GUIDELINES FOR THE MANAGEMENT OF DIABETIC PATIENTS IN THE HEALTH CENTERS OF SAUDI ARABIA

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This paper presents general guidelines for the management of diabetic patients within the primary health care (PHC) system in the Kingdom of Saudi Arabia (KSA). It intends to enhance PHC physicians' knowledge and improve clinical practice to ensure better management of people with diabetes mellitus. A step-wise (Algorithm) management approach for different categories of diabetic patients, including diet, exercise, and drugs, is suggested. The peculiarities of Family Medicine, e.g., adopting the biopsychosocial model, the holistic approach, and relations with the hospital are considered.

Key Words: Guidelines, diabetes, family medicine, Saudi Arabia

INTRODUCTION

Developing guidelines for the management of diabetes mellitus (DM) is given priority, as it is a common, serious and costly health problem. Saudi Arabia is a high-prevalence country (12-16%) according to the Ad Hoc Diabetes Reporting Group. Although DM is associated with a high incidence of complications, better control is associated with reduced morbidity and mortality. Failure of consistency of care causes confusion among patients and reduces their compliance. The economic burden of the disease is enormous. A study in the Al-Khobar area (Eastern Province) found the average total cost, clinic time and investigations cost for diabetic patients to be double while the drug costs were three times those of a control group of non-diabetic patients. Finally, the emotional cost of diabetes is huge, as it is commonly associated with...
anxiety, impotence, disturbed family life, and increased fatigue and irritability. A systematic review of published evaluations of Clinical Practice Guidelines (CPGs) found that the majority were successful in detecting statistically significant improvements in the process of medical care. CPGs developed by family physicians have proved to be the most successful of several tested.

CPGs for the management of diabetes formulated by diabetologists in developed countries may not be applicable to Saudi Arabia, and were designed to manage patients within tertiary care centers. However, as research in family medicine is relatively scarce and the newer CPGs have not been in existence long enough to be properly tested in primary care settings, it seems logical at present to use the most sensible, relevant, and evidence-based CPGs that have been adopted by other specialties and to modify them to be more relevant.

Existing guidelines are directed to Primary Health Care (PHC) physicians and other PHC team members. They were developed in 1988 to be used in a health center at King Saud University hospitals. They were later updated and modified to be used in the Quality Assurance (QA) Program in Primary Health Care developed jointly by the Saudi Ministry of Health and World Health Organization (WHO). The update process included literature review with particular emphasis on expert consensus of medical specialty societies such as the American Diabetes Association, evidence-based analysis, and clinical reviews. As part of the QA program, the author conducted training sessions in different regions of Saudi Arabia for PHC supervisors. Their feedback on the feasibility and appropriateness of the guidelines was utilized to make them more practical and relevant to the PHC setting in Saudi Arabia. Furthermore, WHO and local hospital consultants were consulted.

The aim of the present guidelines is to promote better management of people with diabetes mellitus through the following objectives: (1) to enhance PHC physicians' and other team members' knowledge and clinical practice; (2) to improve patient-doctor relationships and patients' compliance through more consistent physicians advice and management choices.

Standards of process (protocol)

1. Organization

A. Record System: The first requirement towards developing any plan that provides structured care for diabetics in a health center is to identify the patients and establish a register, which should be regularly updated and looked after by one person. The records must always be accessible to the diabetes treatment team and organized so that they not only document what has occurred, but serve as a reminder of what should be done at appropriate intervals (Appendix 1-5).

B. Appointments organization: The organization of diabetic care into fixed sessions (mini-clinics) will allow the professionals (e.g. diabetic nurse, dietitian etc.) to rotate among the Primary Health Care Centers (PHCCs). Non-diabetic patients may be seen during these sessions. A diabetic patient who finds the timing of the sessions inconvenient may be seen at other times. Twenty minutes may be required for new patients and ten for follow-up visits.

C. Frequency of consultation: For a stable Non-insulin Dependent Diabetes Mellitus (NIDDM) patient, a one-to-two monthly appointment interval is acceptable. The
patient may come earlier for a repeat prescription, or for other reasons. The appointment interval should be shorter for new patients, if there is a change in the management program, or a worsening in the patient’s clinical condition.

D. Monitoring: Patients’ files should be screened by a trained health professional (e.g. a nurse) before each consultation, with a reminder placed on those notes that have not complied with the guidelines. A random sample of the medical records of patients seen by each doctor should be audited at regular intervals (for instance every three months) and feedback should be sent to each doctor. The use of patient-specific reminders and feedback helps to increase compliance in a busy clinic.

2. Diagnosis

A. For non-pregnant patients: The WHO criteria for the diagnosis of DM is adopted in Figure 1. (i) Fasting blood sugar (FBS) > 7.8 mmol/L or random blood sugar (RBS) > 11.1 mmol/L on one occasion for symptomatic patients and twice for asymptomatic patients establishes the diagnosis of Diabetes Mellitus. (ii) If the FBS is < 6 mmol/L then the diagnosis of DM is unlikely. (iii) The value of FBS 6-7.7 mmol/L is an indication that the oral glucose tolerance test (GTT) is required (Figure 1).

B. For pregnant patients (Gestational Diabetes): After an oral glucose load of 100 gm, diagnosis of gestational DM may be made if two or more of the following equal or exceed the values (in mmol/L) as shown below. (i) Fasting blood sugar (FBS) > 5.8. (ii) One hour post-prandial glucose > 10.5. (iii) Two hours post-prandial glucose > 9.1. (iv) 3 hours post-prandial glucose > 8.0. Note: Pregnant patients with impaired glucose tolerance should be managed as if they are suffering from diabetes and should be referred to the hospital specialist clinic.

3. Management at initial visit and follow-up

The steps of management suggested here are intended to be general guidelines that would never substitute for clinical judgement. Each patient’s total clinical and
psychosocial circumstances must be considered. The physician should treat the patient and not the disease (the holistic approach). It is not enough to control blood sugar, as other risk factors (e.g., depression, smoking, hypertension, impotence, obesity etc., and other, socio-economic conditions) are important too. Recognizing that psychosocial disturbances are of crucial importance, they should be reviewed in each visit (Appendix 4) and be managed through counseling and referral to other team members who could be of some help. The involvement of other team members is essential during all aspects of diabetic care.

The essential points in history, examination and laboratory work should be completed in the diabetic record in a maximum of two visits (Appendix 1-5). Initial and annual assessment should follow the checklist in Appendix 3. Appendixes 1-4 should be filled by the physician while Appendix 5 is done by the diabetic education nurse. By writing the date in Appendix 5, both the physician and the nurse will know the educational topics discussed in the previous sessions.

Certain groups of patients need shared care with the hospital through the referral system. They include: children, pregnant women, IDDM patients, those with known complications (viz., retinopathy, foot ulcers, nephropathy and neuropathy), and NIDDM patients who can not be controlled by maximum dose of oral hypoglycemics. The specialist should provide written instructions for both the patient and the referring physician.

Individual treatment goals should take into account the patient's capacity to understand and carry out the treatment regimen as the risks associated with optimal control of blood sugar may outweigh the benefit of normoglycemia among certain groups of patients e.g. very young or old age or other coexisting diseases.

The following steps should be taken at the time of diagnosis and on subsequent annual visits: (I) conduct the appropriate initial work-up (history, examination, investigation, treatment) and fill in the diabetic record; (ii) refer all patients to the dietitian, diabetic nurse and dentist, and patients who need shared care to the endocrinologist; (iii) refer NIDDM patients to the ophthalmologist at the time of diagnosis and on later annual visits. For IDDM patients, the annual referral to the ophthalmologist should start five years after diagnosis.10,11

It is important to decide initially what type of diabetes the patient has (IDDM or NIDDM) (Table 1). If difficulties in the classification are encountered, the patient may need to be referred to the hospital for further investigations.

Table 1: Characteristic features of diabetes subtypes: IDDM and NIDDM22

| Feature                        | IDDM                                      | NIDDM                                      |
|-------------------------------|-------------------------------------------|--------------------------------------------|
| Age of onset                  | Usually young (less than 30 years), can occur at any age | Usually over 30 years                      |
| Onset                         | Acute                                     | Insidious                                  |
| Weight loss at diagnosis      | Positive                                  | Negative                                   |
| Ketosis                       | Prone                                     | Not prone                                  |
| Family history                | Positive in some patients                 | Positive in most patients                  |
| Weight                        | Usually thin                              | Usually obese                              |

A. Non-insulin dependent diabetes mellitus (NIDDM) - Type II: The patients' body weight (BW), ideal BW, and body mass index (BMI) should be checked first. If the BMI is more than 30 or the BW is 20% over the desirable body weight (DBW),
FIG. 2
ALGORITHM FOR THE MANAGEMENT OF OBESE AND NON-OBESE TYPE II PATIENTS.

A. OBESE

Overweight (20% over ideal BW)

- Hypocaloric Diet and exercise for around 3 months.

- Metformin 500 mg B.D. (check urea, creatinine, LFT)

- F/U monthly

B. NON-OBESE

Normal weight

- Hypocaloric Diet and Exercise for around 1 month.

- Add Sulphonylurea (e.g. Glibenclamide to a maximum of 20 mg daily).

- F/U monthly

Note: Transfer to the next step if FBS ≥ 10 mmol/L only after making sure that the patient complied with the earlier recommended action.

F/U monthly

Metformin 850 mg B.D.

- ***Increase Sulphonylurea (e.g. Glibenclamide to a maximum of 20 mg daily).

- **Add Sulphonylurea (e.g. glibenclamide)

- Refer to specialist and insulin should be considered.

Transfer to the next step if FBS ≥ 10 mmol/L only after making sure that the patient complied with the earlier recommended action.

F/U monthly

- ***Add Metformin 500 mg B.D.

- Refer to Specialist and Insulin should be considered.
the patient’s management should be as shown in Figure 2-A, otherwise Figure 2-B should be followed.

The exact time of transfer to further management options depends on the clinician’s judgment, but the guidelines are that the thinner the patient (i.e., significant weight loss), the higher the blood sugar, and the more acute the other symptoms, the more the doctor should move from conservative management with diet alone toward (i) oral drugs or (ii) insulin, at short intervals. The presence of ketoacidosis would make insulin therapy essential. The determining factor in the choice of oral hypoglycemics (e.g., Gliben-clamide, Gliclazide) is the price and availability of the drugs. If the patient is not complying with the recommended treatment, then he should be motivated to do so and this should take precedence over other actions.

**Blood Glucose Monitoring** - Fasting Blood Sugar (FBS) and 2-hour postprandial glucose monitoring are usually needed to assess the level of control of Type II patients. HbA1c - if available - provides useful objective information about the adequacy of control over the preceding two to three months. Measurement of HbA1c each three to four months is usually adequate.

The self-monitoring of blood glucose (SMBG) provides useful information on which to base therapeutic decisions. This is more important for IDDM patients. The effective use of SMBG encourages the patient to assume greater responsibility for control, thereby increasing confidence and self-management. It is also of educational value as it provides patients with feedback on the effect of lifestyle changes such as food and exercise on glucose control. The timing of testing should be rotated, preprandially and two hours postprandially to provide a full profile. The frequency, timing and necessity of SMBG need to be individualized according to the patient’s level of control and stability. Patients with stable metabolic control may test once daily at different times or before each main meal and at bed time twice weekly. Those patients whose metabolic control is unstable and those requiring multiple injections need to monitor their blood glucose levels more frequently.

**B. Insulin Dependent Diabetes Mellitus (IDDM) - Type I**

Insulin regimens include the following: (i) A single injection of intermediate-acting insulin should not be used for Type I patients except for patients who refuse or can not have more than one injection per day as it is not possible to achieve reasonable glucose control with this regimen. However, Type II patients, in periods of stress or in case of oral drugs failure may require a single, intermediate-acting insulin injection at night. (ii) Two injections of a short- and intermediate-acting insulin in the morning and evening (iii) Multiple injections (3-4) per day using syringes or insulin pens is associated with better glycemic control.

1. Initiation of insulin: Start with intermediate-acting (NPH) insulin (0.2 units/kg) single dose before breakfast, then consider adding soluble insulin and a second evening dose, as described below.

2. Adjusting the insulin dosage: (a) For patients on a single, medium-acting injection, unmixed, base the decision to adjust insulin mainly on the result of the FBS and 2-hour postprandial glucose monitoring. (b) For patients on more than one injection daily, adjustments should usually be made on the basis of a series of blood sugar estimations e.g. for patients on two injections of both short- and intermediate-acting (NPH) insulin; before lunch glucose is corrected by adjusting morning soluble insu-
Table 2: Calculation of daily caloric requirement

A. Adults

i Basal calories: Desirable Body Weight (DBW) in kilograms (kg) x 22

ii Calories for activity level; Add
  + 30% for sedentary lifestyle
  + 50% for moderate activity
  + 100% for highly active

iii Maintenance of excess body weight:
  Allow 9 Kcal per kg body weight in excess of the ideal weight
  Add 300 to 500 calories: weight gain, pregnancy lactation
  Subtract 500 calories for weight loss in obesity

B. Children

1000 calories + 100 calories per year to puberty

Puberty:
  Females - 2400-2800
  Males - 2600-3400

lin; before dinner glucose by morning NPH, bed-time glucose (evening soluble) and FBS (evening NPH) (c) Adjustments should normally be made at intervals of approximately two to three days (d) Changes in dosage should normally be within 10% of the previous dose.

Exercise

Exercise recommendations for IDDM and NIDDM patients are different. For IDDM patients, safety and precautions against hypoglycemia are the most important. The benefits of improving lipid profile and blood pressure, and of reducing stress should be emphasized.

For NIDDM patients, exercise is more important and should be an integral part of the treatment plan as it promotes weight loss and reduces insulin resistance.13

Diet

Medical nutrition therapy is integral to total care and management of diabetics. Diet, exercise and drugs should be considered together. The patient should fill in a food diary for a week (or at least, a few days) to be used as a baseline for dietary management and education. Group and individual education lessons that include diabetic diet are essential (Appendix 5). The diet scale as an educational tool may prove very useful. Calculation of total caloric requirements and translating them into food exchanges is the role of the dietitian. In practices with no dietitian, the family physician should have a scheme for calculating the patient’s diet (Table 2). The diet should contain fewer saturated fats and no refined sugar. Regulating carbohydrate consumption is important for patients on Insulin or sulphonylurea to avoid hypoglycemia.
Diabetic regime compliance and cultural practices

Diabetes control can only be achieved by effective self-management. The patients’ health-belief model is an important determining factor for their compliance. Patients’ perceived barriers (e.g. clinic waiting time, cost of drugs, inconvenience of SMBG) should be reduced and their perceived benefit (e.g. how better control can reduce the likelihood for complications) should be increased to the maximum. As the acquisition of knowledge does not guarantee better self-management and patients’ health beliefs are not fixed, patients’ education complemented with such behavior modification strategies as motivation, support and encouragement are needed on a regular basis. Initial high standards of self-care may wane, and reasons for this need to be explored with the patient and new targets set.

The doctor’s consultation style influences patients’ compliance. He should be friendly, less dominant, listen more to his patients and encourage them to ask questions. Patients’ false beliefs (e.g. honey and dates do not raise blood sugar because they were mentioned in the Qur’an) and concerns (e.g. insulin causes renal failure) should be addressed.

Hypertension and Dyslipidemia

Hypertension is common among diabetic patients and is a risk factor for coronary heart disease, stroke, nephropathy, and retinopathy. Most clinicians would have a low threshold for the treatment of hypertension among diabetics. Systolic pressure should be under 140 mmHg and diastolic pressure under 90 mmHg. In diabetic patients with nephropathy or with evidence of other micro- or macrovascular complications, a blood pressure > 130/85 mmHg is considered abnormal. In these patients, some evidence points to an advantage of reducing blood pressure to lower levels such as < 120/80 mmHg. However, these lower blood pressure levels may result in orthostatic hypotension (e.g. in patients with autonomic dysfunction or the elderly) or an increase in serum creatinine, especially in those with advanced renal insufficiency or renovascular disease. Mild hypertension should be treated initially with weight reduction, a low sodium diet, exercise, and smoking cessation. If this treatment fails, an anti-hypertensive drug should be used. Angio-tensin converting enzymes inhibitors (ACEI) are the drugs of first choice especially for patients with albuminurea (<30 mg/24 hrs). However, serum creatinine levels and electrolytes should be measured one week after initiation of ACEI, whenever the dose changes, and at least four times a year. Hypertriglyceridemia and/or hypercholesterolemia should be treated with a lipid-lowering diet, weight loss, and smoking cessation. Failure to respond to these strategies justifies referral to the specialist.

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APPENDIX-1: PRIMARY HEALTH CARE CLINIC - DIABETIC RECORD.

| DATA BASE            | FAMILY FILE NO: |
|---------------------|-----------------|
| NAME:               | SEX: M [ ] F [ ]|
| DATE OF BIRTH:      | NATIONALITY(ETHNIC GROUPS): |
| WHEN FIRST DIAGNOSED: | EDUCATION: |
| SIGNIFICANT PAST MEDICAL HISTORY: | MARITAL STATUS: |
| RELEVANT OBSTETRIC HISTORY: | NO. OF FAMILY MEMBERS: |
| DRUG HISTORY:       | OCCUPATION: |
| - CURRENT DRUGS:    | TELEPHONE NO:  |
| - DRUG SENSITIVITY: |                 |
| FAMILY HISTORY:     |                 |
| PRESENTING SYMPTOMS:|                 |

APPENDIX - 2: EXAMPLE OF A PROBLEM SHEET.

| Problem No | Date of onset | Problem label             | Date resolved | Long term medication | Date stopped |
|------------|---------------|----------------------------|---------------|----------------------|--------------|
| 1.         | 1.5.84        | BACKGROUND RETINOPATHY     |               |                      |              |
| 2.         | 3.7.87        | THYROTOXICOSIS             |               |                      |              |
| 3.         | 21.3.89       | DEPRESSION                 |               |                      |              |
| 4.         |               |                            |               |                      |              |
APPENDIX - 3: ANNUAL CHECKLIST

| DATE | SMOKING HISTORY | 
|------|-----------------|
|      |                 |

EXAMINATION

| GENERAL | | |
|---------|---|---|
| Feet    |   | |
| Skin e.g. insulin injection sites. |   | |
| Oral examination |   | |
| Abdomen (e.g. hepatomegaly) |   | |
| Thyroid |   | |
| CVS (i) BP (lying and standing) (ii) peripheral pulse (iii) abdomen aortic aneurysm. |   | |

NEUROPATHY:

| SENSORY | MOTOR | REFLEXES |
|---------|-------|----------|
|         |       |          |

OPHTHALMIC:

| VISUAL ACUITY | CATARACT | FUNDI |
|---------------|----------|-------|
|               |          |       |

A significant decrease of B.P (over 20 mmHg) may indicate autonomic neuropathy or excessive drug treatment\(^{(13)}\).

APPENDIX - 3: ANNUAL CHECKLIST (CONT'D.)

| INVESTIGATIONS: | | |
|-----------------|---|---|
|                 | CREATININE | |
|                 | Fasting, Total Cholesterol (TC) | |
|                 | HDL-C, LDL-C | |
|                 | TRIGLYCERIDES | |
|                 | HbA1C | |
| COMPLETE URINALYSIS | | |
| * 24 Hours urine protein and creatinine clearance | | |
| Others e.g.: | | |
| - CXR, ECG | | |
| - if indicated e.g. hypertension | | |
| Name of examining doctor | | |

24 hours urine protein and GFR tests should be performed only (i) for first visit or (ii) Diabetes was diagnosed more than five years ago or (iii) proteinuria was found\(^{(13)}\).

APPENDIX - 4

DIABETIC FOLLOW-UP CHART
(FOR DIABETES MONITORING VISITS ONLY)

| HEIGHT: | FAMILY FILE NO: |
|---------|----------------|
|         |                |

| Date | Blood Glucose Tests | Urine Sugar Ketone Protein | B.P. | Weight | Examin relevant areas if needed e.g. feet, Fundi | Treatment |
|------|---------------------|---------------------------|------|--------|-----------------------------------------------|-----------|
|      |                     |                           |      |        |                                               |           |

N.B.: Discuss in each visit: - Well-being (e.g., hypoglycaemia, days off-work, mood, and other psychosocial disturbances etc). - Review diet and medication compliance. - Review smoking.
# APPENDIX - 5

## EDUCATION CHECKLIST

| NAME: | FAMILY FILE NO: | DATE |
|-------|-----------------|------|
| 1. EXPLANATION OF DIABETES | | |
| 2. DIABETIC CARD SUPPLIED | | |
| 3. EXPLANATION OF ANTI-DIABETIC DRUGS:- | | |
| a) EQUIPMENT | | |
| b) TECHNIQUE | | |
| c) ACTION | | |
| d) STORAGE | | |
| 4. UNDERSTANDING HYPOGLYCEMIA AND OTHER SIDE EFFECTS. | | |
| 5. UNDERSTANDING DIET. | | |
| 6. EXERCISE. | | |

## APPENDIX - 5

## EDUCATION CHECKLIST (CONT'D.)

| | | |
|---|---|---|
| 7. SEEKING MEDICAL AID IN ILLNESS AND STRESS IMPORTANCE OF NEVER OMITTING INSULIN. | | |
| 8. URINALYSIS (ALL THE PATIENTS SHOULD HAVE URINE DIPSTICKS AT HOME). | | |
| 9. CARE OF FEET. | | |
| 10. RISK OF SMOKING | | |
| 11. CHECK NEED FOR PRE-CONCEPTION COUNSELING. | | |
| 12. HOME BLOOD GLUCOSE MEASUREMENT TECHNIQUE AND CHART FOR SELECTED TYPE I PATIENTS WHO HAVE A GLUCOMETER. | | |
| 13. PSYCHOSOCIAL CONSIDERATIONS. | | |
| 14. SPECIAL CIRCUMSTANCES SUCH AS SHIFT WORK CONTRACEPTION, DRIVING, TRAVEL, GLUCAGOG AND COMPLICATIONS. | | |