THE ROLE OF MEDICAL STUDENTS IN PATIENT EDUCATION TO PROMOTE HOME MANAGEMENT OF DIABETES MELLITUS IN WAD MEDANI TOWN, SUDAN 2003

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Introduction: Faculty of Medicine University of Gezira, utilized a community based educational strategy. In the module primary health care centre practice and family medicine (PHCCCP & FM), each student is assigned a family for whom priority health problems are identified and education given accordingly.

Objectives: To provide, through medical students, health education to diabetics in the assigned families and to assess the impact of the students' intervention.

Methods: This is longitudinal interventional study which was conducted in three stages: training of medical students, education to diabetic patients and evaluation of the intervention.

Results: There was a highly significant difference in the students' knowledge and skills including communication skills on the home management of diabetes mellitus.

Diabetics in the families were 80(3.3%), 42 (52.5%) females, 38 (47.5%) males. Their ages ranged between 22-78 years. Illiteracy rate was 9 (11.2%), most of the families' incomes ranged from low to middle, only 25% were of the high income bracket.

More than half 47(58.7%) of the diabetics reported complications of diabetes. Eye complications 6 (7.5%), peripheral neuropathy 15 (18.7%), foot sepsis 4 (4.5%), urinary tract infection 11 (13.7%), renal failure 2 (2.5%), others 9 (11.2%).

There was a highly significant improvement in the knowledge, attitudes and practices of the diabetics, as a result of the student intervention. These included compliance to treatment, adherence to diabetic diet, regular care of the feet, knowledge of major diabetic complications, knowledge of signs of hypoglycaemia, and home management of hypoglycaemia. Ten cases with serious complications were referred to Wad Medani teaching hospital.

Key words: Patient education, community based education, home management of diabetes.
INTRODUCTION
Since its establishment, the faculty of Medicine University of Gezira (FMUG) has been using community-oriented, community-based and problem-solving educational strategies. Community Oriented Medical Education (COME) is defined as “education which is focused on population groups and individual persons, taking into account the health needs of the community concerned”.1 Community–based education (CBE) is defined as a “means of achieving educational relevance to community needs and consequently as a way of implementing a community-oriented educational programme”.1

A module which satisfies all these strategies, Primary Health Care Centre practice and Family Medicine (PHCCP and FM), is implemented longitudinally in four phases (in semesters 4,5,6, & 7). In this module, the students work in groups in the health centers in Wad Medani town, participating in the delivery of health service by working with the different health personnel in the centre. In phase one, students worked with the nurse, vaccinator and sanitary overseer. In phase two, they worked with the nutritionist and the health visitor. In phases three and four, students worked with the doctor and medical assistant. Each student was assigned a family in the catchment area of the health centre. The aim of the family attachment was to identify family health and related problems, assess and educate the family to apply feasible preventive measures against priority health threats. In the module PHCCP and FM, students were distributed to a large number of families in the town, approximately 200 families for each batch of students. The module was usually offered to two to three batches of students per semester, thus covering 400-600 families. This module aimed at engaging students in solving priority community health problems through the community courses. One example of such problems was diabetes mellitus, which is considered an important non-communicable health problem in Sudan with a major health impact. The prevalence (4.8 % to 6.4%) is increasing due to the change in lifestyle.2

The diabetic complication control trial (DCCT) has proved the importance of tight glycaemic control for prevention and control of complications.3

Problems of diabetes in Sudan: Most diabetic patients receive minimal care. Poor control is attributed to poor drug compliance, non adherence to a diabetic diet, an occasional lack of insulin and the lack of diabetic education,4 which is considered a therapeutic modality integral to the care of the patients.5

OBJECTIVES OF THE STUDY
To raise the competence of medical students towards home management of diabetes mellitus; provide through them health education to diabetic patients and their families; and assess the impact of student intervention on the diabetic patients as measured by the change in knowledge, attitudes and practices related to the home management of their condition.

MATERIALS AND METHODS
Study area: Wad Medani Town, Gezira state, central Sudan has a total population of 3,902,936 with 34 health centers.

Study design: This was a longitudinal interventional study conducted in the period from July 2002 to July 2003 during which students were trained (as part of the module PHCCP and FM) to educate diabetics and their families on the home management of diabetes.

Study Population: Diabetics in the families assigned to the medical students. The families were selected according to a cluster random sampling method. Families served by a health centre where students were trained, were considered a cluster and a random sample of families was selected in each cluster. The research process consisted of three stages.

Stage One: Training of the students
Two batches of students (400) were trained as part of the module on the prevention and control of diabetes. The subjects of the training included: epidemiology, prevention, treatment, self-care, diet, sports, personal hygiene, care of the feet, communication, counseling skills, home management of hypoglycemia. Teaching methods included lectures, demonstrations, group discussion and role plays using Information Education and Communication (IEC) materials such as posters, leaflets, pamphlets and booklets with colored photographs to demonstrate the different home management skills.

Students were assessed using a pre and post test and an end-of-course examination. A check list and peer evaluation were used to evaluate
communication skills. The check list included essential communication steps for good communication using APAC model (Ask Praise Advice and Check Understanding).

**Stage Two: Students intervention**

A pre-tested questionnaire was completed by the students in all families they visited. This was done in the first family visit before conducting the education. Its aim was to determine the total number of diabetics, their socio-economic characteristics; knowledge, attitude and practices (KAP) of diabetics and their families regarding management of diabetes mellitus. Assessed KAP included compliance of patient to treatment, (defined as adherence of patients to instructions of his/her doctor with regard to the medical treatment); adherence to diabetic diet, (low sugar and low fat diet in all meals); regular self-care of the feet, (daily wash with warm water and mild soap and drying thoroughly especially between toes). Knowledge of major diabetic complications, (hypoglycaemia, hyperglycemia, renal, cardiac and ocular complications); knowledge of early signs of hypoglycaemia (perception of fear, sweating and palpitation); knowledge of home management of Hypoglycemia (oral sugar if not possible, referral to the hospital or health center).

Some practices such as the care of the feet were assessed by asking patients to demonstrate necessary skills. Other practices were assessed through a structured interview. The students provided education to assigned families according to their educational needs. The education was conducted in four family visits over the whole semester (15 weeks). The duration of the family visits was two hours every other week. Education of the patients was conducted together with the key persons in the families and delivered to their carers when the patients were children.

**Step Three: Evaluation of the student intervention**

The intervention was evaluated in the next semester by completing the same questionnaire. Any patient with complication(s) was referred to Wad Medani hospital for care from FMUG consultant. Data was analyzed using SPSS. The result of the intervention was tested using the test of difference between percentages. Reliability of the students' intervention was certified by continuous close monitoring of their activities in the families by the staff members and field supervisors. Group discussion on family problems were conducted in open sessions in the class. The consent of each diabetic patient was taken and in the case of young children, the consent of the parents was obtained. Any patient in need of treatment or medical care was referred to the health centre.

The limitation of the study was that the pre and post assessments were conducted by the students themselves.

**RESULTS**

**Student assessment**

The end-of-course evaluation included a question on the home management of diabetes. Most of the students (70%) scored a grade A and 30% scored B on this specific question.

Table 1 and 2 show the results of pre and post assessment of the students in knowledge and counseling skills. The total number of families visited by the students was (400) families with about (2400) persons. There were 80 (3.33 %) diabetics.

**Table 1: Result of the students pre and post test regarding to knowledge about diabetes**

| Students who have correct knowledge about | Pre-test No. (%) | Post-test No. (%) |
|------------------------------------------|-----------------|------------------|
| Epidemiology of diabetes                 | 52 (13.0)       | 310 (77.5)       |
| Self care for diabetic                   | 70 (17.5)       | 298 (74.5)       |
| Proper diabetic diet                     | 60 (15.0)       | 254 (63.5)       |
| Importance of sport                      | 35 (8.7)        | 380 (95.0)       |
| Personal hygiene for diabetics           | 90 (22.5)       | 390 (97.5)       |
| Care of the feet                         | 70 (17.5)       | 378 (94.5)       |

X²=26.100  D-F=5, p-value = 0.00000 Highly significant

**Table 2: Percentage of the students who correctly perform communication skills**

| Skills correctly performed | Pre-test No. (%) | Post-test No. (%) |
|----------------------------|-----------------|------------------|
| Ask                        | 43 (10.0)       | 250 (62.5)       |
| Praise                     | 22 (5.5)        | 315 (78.7)       |
| Advise                     | 115 (28.7)      | 390 (97.5)       |
| Check understanding        | 16 (4.0)        | 300 (75.0)       |

Characteristics of diabetic patients: 42 (52.5%) were females, 38 (47.5%) were males, with ages ranging from 22-78 years. On the level of education, the illiteracy rate was 9 (11.2%), Khalwa 8 (10%) and primary school 34 (42.5%) while high education was 29 (36.2%). Occupation: most of the females 30 (71.4%) were housewives, students 2 (4%), those working 10 (23.8%); 15 (39.4%) of the males were laborers, 11 (28.9%) were merchants, 7 (18.4%) were
employees, 5 (13.1%) jobless. Income: most of the families' incomes ranged from low (< 7.5 SD/month) to middle (7.5 – 20.8 SD/month) 25% with high income (> 20.8 SD/month) (these figures are according to BDN Programme).

**Table 3: Diabetic complication**

| Complication               | Number (%) |
|----------------------------|------------|
| Eye complication           | 6 (7.5)    |
| Peripheral neuropathy      | 15 (18.7)  |
| Foot sepsis                | 4 (4.5)    |
| Urinary tract infection    | 11 (13.7)  |
| Renal failure              | 2 (2.5)    |
| Others                     | 9 (11.2)   |
| **Total**                  | **47 (58.7)** |

**Table 4: The change in knowledge and practice of diabetics**

| Knowledge/Skill                        | Pre-interventional No. (%) | Post-interventional No. (%) |
|----------------------------------------|-----------------------------|-----------------------------|
| Compliance of patient to treatment     | 18 (22.5)                   | 62 (77.5)                   |
| Adherence to diabetic diet             | 30 (37.5)                   | 76 (95.0)                   |
| Regular self care of the feet          | 9 (10.0)                    | 68 (85.0)                   |
| Knowledge of major diabetic complications | 4 (5.0)                    | 56 (70.0)                   |
| Knowledge of early signs of hypoglycaemia | 24 (30.0)                  | 72 (90.0)                   |
| Knowledge of home management of hypoglycaemia | 24 (30.0)              | 64 (80.0)                   |

X²=23.674, D.F=5, p-value=0.0002 Highly significant

More than half of the cases reported diabetes complications 47 (58.7%), eye complications 6 (7.5%), peripheral neuropathy 15 (18.7%), foot sepsis 4 (4.5%), UTI 11 (13.7%), renal failure 2 (2.5%), others 9 (11.2%) (Table 3).

Table 4 summarizes the outcome of student intervention in terms of the change in knowledge and practice in the management of diabetes. Referral cases were 10, four of which had diabetic septic foot, three with visual disturbances and three with renal complications.

**DISCUSSION**

The most important role of a medical school is to be influential in the health services, to ensure that the skills of its graduates are used appropriately. Sudan, a developing country, has scarce resources, so its medical schools should aim at making their curricula relevant through partnership with the community. One way of making this possible is to train students in that community and involve the community in all aspects of their training.1 In this study, the medical students played an important role in the community health through their intervention in the module.

The module (PHCCP and FM) was offered to enable the students to take an active part in the delivery of PHC at the level of the family and to ensure the continuation of that service at the health centre. The rationale behind this was not only to improve the quality of the services but also to fill the gaps in the family's knowledge so that medical problems can be detected early and the help of health centre sought for active management. This study ensured the achievement of the stated course objectives, through their intervention in the families, the students played an important part in promoting community health.

This module continued for four semesters, during which each student was assigned a family to visit every other week. The student had the chance of recognizing the causes of health problems at the family level and acquired the skills of responding to family problems in a holistic manner. They could detect factors relating to the home management of diabetes and thus provide education according to need. In addition, students worked in small groups in primary health care units. During this module, students participated in health service delivery and identified major health problems at the family and community levels using a problem-solving approach. Through this training, the students acquired the practical experience of working in the health system in order to understand its functions and appreciate the importance of working in a team of different health professionals.8

Medical students were trained to educate families to which they were attached on this problem. Patient education is defined as a systematically planned learning experience based on an individual patient's needs that results in a change of behavior with the goal of promoting and maintaining optimal health.9,10 Patient education has also been identified as an integral component of comprehensive patient care activities.11 To ensure a good impact of the students’ education, much was done to help the students acquire good communication skills in this module.

Patient education is vital in the control of diabetes in Sudan because of the lack of diabetic educators.4 The philosophy of PHCCP and FM is to have a comprehensive approach to an
Role of Medical Students in Patient Education

individual's health problems and to look at the individual as part of a unit, the family, to which he reacts and interacts. It is the basic unit of the society that forms the foundation of the social network from which the patient derives some of his/her identity.

In our study, we aimed at raising the competence of the whole family in the management of diabetes, so the patient was educated with the family members especially the key persons. This was vital since teaching the patient alone without the family would result in less than adequate compliance with recommendation, as the family members form an important support for the patient to make the necessary life-style change. In this module, three batches of students covered 600 families in the town each semester.

The education of the families started in the first visit after completing the baseline questionnaire, and was reinforced in the next two visits. The evaluation was conducted in the last visit to detect any changes in behavior.

The students were trained to educate the family using the APAC model. This model has four basic rules: First, ask the patient to determine the knowledge and practice before conducting the education, second, praise him/her for the good practice. Third, give the necessary advice and fourth, check his/her understanding. In this module, communication skills taught in a previous module in an earlier semester was reinforced. In the post-test, the students' communication skills improved significantly as active educational methods such as role plays and group discussions were used (this was checked through role plays and peer evaluation).

Diabetes mellitus (DM) is one of the chronic disorders, which though incurable, can be contained by controlling the level of blood sugar to near normal. Most of the time, patients with diabetes need to make decisions about self-care. This underlines the importance of their education to raise their competence in dealing with the disease.

The medical students had access to about 200 families in the town, where they played an important role in patient education especially when diabetic educators were absent.

Some studies have shown that knowledge of the disease and its treatment is usually associated with increased compliance. Table 4 shows that both the knowledge and practice underwent a significant change. There was also a change in compliance to treatment, an important element in minimizing diabetes complication. Diabetes is a chronic disease for which patients provide 95% of their own care. To control the disease an individualized regimen for monitoring medications, exercise and diet should be created.

Other studies have shown that diet and exercise were the most difficult aspects of the self-care regimen. In our study, the students' intervention made a significant impact on these two important issues. In one study, only 7% of diabetics adhered fully to diabetic regimen.

One of the most important barriers to dietary therapy is socioeconomic, owing to the high cost of low sugar or low fat food. We tried to solve this problem by encouraging patients to look for alternatives from local products.

As shown in the study, in the pre-intervention (KAP) of the families, the knowledge of diabetics was very deficient in all aspects important to their management. This was markedly improved with the intervention of the students (all the results were significant).

The figures shown in Table 3 are high and could have been prevented if there had been proper homecare of diabetes, particularly with regard to compliance to treatment and proper regular care of the feet. The complications were detected through the questionnaire and simple clinical examinations including inspection performed.

The 10 referred cases were very ill and needed special medical care and so were referred to Wad Medani Teaching Hospital. The other cases with complications (Table 3) were booked in the referred clinics of FMUG consultants, as was usual with all problems detected by the students during family visits.

Compliance to treatment and adherence to diabetic diet are important elements for controlling blood sugar levels to normal or near normal to help reduce early and late complications. The evaluation of the programme and students, and perhaps most importantly, the assessment of the impact of students' activities on the well-being of the community is vital.

Assessing the impact of community-based education (CBE) is very important both for the enhancement of decision-making on programme improvement and for strengthening the partnership between the organizing university and the community.

The attitude of the community towards students in Sudan is extremely positive. Students
were sometimes anxious about not being able to meet the expectations of the community, or not deserving their generous hospitality. This sometimes led to disappointment among students which seriously affected their interest. The results of this study gave the students self-confidence and a sense of fulfillment which positively affected their academic performance as exhibited in the end of course results. The students became motivated and their awareness of the importance of patient education was raised. They gained confidence in their ability to provide this important aspect of the management of patients in non-communicable diseases.

Although the conduct of the evaluation by the same students is considered a limitation of the study, it had a good impact on the students and proved a motivating factor which was reflected in their feedback.

The success of this intervention could be attributed to many factors. The knowledge of the students and their good communication skills together with the positive attitude of the families they met. Also important was the relevance of their intervention in the diabetics' and their families' needs. Addressing the problems of the lack of diabetic education, and allowing ample time for the students to educate the families made a lot of difference. This shows that a lot of health problems in the community could be solved through well-organized and managed community courses.

CONCLUSION
This study revealed that through their faculty programs, medical students could make a significant difference in the knowledge, attitudes and practices of diabetics in the management of their illness at home.

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