

PHARMACY PRACTICE

Screening, Monitoring, and Educating Patients with Diabetes in an Independent Community Pharmacy in Puerto Rico

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Objective. Increase the awareness about the importance of Diabetes mellitus (DM) management and assess the educational and monitoring needs of patients visiting a community pharmacy in Puerto Rico.

Methods. A community service activity focusing on DM was held in a community pharmacy. The educational and monitoring needs of the participants were assessed using a questionnaire. Glucose tests were conducted in the pharmacy by medical technologists. Educational activities consisted of presentations and printed materials.

Results. Two-thirds of the fasting people had blood glucose levels higher than 140 mg/dl. Seventy-nine percent of the patients with diabetes were not aware of the

glycosilated hemoglobin test. Most of the patients were interested in learning more about how to manage their condition.

Conclusion. A greater understanding is needed among patients with DM that blood glucose control decreases diabetes related complications. Community pharmacists are in an excellent position to collaborate with other health professionals in screening, monitoring and educating patients with DM to prevent long-term complications.

Key words: Diabetes, Community pharmacy, Pharmacist, Pharmaceutical care, Diabetes education.

Diabetes mellitus (DM) is the third leading cause of death in Puerto Rico as reported by the Department of Health in 1997 (1). It is estimated that there are more than 500,000 patients with diabetes in Puerto Rico (total population in 1994: 3,685,729) (1), one-half of which has not been diagnosed. Hispanics as an ethnic group are at high-risk to develop DM (2). Diabetes mellitus is also a leading cause of morbidity due to preventable complications such as blindness and non-traumatic amputations. Diabetic complications have been demonstrated to be directly related to blood glucose control (3-5). The Diabetes Control and Complication Trial (DCCT) (3) demonstrated a delay in the onset and slowing of the progression of retinopathy, nephropathy, and neuropathy in patients with Type 1 Diabetes mellitus who had good blood glucose control. The United Kingdom Prospective Diabetes Study (UKPDS) (4) also

demonstrated a significant risk reduction in microvascular complications in patients with Type 2 DM. Another trial that enrolled Japanese patients with Type 2 DM demonstrated reductions in microvascular complications related to improvement of blood glucose control (5).

Community pharmacists are respected and trusted by the society. Hence, they are in an excellent position to capture lost patients from their care, and collaborate with other health professionals in screening, monitoring and educating patients with diabetes to prevent diabetic complications. This could be achieved through the development and implementation of a diabetes care service. Such service could serve as model for other community pharmacies in Puerto Rico as well as in Hispanic communities in the United States. This article describes an example of a pharmacy based diabetes care service.

In particular, it describes a one-day activity held in a community pharmacy with the main goal of assessing the education and follow-up needs of the diabetic population in Lares as an initial step in developing a diabetes care program in this pharmacy. People who had not been diagnosed with DM were screened as an effort to detect potential undiagnosed patients with diabetes. The objectives were to educate patients about the proper

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diabetes care and the importance of blood glucose control to prevent diabetic complications, and encourage them to follow dietary plan, medications, and monitoring recommendations.

Methods

The activity was held in *Farmacia San José* in Lares, Puerto Rico, a small town in the center of the Island, close to the North coast and approximately at a 1 hour and 30 minutes drive from the capital city of San Juan. It has a population of approximately 30,000 people. In 1997, the mortality rate reported by the Puerto Rico Department of Health for Diabetes Mellitus in Lares was 71.4 per 1,000 inhabitants, 30 percent higher than the average for the Island.

The community service activity was advertised through announcements in a local radio station, distribution of flyers inside and outside the pharmacy, advertisements at local physician offices, and telephone calls to diabetic customers of the pharmacy. Venous and capillary blood glucose samples were drawn by medical technologists from *Laboratorio Clínico y Bacteriológico Lares*. Breakfast was served to each patient after the sample had been drawn. Two educational topics were presented to the audience. The first topic presented by one of the authors (FJJ) was the Importance of Blood Glucose Control to Prevent Long-term Complications. The second topic presented by Joan Díaz, RD was Nutrition in the Diabetic Patient. Nutritional plans were distributed by the nutritionist after assessment to all interested patients.

A questionnaire was administered after registration to assess patient demographics and diabetes care needs. The demographic data collected included age, sex, diagnosis of DM (as reported by the patient), years of diagnosis, obesity, and co-morbidities. Other information collected included diabetes related medications, blood glucose monitoring, glycosylated hemoglobin test, foot care, ophthalmologic evaluation, renal function evaluation, nutritionist follow up, and participation in diabetes education programs.

Printed educational material was distributed to all people who were present. Several products especially designed for patients with diabetes, were distributed during the activity. Among the products distributed were two Accu-Check Advantage blood glucose monitors, insulin travel bags, glucose tablets samples, insulin syringe samples, nutritional supplements (Choice, Glucerna, and Resource), educational videos, and sugar free candies.

Due to the exploratory nature of the activity, descriptive statistics were used to analyze the data collected. Frequency distributions, means and standard deviations

were calculated using the Statistical Package for the Social Sciences (SPSS, Inc. Chicago, Illinois).

Results

Patients were divided into three groups with the purpose of statistical analysis. The diagnosis of DM was self-reported by patients and/or verified by the patient medication history. The first group (Group 1) included patients whose venous blood was drawn. Only 5 of the 38 patients in this group were not diagnosed with DM. Groups 2 and 3 included patients whose capillary blood sample had been drawn. Group 2 were all patients with DM and Group 3 were patients without diagnosis of DM.

Patients within the ages of 1 to 84 years were evaluated. The mean age among the patients with diabetes was 61 years while the patients with no diabetes had a mean age of 50 years (Table 1). The majority of the participants were

Table 1. Patient Characteristics

Characteristic	Group 1 n = 38	Group 2 n = 29	Group 3 n = 62
Age (yrs)	60 – 13	63 – 13	49 – 23
Sex	Male	26 % (10)	46 % (14)
	Female	74 % (28)	54 % (12)
Diabetes	87 %	100 %	NA
Years of diagnosis	13.2 – 9.0	8.5 – 5.9	NA
Obesity*	30 %	19.2 %	NA

* Body Mass Index (BMI) greater than 30.

taking oral agents or insulin alone (Table 2). Less than ten percent of the patients with diabetes were taking a combination of insulin plus oral agents. Up to thirty percent of the population were obese as calculated by a Body Mass Index (BMI) greater than 30. Group 3 was not evaluated to determine obesity.

Table 2. Diabetes Treatment

Treatment	Group 1 (%)*	Group 2 (%)
Oral agents	39	58
Insulin	39	38
Insulin + Oral agents	9	4
Diet alone	9	0

* Four percent did not answer the question.

There were several patients who reported having diabetic complications. Three patients already had end-stage renal disease and were on hemodialysis three times per week. One patient had two above knee amputations. As we could expect, cataracts were found more commonly in Group 1 (27%) and Group 2 (19%) than in Group 3 (2%)

who were patients with no diabetes. Several cardiovascular risk factors were also found more commonly in patients with DM. Hypertension and hyperlipidemia were present in 35 to 55% of the patients with diabetes (Groups 1 and 2) compared to 5% in the non-diabetic group. The prevalence of obesity was high (up to 30%) among the patients with diabetes. Retinopathy was reported by 12% of the patients (See Table 3).

Table 3. Co-morbidities reported by patients

Disease	Group 1 (%)	Group 2 (%)	Group 3 (%)
Hypertension	54	35	5
Hyperlipidemia	46	35	6
Nephropathy	12	0	0
Dialysis	3	0	0
Retinopathy	15	0	0
Cataracts	27	19	2
Psychiatric	3	0	0

As evidenced in Figure 1, more than 65 % of the patients had their last fasting plasma glucose test (FPG) longer than one month before the day the activity was held or do not remember the last test date. The mean FPG reported by patients in Group 1 was 201 ± 71 mg/dl while in Group 2 was 160 ± 55 mg/dl. Sixty percent of all patients with diabetes reported FPG greater than 140 mg/dl. The percent of uncontrolled patients with diabetes increases when we evaluate our results based on the recommended FPG goal of 126 mg/dl.

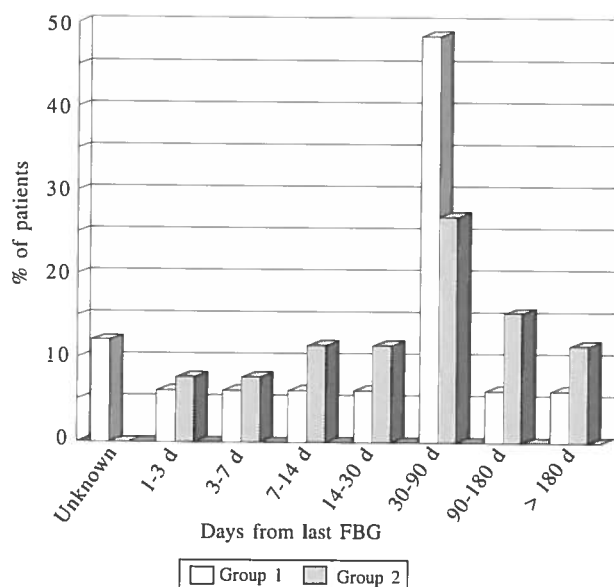


Figure 1. Last Fasting Blood Glucose Date

The mean FPG reported by the medical technologists was 190 ± 61 mg/dl in Group 1 (venous blood) and 208 ± 76 mg/dl in Group 2 (patients with diabetes - capillary blood test). In Group 3, the mean FPG was 105 ± 23 mg/dl. Four patients who had never been diagnosed with DM were referred to their primary physician due to FPG greater than 140 mg/dl. There were no patients with hypoglycemia in the diabetic population evaluated (the minimum fasting blood glucose was 92 mg/dl). The maximum FPG observed was 364 mg/dl. Glycosilated hemoglobin test values (HbA1C) were reported by only four patients. The reported values were extremely high (11 - 14%). More than 80% of the population studied were not aware of the glycosilated hemoglobin test.

The diabetes care reported by the participants of the activity was not adequate (Table 4). Fifty percent of the patients with diabetes had not visited the ophthalmologist during the last year. Renal function had never been evaluated in 60 to 76% of the patients. Forty percent of the patients had not had their feet checked by a physician and 40% were not checking their feet by themselves. Even though up to 70% had visited a nutritionist, the follow up was not evaluated in our population. Only 35% had participated in diabetes education programs. In spite of

Table 4. Diabetes Care Reported by Patient

Evaluation	Group 1	Group 2
Ophthalmology		
Never	33%	8%
≤ 1 year ago	52%	53%
> 1 year ago	15%	23%
Renal function		
Never	76%	59%
≤ 1 year ago	21%	10%
> 1 year ago	3%	7%
Feet exam by patient		
Yes	51%	42%
No	42%	42%
Feet exam by physician		
Yes	58%	42%
No	36%	42%
Nutritionist education		
Yes	70%	27%
No	27%	58%
DM education		
Yes	36%	31%
No	54%	50%

the poor care to prevent diabetes complications, patients expressed a great deal of interest in being evaluated by a nutritionist and participating in diabetes education programs.

Discussion

The majority of the patients with DM who participated in the community service activity had uncontrolled diabetes and had poor diabetes care. It was found that our patients are not monitoring their blood glucose adequately. Two thirds of the diabetic fasting patients had FPG > 140 mg/dl. Eighty percent of the patients were not aware of the glycosylated hemoglobin test and only four patients reported their last values. More than half of the participants already have diabetic complications or are at high risk to develop cardiovascular diseases. Several patients have two or more risk factors beside DM to develop cardiovascular diseases (hypertension, hyperlipidemia, obesity).

Screening is important, since many people do not know they have the disease. Four participants with no reported history of diabetes were referred to their primary physician with FPG levels above 140 mg/dl. There is a great deal of interest in the community for diabetes education and proper management. This was demonstrated by the participation of over 200 people in the activity and the overwhelming interest to learn more about how to manage their condition.

This community service activity has important implications for pharmacy practice. First, there appears to be an impending need in the diabetic community for better education and care that could improve blood glucose control and prevent diabetic complications. Second, it demonstrates that community pharmacists are in an excellent position to offer community-based health promotion and disease prevention activities. Third, pharmacists, as respected, trusted and accessible health care professionals, may collaborate with physicians, nutritionists and other professionals in providing care for patients with DM.

The results are limited because the information was provided by the patient and could not be verified with objective sources of information such as patient records. Since the activity was held in one pharmacy the results may not be extrapolated to other pharmacy settings.

This service is expected to improve health outcomes, which, in turn, may reduce health care utilization and costs. Whether hospitalizations and deaths related to diabetes could be decreased or not, needs to be evaluated in further studies. Lipid profile and blood pressure in patients with diabetes also need to be evaluated in future activities.

Among the multiple roles that the pharmacist must assume, we find one of the most important is the responsibility of taking care of the population with DM. Pharmacists need to take advantage of their excellent accessibility to collaborate with all health care professionals in the screening, monitoring, education and management of people with diabetes or at high risk to develop it. It is the pharmacist's responsibility to assess the pharmacologic treatment of every patient at the pharmacy. Drug related problems should be prevented and/or solved to avoid further harm and improve patient outcomes.

The pharmacist should recommend and encourage patients to modify their lifestyle when needed to manage their disease. Screening people at risk to develop diabetes is important because many people are asymptomatic for many years, and may be diagnosed after long-term complications have already been developed. Patient education is essential to help patients to reach their optimal blood glucose goal and prevent long-term diabetes related complications. Pharmacists have the potential to educate patients with DM and manage the disease in collaboration with the physician, all other health related professionals, and the patient.

Conclusion

There is a great need to monitor and educate patients with diabetes in Puerto Rico. It has been well documented that the better the blood glucose control, the lower the incidence of microvascular complications related to DM. Community pharmacists may assist patients with diabetes in managing their condition and collaborate with their primary physician and other healthcare professionals in caring for them. This collaborative effort may decrease the incidence of complications related to DM.

The results of this community service activity will be used to develop a community pharmacy-based diabetes care program. Eventually, this program could be used as a model for other community pharmacies in Puerto Rico and in Hispanic communities in the United States.

Resumen

El objetivo de este estudio fué concientizar la población sobre la importancia del manejo de diabetes mellitus y evaluar las necesidades de educación y seguimiento de la población que visita la farmacia de comunidad.

Se organizó un servicio público en una farmacia de la comunidad en un pueblo de la región Central de Puerto Rico. Las necesidades de educación y seguimiento de los

participantes fueron evaluadas utilizando un cuestionario. Las pruebas de glucosa en sangre fueron tomadas por tecnólogos médicos. Las actividades educativas incluyeron presentaciones orales y material escrito. Los resultados revelaron que dos terceras partes de los participantes en ayuna tuvieron niveles de glucosa en sangre mayores de 140 mg/dl y setenta y nueve porciento de los pacientes con diabetes no conocían la prueba de hemoglobina glucosilada. La mayoría de los participantes con diabetes reportaron estar interesados en aprender más sobre como mejorar el manejo de su condición.

Este estudio nos indica que la población diabética necesita comprender que el control adecuado de los niveles de glucosa en sangre disminuye las complicaciones relacionadas con diabetes mellitus. El farmacéutico de comunidad está en una posición excelente para colaborar con todos los profesionales de la salud en la detección temprana, seguimiento y educación de la población con diabetes.

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