AUDIT OF DIABETIC CARE IN A SAUDI PRIMARY CARE SETTING

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Objective: To audit the care offered to diabetic patients attending the Family and Community Medicine Clinic (FAMCO), King Faisal University, Kingdom of Saudi Arabia (KSA).

Design: A cross-sectional study of medical records of 45 diabetic patients who regularly visited the clinic during a one-year period from June 1997 to May 1998.

Subjects: Patients who presented at the clinic because of non-insulin-dependent diabetes mellitus (type II).

Results and Conclusions: The level of care for diabetic patients was relatively inappropriate, and some important parameters were under-recorded. Specific measures to improve and promote diabetic care in FAMCO clinics need to be undertaken. These include formulating and using protocols for diabetes management and better training of health-care providers.

Key Words: Saudi Arabia, medical audit, diabetes mellitus, primary care.

INTRODUCTION

Diabetes mellitus is a group of metabolic diseases, characterized by hyperglycemia resulting from defects in insulin secretion, peripheral insulin action, or both. The chronic hyperglycemia of diabetes is usually associated with long-term dysfunction, which may lead to the failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels. The manifestations of diabetes cause considerable human suffering and an
increasing burden on the health care system. The reduction in mortality, morbidity and cost of such a common disease could hardly be achieved without proper healthcare and education of diabetic patients so that they can participate actively in their own care.

Diabetes is a disease prevalent in almost every part of the world, with increasing incidence of Non-Insulin Dependent Diabetes Mellitus (NIDDM). The disease is widely recognized as one of the leading causes of death and disability; it caused or contributed to more than 200,000 deaths in the United States. The actual toll may be much higher because it was not indicated on half of the death certificates of people who had had diabetes. In 1988, WHO estimated that there were approximately 40 million people with diabetes mellitus in developing countries, and by the year 2000 this number is expected to increase to about 65 million.

In the Eastern Mediterranean Region (EMR), an overall prevalence of 2.3% has been reported by several surveys based on the WHO criteria. The prevalence in Saudi Arabia has been shown to vary from one study to another and from one area to another though an overall prevalence of 4-10% has been estimated.

In the KSA, the audit of diabetic care in primary health care is becoming common, especially since the introduction of certain mandatory requirements in the Saudi Government’s chronic disease management. Clinical audit allows family physicians to ensure that their patients receive satisfactory standard of care and its attendant benefits. To date, diabetes, asthma and hypertension have proved to be the three most popular topics for audit in general practice.

In this study, a diabetic audit was conducted in the Family & Community Medicine (FAMCO) clinic, which is the main satellite teaching clinic of King Fahd Hospital of the University, Al-Khobar, Saudi Arabia. This clinic offers services to about 10,000 people. It also offers training in Family and Community Medicine to residents, medical and nursing interns of the University. The clinic has three major units: MCH; adult family and health promotion and education unit. In these units, promotive, preventive and curative services are provided. The overall aim of this audit is to improve care received by patients with diabetes in the FAMCO clinic, and reduce long term morbidity.

OBJECTIVES
To audit the quality of care provided by the clinic to diabetic patients, to provide staff with data to assist in improving patient care and to identify needs for further education and training.

METHODOLOGY
Audit design and data collection instruments: The audit was conducted in two phases: a structure audit and a file review audit and instruments for these were designed by the authors. For the structure audit, all facilities available were inspected according to a checklist modified from the Saudi Board for Family Medicine and the MOH Total Quality Manual (TQI). Special instruments for the auditing process, measures for diabetic care in the FAMCO clinic, through review of medical records, was also specially designed for the study.

Process variables were sub-divided into patient characteristics and process measures. Patient characteristics included: age, sex, nationality, occupation, education, marital status, smoking, date of diagnosis, type of diabetes, duration, family history and diabetic flow-chart. Process measures included: weight, height, Body Mass Index (BMI), blood pressure, blood sugar (fasting/random: basic and most recent), hemoglobin AIC,
fructosamine, urinalysis items, serum creatinine/lipids, foot inspection, fundoscopy/visual acuity, ECG, chest x-ray, management (health education, insulin, oral hypoglycemics, combinations, compliance), medications for associated conditions (e.g., hypertension, ischemic heart disease, hyperlipidemia), and referral pattern/reason.

Abstraction of medical records of diabetic patients managed in the clinic during a one-year period (June 1997-May 1998) was made to complete the questionnaire for the pre-mentioned process variables (n=45 records). Wrongly-labeled, single visits, or records before June 1997 were excluded. For each variable: the recording status as well as positive (for yes/no variables as smoking) or value (for tests or measures as blood glucose) was included in the questionnaire. American Diabetics Association (ADA) standards were used to verify the diabetic status of patients in the sample. King Fahd Hospital of the University (KFHU) laboratory standards were used to determine cut-off points for abnormality and interpret the values of tests collected.

An IBM compatible computer was then used to manage the collected data using SPSS, version 6.0 software. After data entry, verification was carried out to ensure completeness and accuracy. For the structure variables, the availability of each item was verified and results tabulated. For the process variables, the recording status was verified for each variable. Out of the recorded data, percentages of positive/abnormal values for each variable were then calculated, using standards described above. The necessary tabulations were then done to summarize the findings. Means, standard deviations and ranges were reported, as appropriate.

RESULTS

Table 1 reflects the demographic characteristics of the diabetic patients, as observed from their records (n=45). The review showed that there were more females (55.6%), non-Saudis (62.2%), manual laborers (69.8% among recorded), married (75.6%), educated (97.5% among the recorded), smokers (61.5% among the recorded), no family history (56.7%), those that had diabetes flow-charts (80%) in the

| Variable                  | No. | %   |
|---------------------------|-----|-----|
| **Sex**                   |     |     |
| Male                      | 20  | 44.4|
| Female                    | 25  | 55.6|
| **Nationality**           |     |     |
| Saudi                     | 17  | 37.8|
| non-Saudi                 | 28  | 62.2|
| **Occupation**            |     |     |
| Recorded                  | 43  | 95.6|
| Manual labourers          | 30  | 69.8|
| Professionals             | 7   | 16.3|
| Job-less                  | 6   | 13.9|
| **Marital status**        |     |     |
| Recorded                  | 38  | 84.4|
| Single                    | 1   | 2.6 |
| Married                   | 34  | 89.5|
| Divorced                  | 1   | 2.6 |
| Widow                     | 2   | 5.3 |
| **Education**             |     |     |
| Recorded                  | 40  | 88.9|
| Illiterate                | 1   | 2.5 |
| Educated                  | 39  | 97.5|
| **Smoking**               |     |     |
| Recorded                  | 26  | 57.8|
| Smoker                    | 16  | 61.5|
| Ex-smoker                 | 2   | 7.7 |
| Non-smoker                | 8   | 30.8|
| **Family history of DM**  |     |     |
| Recorded                  | 30  | 66.7|
| Yes                       | 13  | 43.3|
| No                        | 17  | 56.7|
| **DM Flow Chart**         |     |     |
| Available                 | 36  | 80.0|
| Recorded                  | 40  | 88.9|

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Table 2: Some process measures for DM patients in a PHCC setting in the Eastern Province, Saudi Arabia

| Variable              | No. | %     |
|-----------------------|-----|-------|
| **Type of DM**        |     |       |
| Type I (IDDM)         | 1   | 2.5   |
| Type II (NIDDM)       | 39  | 97.5  |
| Recorded              | 31  | 68.9  |
| **Urine Ketones**     |     |       |
| +ve                   | 28  | 90.3  |
| -ve                   | 3   | 9.7   |
| Recorded              | 32  | 71.1  |
| **Urine Glucose**     |     |       |
| +ve                   | 9   | 28.1  |
| -ve                   | 23  | 71.9  |
| **Proteinuria**       |     |       |
| Recorded              | 21  | 46.7  |
| +ve                   | 18  | 85.7  |
| -ve                   | 3   | 14.3  |
| **Fundoscopy**        |     |       |
| Done                  | 15  | 33.3  |
| Once                  | 12  | 80.0  |
| Twice                 | 2   | 13.3  |
| Three times           | 1   | 6.7   |
| **Visual Acuity**     |     |       |
| Recorded              | 6   | 13.3  |
| Normal                | 4   | 66.7  |
| Abnormal              | 2   | 33.3  |
| **ECG**               |     |       |
| Done                  | 17  | 37.8  |
| Once                  | 13  | 76.4  |
| Twice                 | 2   | 11.8  |
| Three times           | 2   | 11.8  |
| **Chest X-ray**       |     |       |
| Done                  | 4   | 8.9   |
| **Foot Inspection**   |     |       |
| Done                  | 9   | 20.0  |
| +ve                   | 7   | 77.8  |
| -ve                   | 2   | 22.2  |
| **Health Education**  |     |       |
| Done                  | 42  | 93.3  |
| **Referral**          |     |       |
| Recorded              | 14  | 31.1  |
| Once                  | 8   | 57.1  |
| Twice                 | 6   | 42.9  |
| Recorded              | 43  | 95.6  |
| **Therapy**           |     |       |
| Diet only             | 7   | 16.3  |
| Diet + OHA            | 34  | 79.1  |
| Diet + Insulin        | 2   | 4.6   |

For the status of smoking there was no recording (42%) and none (33%), for family history, there were no diabetes flow charts for 20% of the cases.

Table 2 shows the clinical characteristics of the patients as reflected by some examination, investigative and management procedures. Among the recorded variables, most patients (97.5%) were NIDDM or type II diabetes. Of these, 90% had ketonuria and proteinuria (86%) but with no glucosuria (72%). The results of the 3 urinalysis were not recorded in 29-53% of the charts and for most of the patients, some procedures were not performed. For example, only 20% of the 45 patients had had their feet inspected and 77.7% of these exhibited certain abnormalities. ECG and fundoscopy were done for one third of cases only (37.8 and 33.3%, respectively). About one third (31.1%) of the cases had shared case i.e., had been referred. The main mode of management of the sampled patients (79%) was diet coupled with oral hypoglycemics.

Table 3 provides the range, mean and standard deviation of selected demographic, anthropometric, examination and investigative procedures. It is to be noted that hemoglobin AIC and fructosamine estimation were not performed for any patient in our sample.

**STRUCTURE CRITERIA**

As shown in the list in Appendix 1, the following was noticed. All items for glucose except lancets were available. Items used for urine, neuropathy, and body mass tests were all available. However, pinhole card and mydriatic drops used for eye tests were not available.

With regard to administrative work on patients, it was found that there were no patient monitoring diaries, annual and educational checklists. The FAMCO clinic uses the services of the social worker of the nearby MOH hospital and has no dieticians.
Table 3: Some process measures for DM patients in a PHCC setting in Eastern Saudi Arabia

| Variable                                           | Done No. | Mean ± SD | Minimum | Maximum |
|----------------------------------------------------|----------|-----------|---------|---------|
| Age (years)                                        | 45 100   | 48.8 ± 11.7 | 25      | 72      |
| Duration (month)                                   | 40 88.9  | 89.4 ± 61.8 | 7       | 240     |
| Weight (kg)                                        | 44 97.8  | 76.8 ± 18.6 | 46      | 134     |
| Height (m)                                         | 41 91.1  | 160.8 ± 9.6 | 142     | 184     |
| Body mass index [wt(kg)/ht (m²)]                   | 14 31.1  | 28.4 ± 5.1  | 20      | 40      |
| Systolic blood pressure                            | 45 100   | 31.1 ± 22.4 | 90      | 200     |
| Diastolic blood pressure                           | 45 100   | 82.1 ± 10.2 | 60      | 100     |
| Fasting blood sugar                                | 34 75.6  | 198.7 ± 74.7 | 94      | 370     |
| Baseline random blood sugar                        | 19 42.2  | 270.8 ± 103.6 | 95     | 466     |
| Most recent random blood sugar                     | 9 20.0   | 275.6 ± 74.4 | 170     | 413     |
| Blood urea nitrogen                                | 36 80.0  | 0.82 ± 0.22 | 0.4     | 1.4     |
| Cholesterol                                        | 35 77.8  | 202.6 ± 79.4 | 23      | 525     |
| Triglycerides                                      | 31 68.9  | 136.43 ± 73.0 | 1       | 307     |

and social workers of its own. There are no rooms specially allocated for diabetic care, nor is there a special appointment system solely for diabetics or a mini-clinic for their care. Hypoglycemic medications were only available from the pharmacy. Although the referral system included the items of referral from FAMCO to and from the hospital, as well as feedback; referred cases rarely report back to us. After this structure audit, most of the items missing were replaced.

DISCUSSION

Although there are diverse descriptions of quality-control assessments for diabetic patients, e.g., structure management of the diabetic foot according to Saint Vincent’s movement, there is little in available literature that describes long term changes in diabetic control of NIDDM patients. Consequently, the appreciation of the natural history of the disease is difficult. This in turn renders the assessment of the achievements of diabetic auditing in a PHC clinic arduous. Some of the problems that arose during the audit are worth discussion. The most common problems were the lack of training and oversight of medical reviewers; the use of data-collection instruments that provided little guidance to reviewers to ensure that the accurate information was obtained; and the reliance upon provider attestation in place of medical record review. Furthermore, it was found that the most frequent problems were poor data collection, inadequate or incompatible information systems, inefficiency in the monitoring of data collection and processing procedures, and insufficient oversight of vendors.

In this study, we found that there were problems with follow-up and the recording of patients. Similar inadequacies in the care of diabetics have been recorded in other studies. Taking all auditing parameters into account, our study showed that more than half of the diabetic patients was poorly controlled. This result is much higher than another study conducted recently in Riyadh which showed and inadequate control of only 12.3% diabetic patients. The big difference could be attributed to the small number of the patients (45) in our study and the fact that more parameters were utilized. As observed in other similar local studies there were more females (55.6%) in our study.
In general, there is a great need to emphasize the importance of recording complete information such as demographic data, smoking status and family history of diabetes to the health team. Although there is better recording for urine dipstick (ketone 69% and glucose 71%) compared to 55.9% in the Riyadh study, there is room for further improvement.

Visual acuity, fundoscopy and foot inspection were recorded in less than one-third of the patients under study. Therefore, the health team should be trained in these skills to help them record their findings, which will in turn help in the early detection of complications among diabetic patients.

The practice of having the blood pressure of all patients measured; is good and should be encouraged. HbA1C was recorded in less than one-third of the cases (16.7%). There is a need for the improvement of this since HbA1C is a sensitive parameter in detecting diabetes control status. With better management, the number of referrals (more than half) which resulted from diabetic complications might diminish.

**CONCLUSION**
This audit study was the first to be conducted in Family and Community Medicine clinic of King Faisal University. We realized that some important parameters were under-recorded and many diabetic patients were not appropriately managed.

**RECOMMENDATION**
To standardize and increase quality of care at our clinic, it is recommended that:
1. A clear and standardized policy of diabetic patient care be established as follows: formulate and use protocols for DM management; proper recording; check-list of smoking, related diseases i.e., hypertension, family history, foot inspection, fundoscopy; flowchart of laboratory results, medications, diet.
2. Provide continuous education and training of all members of the health team.
3. Provide critical health education of diabetic patients and improve their skills for self-monitoring at home (e.g. face-to-face, one-on-one basis with return demonstrations of self-monitoring, etc.).
4. Establish structure treatment and teaching program for type II DM, in accordance with published literature including the Saint Vincent’s declaration.13,14
5. An audit of the clinic be conducted every two years to provide continuous monitoring so that diabetic patient care in the clinic could be improved.

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**Appendix 1**

### Diabetic Clinic Audit (Structure)

| CRITERIA | Remarks |
|----------|---------|
| **I** For glucose testing: | |
| 1 | Blood strips |
| 2 | Blood glucose meter |
| 3 | Lancets |
| 4 | Finger pricking device (with disposable platform) |
| 5 | Sharps box |
| 6 | Blood taking equipment & bottles |
| **II** Urine testing equipment for glucose, protein & ketones | |
| 7 | Urine specimen bottle |
| **III** For eye testing: | |
| 8 | Snellen chart |
| 9 | Pin-hole card |
| 1 | Mydriatic drops |
| 1 | Ophthalmoscope |
| **IV** For neuropathy testing: | |
| 1 | Cotton wool |
| 1 | Tuning fork |
| 1 | Patellar hammer |
| **V** For body mass index: | |
| 1 | Scales |
| 1 | Height gauge |
| **VI** Paper work: | |
| 1 | Diabetic register |
| 1 | Structured record card |
| 1 | Patient monitoring diaries |
| 2 | Patient education leaflets |
| 2 | Annual check list |
| 2 | Follow up chart |
| 2 | Educational check list |
| 2 | BDA membership card |
| 2 | Free prescription leaflets |
| **VII** Trained staff: | |
| 2 | GP |
| 2 | Practice nurse |
| 2 | Health educator, dietitian, social workers |
| **VIII** Other facilities: | |
| 2 | Rooms |
| 3 | Appointment system |
| 3 | Mini clinic |
| **IX** Drugs: | |
| 3 | Sulphonylureas |
| 3 | Biguanides |
| 3 | Insulin |
| 3 | Glucose IV fluid |
| 3 | Syringes |
| 3 | Alcohol swabs |
| **X** Referral system | |
| 3 | From the clinic to the hospital |
| 3 | From the hospital to the clinic |
| 4 | Feed back system |