The benefits of a PHARMACIST–LED TYPE 2 DIABETES CLINIC

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The successful piloting of a pharmacist-led type 2 diabetes clinic in a Darlington hospital has led to many benefits for patients, as discussed in this article

Diabetes mellitus is a chronic metabolic disorder in which glycaemic control is important to prevent complications. Non-insulin dependent diabetes is partially of genetic aetiology but is also strongly influenced by environmental and lifestyle factors. Diabetes affects around 1.4 million people in the United Kingdom and trends suggest that this number could double over the next 10 years.[1] The estimated annual cost of diabetes to the NHS is currently around £2bn.[2]

Diabetes is a major cause of blindness, coronary heart disease, lower limb amputation and kidney failure. On average, a patient with diabetes spends approximately six days a year in hospital compared with an average of one day for a non-diabetic patient. Currently, up to 10 per cent of all health care costs is spent on diabetes care, and this will increase with the rise in the number of people developing diabetes.[3,4]

The work of the St Vincent Task Force[5] as well as the diabetes control and complication trial (DCCT)[6] had identified the potential for preventing many of the complications of the disease.[7–9] The aim of managing patients with diabetes includes control of symptoms, screening for complications, and prevention of long-term complications. The prevention of complications relies on achieving tight blood glucose control,[10–12] along with management of other risk factors, including hypertension and hyperlipidaemia.[13,14]

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There is now compelling evidence that good blood glucose control leads to lower incidence (as well as preventing progression) of microvascular complications (retinopathy, nephropathy and neuropathy) in non-insulin dependent diabetes.[15–17] Better glycaemic control is also associated with a low risk of macrovascular disease (heart disease, stroke and peripheral vascular disease).[3,18,19]

Macrovascular complications are the leading cause of morbidity and premature mortality in patients with diabetes. For example, 70 per cent of patients with non-insulin dependent diabetes will die prematurely from vascular complications.[20] Effective management of hypertension[17,21] and hyperlipidaemia[22] reduces macrovascular complications, and has the potential to decrease the costs of managing diabetes.[23] Education of diabetic patients is the cornerstone of therapy.

The clinic

The pilot pharmacist-led clinic started in June, 2000, at Darlington Memorial Hospital, part of South Durham Health care NHS Trust. The clinic ran once weekly and each patient consultation lasted for 30 minutes. The patients had uncontrolled diabetes that had not responded to interventions by specialist diabetes nurses or consultant staff. All patients had been admitted to hospital as a result of diabetes and its complications at least once during the preceding 12 months.

The criteria for referring patients to the pharmacist-led diabetes clinic (inclusion criteria) were:

- HbA_{1c} higher than 8 over the preceding 12 months (HbA_{1c} is a glycated haemoglobin test that measures a patient's average blood glucose level over the preceding two to three months. It shows the amount of glucose that is bound to red blood cells, which is proportional to the amount of glucose in the blood)
- One or more of the following complications: hypertension higher than 160/100mmHg, unstable angina (class 4), myocardial infarction in the past year, two or more episodes of hyperglycaemia or hypoglycaemia, alcoholism, retinopathy, proteinuria, or late-stage microvascular complications due to diabetes

Exclusion criteria were:

- Age over 70 years old
- Inability to attend the clinic every three weeks
- Serious illness
- Poor record of attendance at clinic

The pharmacist-led diabetes clinic developed a database for all the referred patients. For each patient, the database included the patient's medication history, duration of type 2 diabetes and any complications. All patients signed an informed consent form and the consultant at the clinic completed the eligibility assessment. Baseline information was obtained and an HbA_{1c} test was ordered. All patients were given blood glucose monitoring meters (Glucotrend) for use at home.

The patients measured both their fasting blood glucose level (FBGL) and the blood glucose level two hours after their main meal.

The pharmacist's responsibilities in the clinic were:

- Educating all patients individually on how to use the Glucotrend to mea-

Table 1: Number and types of pharmacist interventions

Criteria	Number of patients with interventions	Adding or changing to a new drug	Dose increment	Dose reduction
Diabetes type 2	41	19	17	5
Hypertension	39*	31	8	0
Hyperlipidaemia	15	11	2	2 (with diet control)
Microalbuminuria	2	1	1	0
Neuropathy	7	5	2	0

*All patients were instructed to have a restricted salt diet

Table 2: Impact of pharmacist-led diabetes clinic on patients fasting blood glucose level

Baseline FBGL	Number of patients	Latest FBGL	Number of patients
>20mmol/L	4	>20mmol/L	0
15 19mmol/L	9	15 19mmol/L	2
11 14mmol/L	26	11 14mmol/L	7
8 10mmol/L	11	8 10mmol/L	8
6 8mmol/L	0	6 8mmol/L	14
4 6mmol/L	0	4 6mmol/L	19

sure their blood glucose level
- Evaluation and dosage adjustments of diabetes-specific drug therapy
- Comprehensive and individualised patient education regarding diabetes and its complications
- Training on recognition and treatment of hypoglycaemia and hyperglycaemia
- Counselling patients on the use of their medicines
- Specific instruction on dietary regulation and exercise plan

Patients were instructed to record the date and time of any hypoglycaemic events as well as symptoms they experienced during these events. During each clinic visit, the occurrence of hypoglycaemic episodes between clinic visits were evaluated by means of the self-tested blood glucose measurements. Oral hypoglycaemic medication regimens were adjusted to achieve an FBGL of 4–6mmol/L and a two-hour postprandial blood glucose level lower than 10mmol/L.

At each clinic visit, patients were questioned on medicine use, and self-monitoring blood glucose records were investigated. These measures were used to determine and ensure patients' compliance to medication regimens, as well as patients' understanding of and self-engagement in diabetes control. At each visit, the pharmacist reviewed patients' blood glucose results and blood pressure measurements for subsequent hypoglycaemic dosage and adjuvant drugs adjustment, the validity of the meter, patient's technique, body weight, waist/hip ratio, meal planning and exercise regime. The consultant endocrinologist also reviewed, at three-monthly intervals, the following parameters: HbA_{1c} value, serum creatinine, creatinine clearance, microalbumin to creatinine ratio, total cholesterol, triglycerides, high density lipoprotein, low density lipoprotein and fasting blood glucose levels.

Outcomes of the pilot

The one-year pilot clinic started with 50 patients (31 males and 19 females).

There were 14 patients on the maximum dose for sulphonylureas, 11 patients on the maximum dose for biguanides and seven patients on the maximum doses for both. The pharmacist made 41 changes to the oral hypoglycaemic regimens and 63 changes to the other medication as illustrated in Table 1, p205. Dose adjustment after any intervention in the follow-up visits were made by the pharmacist and not considered as interventions.

The pharmacist discussed all the interventions made with the consultant endocrinologist in charge of the diabetes clinic before implementation. The consultant endocrinologist approved all the interventions and letters were sent to each patient's GP with the changes. All the patients were hypertensive. Obesity, defined as a body mass index of more than 27kg/m^2, was noted in 12 patients. Other co-morbidities included angina, microalbuminuria, stroke, myocardial infarction, heart failure, neuropathy and retinopathy. Comparison between the base line and the latest FBGL is illustrated in Table 2, p205.

Significant reductions in the FBGL, HbA1c, mean systolic pressure, and mean diastolic pressure were observed in the patients. In addition, there were no appreciable changes in body weight, waist/hip ratio or serum cholesterol measurements. However, there was a tendency towards an increase in the final low-density lipoprotein level (3.01 ± 1.45) when compared with baseline. There were two reported hypoglycaemic events, but the consultant did not consider them to be serious. No patients were admitted to hospital during the study.

Summary

The study examined the effectiveness of the pharmacist-led diabetes clinic on the degree of glycaemic control and secondary complications of diabetes. The positive patient outcomes observed include:

- Increased patient awareness of the complications of diabetes
- Improved patient compliance with drug therapy, diet planning, advice on exercise and on alcohol consumption
- Significantly improved glycaemic control as evidenced by FBGL and HbA_{1c} measurements.
- Reduction in diabetes complications
- No hospital admissions
- Reduction of elevated blood pressure to normal blood pressure in all patients
- Absence of symptoms of hyperglycaemia
- Negative urine test for leukocytes, protein, blood, ketone and glucose
- High patient satisfaction, as indicated by unsolicited letters to the pharmacy department, in which patients expressed satisfaction with their improved quality of life

The pharmacist-led diabetes clinic improves health outcomes through better glycaemic control and potentially reduces the risk of developing long-term secondary complications of diabetes. In addition to the resources that will be conserved by avoiding hospital stays related to the complications of diabetes and adverse drug reactions, it is important to consider the costs of non-compliance and ineffective, improper and inadequate therapies. Inappropriate therapies may be associated with inadequate responses, unsuccessful treatments and no improvement or a decline in patient's quality of life.

The pharmacist-led diabetes clinic has had significant impact in terms of better glycaemic control, reduction of the complications of diabetes, reduction of hospital admissions, and improved quality of life in patients.

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