing the risk factors and complications. Despite the low rate of DM good control (28%), most of patients were found to have optimal therapy including insulin (40%), aspirin (66%), and statin (61%). In a previous study from the same center, the good metabolic control was achieved among 30% compared to 21% in Qassim region and 18% in Riyadh region and 35% in UK. In Dammam, good control was improved from 9% in 2012 to 37% in 2016, while study from Bahrain reported 32%. In UAE, Shehab et al. reported very high figure (73.6%) after 6 months of continuous care of 254 diabetic patients. In comparison study which was conducted among 200 diabetics in internal medicine department, Riyadh city and Diana Prince center, UK, good diabetic control was 18% and 35%, respectively. In another survey “The Gulf DiabCare” which included 1290 diabetic patients from KSA, Kuwait, and UAE, the good metabolic control was reported among 37% of the total sample study.

In a recent large analysis of diabetic care in England which included 2.7 million diabetic patients, a high good metabolic control was reported among 66.9% of patients and they found that good control was affected by type of used medications particularly the new oral anti-diabetic agents.

Such difference in metabolic control is expected as the cut-off point, patients’ compliance, and other patients’ characteristics are

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**Table 3: Process of diabetic care at Al-Manhal PHCC, Abha, KSA, 2018**

| Standards             | Percentage | Score |
|-----------------------|------------|-------|
| Recording bio-data    | 100        | 3     |
| Recording smoking status | 100       | 3     |
| Checking weight and BMI | 100       | 3     |
| Checking blood pressure | 100       | 3     |
| Checking blood glucose | 100       | 3     |
| Checking HbA1C        | 70         | 2     |
| Checking lipid        | 75         | 3     |
| Checking urea, creatinine | 72       | 2     |
| Eye examination (fundoscopy) | 69       | 2     |
| ECG                   | 68         | 2     |

**Table 4: Outcomes of diabetic care at Al-Manhal PHCC, Abha, KSA, 2018**

| Standards                             | Percentage | Score |
|---------------------------------------|------------|-------|
| Average of annual visits (4-6) visits per year | 3 visits per year | 3     |
| Good control of diabetes              | 28%        | 1     |
| Good control of HTN                   | 71%        | 2     |
| Good control of lipid                 | 54%        | 2     |
| Good compliance with appointment      | 85%        | 3     |
| Satisfaction with DM care among patient | Not done | 0     |
| Rate of complications                 |            |       |
| CHD                                   | 19 (4%)    |       |
| Stroke                                | 5 (1%)     |       |
| Renal impairment                      | 14/311 (4.5%) |       |
| Diabetic foot                         | 8 (2%)     |       |
| Retinopathy                           | 42/295 (14)|       |
different. Whatever the underlying reason, it is very mandatory to review the plan of care and to determine objective for each patient in order to achieve high target of good DM control. The average of the visit to PHCC was 3, which is lower than acceptable number of visit (4 per year); this low rate of visits to family doctors could contribute to poor compliance with appointment, drugs, and lifestyles, which may significantly lead to poor diabetic control and complications. Rates of co-morbidities are common, 57% have obesity, 55% have dyslipidemia, and 50% have hypertension. These findings are comparable to that reported from Qassim region, as obesity and hypertension were documented among 50% and 35% but higher than that reported from UAE (29% and 26%, respectively). In Riyadh, Almutairi et al. reported that 56% have obesity, 44% suffer from hypertension, and 32% have lipid disorders.

Rates of DM complications in this study were CHD (4%), stroke (1%), nephropathy (4.5%), diabetic foot (2%), and retinopathy (14%). These rates were higher than that reported earlier; retinopathy (5%), diabetic foot (0.2%), and similar for some complications that reported by Al-arfaj from southern region; retinopathy (17.9%), nephropathy (13.3%), CHD (6.6%), and neuropathy (4.8%). In “The Gulf DiabCare,” rates of complications were higher than our study; about 40% had retinopathy, 34.9% had neuropathy, 8.9% had CHD, 6% had diabetic foot, and 34% had nephropathy. A study conducted in southern region of KSA, the diabetic retinopathy was reported among 27.8%, while the rate of neuropathy was 19.9% as reported by Wang et al. A study conducted by Al-Rubeaan et al. included about 55,000 diabetic patients revealed that about 11% had diabetic nephropathy. The variations in the rates of complications in these studies have many explanations including duration of DM, metabolic control, associated other risk factors, incomplete documentation of such complications in patients file in addition to different health care settings as reported from South Africa and India.

We noted that the standards of outcomes were lacking in CBAHI manual which made some difficulties to compare our findings; hence, we suggest that such standards should be discussed by experts in the field of diabetology and family medicine and to be added in the next version of CBAHI manual.

Quality and DM control face many different challenges as reported by Almutairi in his review which need teamwork and more collaborative effort between health care providers and patients.

Conclusion

This audit revealed that using CBAHI standards for DM care at PHCC is simple and practical and could help to identify the weak areas that need improvement. The current version of CBAHI manual for chronic diseases needs updating and adding standards for outcomes. The present care of DM in our PHCC has acceptable infrastructures except for health education program, laboratory, and coordination with hospital for referral system, which should be scaled up to improve the processes and outcomes. Patients’ satisfaction was lacking and such area should be explored in future studies.

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Conflicts of interest

There are no conflicts of interest.

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