

Quality improvement in action

Improving glycaemic control in patients attending a Trinidad health centre: a three-year quality improvement project

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ABSTRACT

Aim To determine the effect on glycaemic control over three years, by selecting patients living with diabetes or diabetes and hypertension from a crowded chronic disease clinic (CDC) in a public health centre and treating them in a special diabetic clinic (DiaC) using resources available at the health centre.

Methods An uncontrolled observational cohort study. One hundred and one patients from the CDC volunteered to join the DiaC and were followed for three years in the DiaC. Patients in the DiaC were provided with greater consultation times, more frequent clinic appointments and more frequent lifestyle advice than patients in the CDC. HbA1c levels were done at the start of the project (0 months) and at three, 24 and 36 months after the start. The DiaC was run by a primary care physician (PCP) and registered nurse (RN).

Results Eighty-six patients completed follow-up. The mean HbA1c \pm standard deviation scores at 0, 3, 24 and 36 months were: 9.44 \pm 1.27%, 9.50 \pm 2.22%, 8.33 \pm 1.97% and 7.96 \pm 1.84% respectively ($P < 0.0005$ for difference between 0 and 36 months).

Conclusion A special diabetic clinic run by a PCP and an RN in a primary care setting where regular monitoring of glycaemic control is done, where patients concerns and fears about diabetes are addressed, where patients are educated about diabetes, diet and exercise and advised on compliance with medication leads to improved glycaemic control after three years. This low-cost clinic could be readily established in other developing countries.

Keywords: Caribbean, diabetes, intervention, patient-centred care, primary care

How does this fit in with quality in primary care?

What do we know?

Glycaemic control among many persons living with diabetes (PLWD) is sub-optimal in Trinidad and Tobago and many other developing countries. Improving glycaemic control in diabetic patients reduces their morbidity and mortality.

What does this paper add?

By making small adjustments to the mode of delivery of health care to PLWD, by allowing greater periods of interactions between medical staff and patients, by allowing patients to express their concerns and fears about diabetes and by addressing these issues and others (such as compliance with medications, diet and exercise) glycaemic control was improved in PLWD over a three-year period. This was done with no added expense to the health centre's budget.

Introduction

Strict glycaemic control in patients living with diabetes (PLWD) can lead to a reduction of long-term complications,^{1,2} therefore optimal control in each patient afflicted with diabetes is desirable. Despite frequent monitoring of glycaemia³ and new drugs being introduced, diabetic control in patients from both developed⁴ and developing countries^{5,6} remains sub-optimal.

Trinidad and Tobago is a developing nation with an estimated prevalence of diabetes of about 20%.⁷ The economic impact of diabetes in Trinidad and Tobago is exorbitant.⁸ Cross-sectional studies looking at PLWD attending public health centres in Trinidad and Tobago show that glycaemic control is generally poor.^{5,9}

Most PLWD in Trinidad and Tobago receive treatment at public health centres where they are treated primarily by general practitioners (GPs) or less frequently by doctors with postgraduate qualifications in primary care and family medicine (PCPs). The remainder are treated by private GPs, with a minority of patients being treated by internal medicine specialists or diabetologists. There is no group approach to the care of patients afflicted with diabetes, so the doctor does most of the counselling and medication adjustments.

At present there are one to two clinic sessions per week per public clinic dedicated to chronic diseases (CDC) where patients affected with diabetes are seen together with other patients suffering from: hypertension, ischaemic heart disease, cerebrovascular accidents, epilepsy and thyroid disorders. Owing to large clinic sizes and the few doctors attached to these clinics, doctor–patient consultations last about five minutes per patient. Patients are seen every four to six months at these clinics. This is insufficient to explore patients' fears and concerns about diabetes and is inadequate to counsel patients about lifestyle changes and compliance that could benefit them.

Evidence emerging suggests that PLWD who are enlightened about their condition are more likely to have better glycaemic control than those patients who are not. In addition patients whose concerns and fears of diabetes are addressed by the attending medical staff seem to have better long-term control of their condition.^{10,11}

The aim of this study was to determine the effect on HbA1c levels for patients living either with diabetes alone or with diabetes and hypertension who were transferred from the CDC to a separate diabetic clinic (DiaC), within the same public health centre, a setting providing longer consultation times, more frequent monitoring of glycaemia, investigations into concerns and fears of patients and annual counselling on exercise and diet.

Methods

All 960 CDC patient notes were hand searched by the researcher to identify patients suffering with diabetes alone or with diabetes and hypertension. The inclusion criteria were: any sex, no recorded gross micro- or macrovascular complication of diabetes, insulin or non-insulin dependent diabetes. To determine the absence of gross complications of diabetes in the participants, patients with the following were excluded: proteinuria, symptoms of angina and peripheral vascular disease and any recorded diagnosis of diabetic retinopathy and a creatinine level of more than 106 mmol/L. Each participant was interviewed to determine his/her willingness to join the DiaC. This clinic was held separately from the CDC. One hundred and twenty-five patients met the inclusion criteria and were invited to participate. One hundred and one patients accepted the invitation to participate. This study was done in accordance with the criteria of the Declaration of Helsinki (1964). All 101 patients gave written informed consent that they would participate in the study and for the use of their results in this manuscript. This project was a Quality Improvement Project and approval to carry out this project was obtained from the Quality Department of the South West Regional Health Authority, under whose jurisdiction the project fell. The project started in November 2003.

An HbA1c level of $\leq 7.0\%$ was considered good glycaemic control.

Intervention

Patients were given clinic appointments every three months. Those patients who needed closer monitoring were scheduled more frequently. The average doctor–patient or nurse–patient consultation lasted 10–12 minutes. The total time taken for the clinic was divided by the number of patients seen, leading to the average time per patient. The number of consultation times per year for each patient in the DiaC was recorded. The patients were informed that the desired HbA1c level was 7% or lower. About ten patients per session were booked. There were no fixed formats to consultations but patients' cues were used to start discussions. Once a year each patient received advice from the PCP about exercise and was subjected to an individualised dietary counselling session with a dietary technician.

Glycosylated haemoglobin (HbA1c), lipid profile and renal function were tested annually. Weight and blood pressure were measured at each visit. There was

a problem with the supply of reagents at the laboratory for the HbA1c so the tests to be done at 12 months were not completed.

Patients' fears and concerns were addressed at all sessions and compliance with medications and medical advice reinforced. Patient education about diabetes was covered individually at each clinical session.

The same PCP and researcher conducted about 90% of the clinic sessions. Locum staff did the other 10%. The doctor was a PCP and the nurse was a trained registered nurse (RN). Both had an interest, but no specialised training or qualifications, in diabetes care and management. Both were employed full time in the public health centre and used a free afternoon session to hold this special clinic.

The mean baseline HbA1c level in this cohort was compared with the mean HbA1c levels at three, 24 and 36 months. This was done using the paired sample *t* test between the baseline HbA1c and each of the means of the three subsequent HbA1c levels taken. SPSS Version 10 (Chicago, USA) was used to analyse the data.

Results

One hundred and one patients started the project and 86 patients could be accounted for three years later. Four patients died (one from an accident during the first year and three from myocardial infarctions during the second and third years of the study), four migrated (two each during the first and third years), five were re-registered at the original CDC and two could not be accounted for. Males accounted for 28.7% and females for 71.3% of the studied population. The average age of patients at the start of the project was: 52.5+/-8.2 years (range: 31–68 years). The median length of time between the patients being diagnosed with diabetes and enrolling in the DiaC was five years (range: three months to 11 years).

Patients in the DiaC were seen a mean of 4.2 times per year and those in the CDC were seen a mean of

three times per year (based on an appointment every four months).

Table 1 shows the difference in mean HbA1c between baseline and each of the three other HbA1c values.

Overall the proportion of patients having good glycaemic control over the three years of the study had increased. Five out of 101 (5.0%) had HbA1c levels of less than 7% just before the start of the project, whereas 29 out of 86 (33.7%) had HbA1c levels of less than 7% at 36 months after the start.

Discussion

This study shows that the introduction of a DiaC for uncomplicated patients suffering from diabetes and diabetes with hypertension within a primary care setting led to significant improvements in glycaemic control over three years. This improvement was not apparent within the first three months of the study, which suggest that this intervention is geared to intermediate term control of these diabetic patients. By taking these patients out of a crowded CDC and providing them with consistently longer doctor–patient and nurse–patient consultation times where their concerns and fears are addressed and explored, together with the annual exercise and dietary advice provided, leads to improved glycaemic control over a three-year period. Importantly, this was a complex intervention and an analysis of each individual component's contribution to the overall success was not made.

The glycaemic control of patients just before the start of this clinic was poor, and this supports the work done previously in Trinidad.^{5,9} A medical consultation lasting about five minutes for a patient suffering with diabetes does not give enough time to explore fears and concerns about their disease. Studies that show significant improvements in glycaemic control over time have included interventions where patients' fears and concerns about diabetes were addressed and where patients were educated about diabetes so as to take control of their condition.^{10,11}

Table 1 Mean HbA1c readings (SD) at baseline (HbA1c 0) and at three, 24 and 36 months post intervention (HbA1c 3, HbA1c 24, HbA1c 36, respectively)

HbA1c 0 (%)	HbA1c 3 (%)	HbA1c 24 (%)	HbA1c 36 (%)
9.44 (1.27)	9.50 ^a (2.22)	8.33 ^b (1.97)	7.96 ^b (1.84)

The mean represents the total HbA1c divided by the number of persons presenting for the HbA1c test at each testing session
SD= standard deviation

^a = difference between HbA1c 0 and HbA1c 3, *P*=0.845

^b = difference between HbA1c 0 and both HbA1c 24 and HbA1c 36 *P*=0.000 (*P*<0.0005)

Having smaller clinics with all patients having the same diagnosis leads to greater patient interactions and becomes an informal support group for these patients where fears about their condition are analysed. It was observed that most patients with poor readings felt badly about this and were motivated to do better, especially if other persons in their clinic session had good results.

Trento *et al* showed that structured group visits of PLWD improved glycaemic control as opposed to PLWD who received individual consultations after a two-year follow up. Those in the structured group also had improved quality of life, improved knowledge of diabetes and exhibited more appropriate health behaviours than those seen individually. More importantly, seeing a group comprising of nine or ten patients took less time than seeing the same number of patients individually.¹² Such an approach could well be a cost-effective method of dealing with overcrowded CDCs, as occur in Trinidad and Tobago and other developing countries.

It is notable that this clinic was run by a PCP and RN both of whom had no postgraduate qualifications in diabetes. De Berardis *et al* found that being followed by the same physician in a diabetic outpatient clinic, especially if the physician had a speciality in diabetes, led to improved process outcomes such as more frequent testing of lipids and HbA1c levels.¹³ Aubert *et al* show that having a nurse case manager following written algorithms working together with a primary care physician and endocrinologist led to improved glycaemic control in patients suffering with diabetes.¹⁴ This present study shows that having the same physician and nurse working together over a prolonged period of time with a cohort of patients led to a similar improved process and improved glycaemic control, though neither had any postgraduate qualification in diabetes. Based on the results obtained, there is some significance of having the same health providers following up these PLWD on a long-term basis.

A small study showed that having community pharmacists discuss medications, clinical goals and self-care activities with patients suffering from diabetes did lead to an increased compliance with diabetes-related lifestyle activities such as diet and exercise, though clinical outcomes did not improve.¹⁵ This role of the community pharmacist could be a further adjunct to the team approach to management of PLWD in developing countries

There was an average decrease in HbA1c of almost 1.5% over the three years. While impressive, it should be remembered that the initial glycaemic control of this cohort was poor. Studies which show the greatest improvements in HbA1c levels are those having the highest HbA1c levels at the start of their projects.^{11,16} A systematic review showed that there is some benefit of individual patient education as opposed to usual

care on glycaemic control in patients whose baseline HbA1c levels were greater than 8% when followed for 12–18 months.¹⁷ In the present study, most patients had HbA1c levels of more than 8% at the start, and this may have contributed to the success in terms of a significant reduction in the HbA1c levels at three years into the project compared with the start.

An important consideration for healthcare managers is that this quality improvement project was implemented without any additional burden on the health budget. No additional staff were recruited for this project. The same dietitian that was used for the CDC was used for the DiaC. Staff simply adjusted their daily schedules to facilitate this added clinic. Medications were initially obtained from the clinic pharmacy and, with the implementation of the CDAP program, patients also benefited from this additional source of medications.

The limitations of this study should be noted. The major limitation of this study is that it was an uncontrolled observational cohort study where patients volunteered to participate. This could have led to the potential for selection bias with more motivated patients volunteering to join the DiaC. The results therefore cannot be extrapolated to all diabetic patients but only to the compliant ones. Three years of follow-up could show trends in improving glycaemic control, but is insufficient to predict the long-term benefits of the clinic. A five to ten-year follow-up is more suitable to determine the effectiveness of any study involving chronic diseases. The missing 12 month data would have been important to give a better impression of how long it took to get significant improvements in glycaemic control. This study suggests that this occurred at between three and 24 months.

This project changed the authors' practice in primary care diabetes as now smaller clinics are booked with more frequent follow-up visits for those who exhibit poor glycaemic control. Consultation times have increased to about eight minutes per patient.

In conclusion, a special diabetic clinic established in a public primary care clinic run by a PCP and RN, where patient education about diabetes is ongoing and patient centeredness is apparent, leads to improved glycaemic control in patients over the intermediate term, but not the short term. This is a model that is simple to adopt and requires a simple service redesign of existing clinic sessions. It may be of benefit in many primary care settings, especially in developing countries.

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ETHICAL APPROVAL

The study was a service improvement project and therefore did not require ethical approval.

PEER REVIEW

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CONFLICTS OF INTEREST

None.

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